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Section A – Panel of Speakers



Human and AI

Hansa Perera

Zone 24x7 PVT Limited

"Hansa Perera is currently working at Zone 24x7 PVT Limited as an Associate Architect for Data Science, leading the Data Science team there. He has 7+ years of experience in the Analytics industry. He has served for several companies both locally and overseas, sharing his expertise to initiate the data-driven transformation and digitization. He is also involved in Data Science curriculum development as an industry expert for several universities in Sri Lanka and also a part-time lecturer for Data Science and Machine Learning. He has won several awards for his contribution to the data-driven

transformation and digitization."



Blockchain and Cryptocurrency

Chathum Henegama

Founder & CEO @ Xpressjobs

Chathum Henegama is the founder and the Chief Executive Officer at Xpressjobs. Xpressjobs has grown to be one of the most successful startups in the country. After following the Diploma at SLIIT Academy, Chathum transferred to Sheffield Hallam university, United Kingdom in 2010, where he completed his Bachelor of Science degree. He afterwards joined Davton Ltd in the UK as a junior programmer and was quickly promoted to lead developer. He later moved back to Sri Lanka, and was tasked with setting up and managing the technology division for Davton Ltd. Now he is also serving as the Chief Technology Officer at Davton Ltd.



SLIIT to Shades –My Own Journey

Delaxshana Manoharan

Founder of Shades IT Solutions

Delaxshana Manoharan is the founder of Shades IT Solutions. This young entrepreneur has been awarded as "The Young Woman entrepreneur - North 2018" in Entrepreneurs Appreciation Awards Sri Lanka in 2018 for her contribution in promoting IT education towards marginalized women who have limited opportunities and resources. Delaxshana obtained Bachelor of Science Special honors degree in Computer Science and Software Engineering from University of Bedfordshire, United Kingdom. She has participated in many events including SAARC CCI Conference on "REGIONAL ECONOMIC

INTEGRATION & SAARC Women Business Leadership Summit.

Section B – Proceedings

Automated Orchid Plant Nursery via Internet of Things

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Abstract — Rapid population growth, climate change and the dynamic business environment demands farmers to improve the efficiency of their agricultural processes. Technological innovations such as drones, satellites and sensor technology are reshaping the agricultural industry in a remarkable way. The Internet of Things (IoT) is reshaping the agricultural industry through precision agriculture, a concept that uses sensors, data, and network communication to tailor the agricultural system to the specific conditions of the field. The result is a more efficient (optimize) system that promotes sustainable growth while reducing costs. Orchid plantation is a popular Floriculture in Sri Lanka that brings substantial foreign exchange and generate employment directly as well as indirectly. Orchid plantation requires controlled sun light, watering and fertilization. This paper presents a system which uses sensors and IOT technology to automate an Orchid Plant Nursery. The sensors detect the sun light level, rain level and the soil moisture level. The sensors are connected to the Arduino Board and Node MCU which are connected to the Firebase Database (Realtime Database) via a Wi-Fi router and this Realtime Database are connected to Android application. According to the sensor reading, roof of plant nursery would be automatically opened or closed to control the sun light. Similarly, according the sensor reading of soil moisture, Plant Nursery would be automatically watered. The user can also manually control the Servo motors of smart roof and water pipes of Plant Nursery to control the Sun light and water supply. This Automatic Plant Nursery system enhance the user experience while reducing labour costs. The owner of plant nursery could even remotely control sun light and water supply through the Android phone. Android mobile phones being versatile today and the cost of sensors and hardware are bearable, this system helps to improve the efficiency of Orchid plantations remarkably.

Keywords — Internet of Things (IoT), Android, Mobile Applications, Sensors, Arduino Technology, Node MCU, Servo Motors, Relay Modules

I. INTRODUCTION

Orchids are a very unique family of flowers; they are the largest family of flowering plants. The orchid has evolved so successfully that there is only one continent in the world where they do not grow naturally ? Antarctica. The evolutions of the orchids mean that they have learnt to adapt to each individual environment. During this process of adaptation the orchid has drawn on arachnids, insects, birds and butterflies to ensure its successful pollination, their achievements of survival still make them worthy of admiration. The needs of an orchid are much less than many plants, this has been key to its survival. There are two main factors for its survival. Sunlight and Watering process. When considering about sunlight, it is a key factor in growing healthy orchids. Direct sunlight may cause plants to burn, and too little light will prevent plants from flowering as well as water once a day during the rainy days and twice a day when the weather turns warm and dry in Srilanka. This will be varied in other countries. If over watered roots may rot as well as less watered, it will be harmful.

When planting orchids planters should consider about these problems. In this article a framework for the design of Automated Plant Nursery to support for control Sunlight by

introducing Smart Window that automatically closes when Sunlight is too high and also when raining through IOT (Internet of Things)[1]-[4] technology and using Temperature, Humidity and Rain detecting Sensors, as well as support for control watering by knowing about moisture level of the soil using moisture Sensors that indicate in Android App, then water the plants using the Android App. Plant Water Controller System is made using IOT technology. A key benefit of this system is that it enables planter to control plant nursery anywhere in the world remotely.

This paper aims to address this research. Section II describes the literature review of the various aspects and Section III describes the methodology followed to develop this research, while Section IV the findings are described, accompanied by variable amounts of commentary. Then, Section V discusses the Conclusions and Future works of this research, and finally Section VI includes the Acknowledgements and VII includes References

II. BACKGROUND STUDY

Planting orchids can consider so many problems. There are some systems have developed already has a different type of solutions. Light is a key factor in growing healthy orchids,

Direct sunlight may cause plants to burn, and too little light will prevent plants from flowering it need temperatures between 18C and 30C. Orchid foliage changes color in response to lighting conditions, and too much light may cause a yellowing of tissues or a purple cast, depending on the species. Not enough light usually causes dark foliage to develop. And also consider about watering these plants, if watered too often (overwatered), the roots will rot. When they rot, they are unable to absorb water, and the leaves show symptoms of drought. When planting orchids planter have to consider about these problems. Other thing is that planter should give full attention to protect and check plant nursery every day. The development team can find similar system that already developed they come up with these areas as solutions to above problems. The review is covering these technologies.

A. Automated Systems that Uses IOT (Internet of Things)

- Smart wireless home security system
- Will be filled with intelligence and two-way communication capabilities to monitor and control the power grid anywhere.[4]

B. Automated Sunlight Control Systems. [5]

- Reduce uses of artificial lighting energy.
- Can know about errors because system provides the error messages on the LCD display

C. Automated Watering Systems.[6]

- Eliminates the manual operation of opening or closing valves
- The system has the potential to be useful in water limited geographically isolated area

Literature revive was conducted on above mentioned areas. This research is mainly based on Plan Nursery Automation using difference technologies mainly IOT (Internet of Things). There is sensor based Automated Irrigation System with IOT [7] that use various sensors to detect moisture levels, water management decisions etc. As well as some pros like;

- The system supports water management decision, used for monitoring the whole system with GSM (RS-232) module
- The system continuously monitors the water level (Water level Sensor) in the tank and provide accurate amount of water required to the plant or tree (crop).
- The system checks the temperature, and humidity of soil to retain the nutrient composition of the soil managed for proper growth of plant.

But when comparing with “Automated Plant Nursery” this project does not have capability to control this irrigation system with Mobile Application. As well as there is a system “MICROCONTROLLER BASED AUTOMATIC PLANT IRRIGATION SYSTEM [8]” in this system they used GSM text message technology instead of mobile application, so it will limit users’ vision and capabilities to control watering system. Research gap is mentioned in below table including these systems and some other systems.

TABLE I. Research Gap

	Arduino Based Automatic Plant Watering System	design and implementation of automatic plant watering system	Arduino Based Automatic Plant Watering System	Proposed System
Water Control	Yes	Yes	Yes	Yes
Sunlight Control using Window	No	No	Yes	Yes
Backup Power	No	No	No	No
Control Remotly from Anywhere	No	No	No	Yes
Android App	No	No	No	Yes
Servo Motors	No	No	No	Yes
IOT Concept	No	Yes	No	Yes

Source: [9], [10], [11].

There are other systems that predict natural sunlight [12], some windows that absorbs heat [13] as well as Sola powered adaptive street lighting system evaluated with real traffic and sunlight data [14]. As well as some other systems that found when doing literature review [15]-[22].

III. METHODOLOGY

The Research Team is used Agile Methodology to complete the project. This methodology focus on close collaboration between client and the developer. Being agile helps Research Team respond to unpredictability through incremental, iterative work processes. Research Team requires to cycle through a process of planning, executing, and evaluating as they go along.

Planning – In this phase Research Team plan how to build proposed system. This phase includes;

- Plan Scope, Time, Cost, Quality, Prototype (Structure)
- Feasibility Study

From these phases Research Team can get good idea about the proposed system, how to manage time with workload.

Requirement Gathering and Analysis – In this phase Research Team gather requirement with several techniques.

- Primary Data Gathering

- Interview the Orchid plantation owners, Planters
- Secondary Data Gathering
 - Literature Review
 - Social Media
 - Web sites

Design – In this phase Research Team divide proposed system into several parts and develop that parts according to agile methodology.

- Prototype - Research Team develop prototype of proposed system to get good idea about structure, equipment placements.
- Android App – Proposed System is controlled remotely by an Android app in this stage Research team develop Android app and basic functionalities.
- Back End Functions – Android app use back end (Fire base database) to store important data about plant nursery such as; Soil moisture levels, Temperature in some time periods that helps planter to get good idea about seasons.

Implementation – Implementation of Proposed System brakes into three main components;

1. Water Control Development
2. Sunlight Temperature/ Rain Control Development
3. Android App Development

Research Team Members develop Water Control [23] and Sunlight Control [24] frameworks parallel as first sprint. In the second spring Research Team develop Basic functionalities of Android App. Then combine these three and develop working system and testing starts. After developing water control and Sunlight Temperature control Research team meet the Customer and get feedback from customer, if some changes to be made, Research Team make the changes to the system. This is going to be iterative implementation until working system is developed.

Testing – Proposed System goes around three testing techniques;

1. Unit testing
2. Integrated Testing
3. System Testing

Individual units/ components of a proposed system are tested in Unit Testing technique. Each component will be tested parallel while developing. After main components developed and Unit testing is passed then all of components integrated and do integrated testing. Finally, to evaluate the system's compliance with the specified requirements, System Testing will be done.

IV. RESULTS AND DISCUSSIONS

There are three main functions in this Automated Plant Nursery System.

1. Water Controlling Component

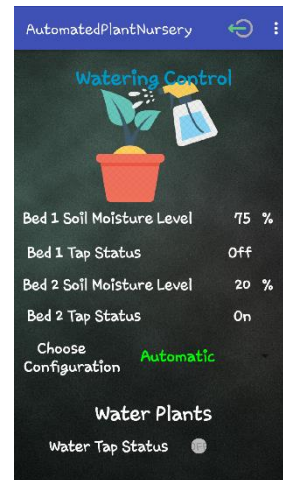


Figure 1: Water Control Interface

Through this component, user can select the control mechanism as Manual or Automatic. If user select manual, he can control watering plants manually (Remotely) from anywhere through the button (switch) in bottom of the interface. Or if user select Automatic as control mechanism, plant watering system switch into automatic state so it will water the plant beds automatically if soil moisture level is low and stop watering when soil moisture level is up to standard level that orchid plat need. When user select control mechanism as Automatic, he can't press the manually water controlling button, if he presses the button it will generate an error that showing "You have selected Automatic Mechanism to water plants".

2. Smart Window Controlling Component

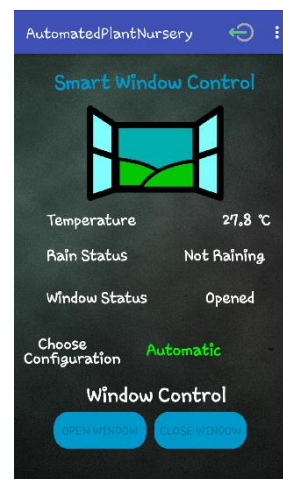


Figure 2: Smart Window Control Interface

Through this component, user can select the control mechanism as Manual or Automatic as above Water Controlling interface. If user select manual, he can control Smart Window manually (Remotely) from anywhere through the buttons (Open and Close) in the bottom of the interface. Or if user select Automatic as control mechanism, Smart Window Controlling System switch into automatic state so it will close the window automatically if temperature is high and when raining, and also open window automatically when temperature is come up to programmed value and when raining stops. If raining occurs in high temperature it will close the window by the logic applied by the research team. When user select control mechanism as Automatic, he can't press the manually Smart Window Open and Close button, if he presses the button it will generate an error that showing "You have selected Automatic Mechanism to control Smart Window".

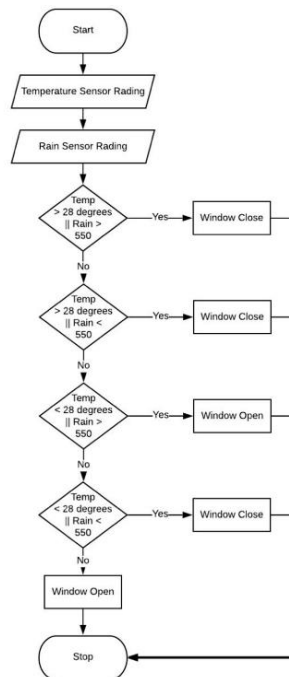


Figure 3: Flow chart for Smart Window Logic

3. Water Tank Controlling Component

Through this, user can select the control mechanism as manual or automatic as above Water Controlling and Smart Window controlling interface. If user select manual, he can control Water Tank manually (Remotely) from anywhere through the buttons (Motor Status) in the bottom of the interface. Or if user select Automatic as control mechanism, Water Tank Controlling System switch into automatic state so water motor will off automatically if water level is up level, and water motor will on automatically when water level is low. When user select control mechanism as Automatic, he can't press the Water Motor on, off button, if he presses the button it will generate an

error that showing "You have selected Automatic Mechanism to control Smart Window"

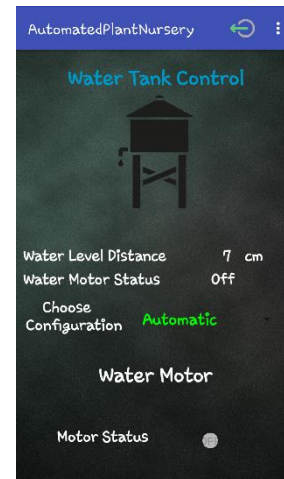


Figure 4: Water Tank Control Interface

V. CONCLUSION

Orchids need extra care from the planers because of the different characteristics of the orchid plants other than several plants. In order to reduce labour and develop the efficiency of the orchid plant nurseries this automation technique and mobile application was introduced to the orchid plant nursery owners and planters. The objective of this research is to reduce labour and increase the productivity of the flowers as mentioned above. This application will make an opportunity to go to these objectives.

Automated Plant Nursery hardware components and mobile application was tested prototype level only. The reliability rate is about 65% and Accuracy rate is about 60%. These rates are coming due to the following reasons. Sensors that used to develop this prototype is not in exact good quality, so these sensors give some delay in reading values. And mainly if internet connectivity is not reliable the mobile application will not work perfectly, and readings will not store in the Realtime database or readings will be delay.

Soon, research team hope to develop an IOS compatible application and manual control of the plant nursery through voice recognition technology and identify suitable fertilization method using the IOT technology. This can be conducted by anyone who wished to do this research furthermore.

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I Portal: An Advanced Messaging platform for the University

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Abstract— In the current world, with the increase of access to higher education, the number of students enrolling in universities have rapid growth. Hence communicating with the students has become a process with utmost effort and problematic. The I Portal Advanced Messaging web-app paves the way for a hassle-free and secure communication platform for the students & lecturers to interact instantly. This messaging portal has been designed with fast, state of the art services and optimized backend for an enhanced communication experience that has the specialty of broadcasting or multicasting a message within the university. The integration of the user management system to the I Portal platform overcomes the manual user handling process. Hence the paper elaborates on the systematic development and methodologies of the I Portal Messaging web app.

Keywords— Instant Messaging, Message Broadcasting, Message threads, user management, Web app

I. INTRODUCTION

The web-based electronic messaging system has become the foremost standard approach for text-based communication since its origin and has spiked speedily within the past ten years' time, spreading into completely different platforms. Commencement of Peer to Peer communication within Science facilities and universities in the late 1980s has paved the path to web-based messaging while innovating Messaging protocols to the world. Subsequently, the origin of ICQ, AIM, GTalk, MSN Messenger and Google chat to Facebook chat, global internet users were facilitated to send messages to peers simultaneously and instantaneously alongside added security [1]. Then the messaging protocol has been developed and customized to suit modern day communication needs, where it further got integrated into almost every globally known field of work acting in instances such as intercompany communication and Education services.

With the advancement of technology, the devices used for daily communication needs too became progressive, easing the activity. Most smartphones are used to fulfil communication needs while being text-based but rich in multimedia content from any corner in the world via web-based applications [2]. Even though the technology is at a paramount stage, there are some sections or fields which are not yet wholly addressed in terms of communication. One of the examples is the education field. If we consider a university, students have to attend lectures in various lecture halls and faculties and for that interaction between the lecturers and students is a must to convey a message regarding changing venue, lecture cancellations and special inquiries. Though there are specific web portals for each university, an optimized UI for both Mobile screens and desktop pcs are hardly identified whereas

students are not able to get access to a desktop pc at all time and misses out special messages from lecturers regarding academic issues [3]. The primary requirement of an interactive platform is highly obligatory in such situations with a simple and easily understandable UI integrated together. Thus the interaction between students and lecturers has been problematic within universities since then.

The I Portal communication is made via the internet between the university staff member, lecturer and the student where the database managing will be carried out in SQL, developed using the programming framework Laravel based on PHP. A push message service will be integrated for the Staff member and Lecturer, in order to send instant messages such as special events and urgent lecture cancellations, to the registered students. Specifically, I Portal will allow lecturers and administration staff to broadcast messages as threads where it makes the end user effortless to check previous messages. The user interfaces will be well optimized for both PC and Mobile screens which will increase the habitude of the messaging platform that of the current day web-based chatting apps. The user management part of the I Portal system permits the administrator to perform CRUD-operations with regard to accounts registered to the system.

Overall I Portal system will act as a web-based, independent, Advanced Messaging platform and a User Management system integrated to overcome the research problem as identified. This paper determines to address the research gap which highlights the most relevant and significant work in this expanse. Section I will preface the history and background of the present research and the importance of it while Section II declares the related work identified in the same field of work and section III depicts the methodologies and implementation. Section IV

reveals the functioning of the complete system and the technical background while section V and VI explain research limitations problems and future work, Conclusion of the I-Portal web application, respectively. The research paper will extend, expressing the research modules systematically under the IEEE standards until the end.

II. LITERATURE REVIEW

During the time, when the problem is identified, a few of the recognizable pieces of work were found, which are directly related to this current research component. The tools, protocols and techniques the researchers have used, a summary of findings and information collected to elaborate on the main problem are acquired with great respect to the authors.

Similar systems which are globally used can be mentioned as

- My Class Campus
- Moodle
- Blackboard

And neither of the platforms mentioned above support advanced message threading system and Message Broadcast function or a user management system integrated to the same system.

Discoveries of Shrideep Pallickara and Geoffrey Fox [4], their research project aims at Service Oriented Architecture in which web services communicate by exchanging messages. This work compares two different contending requirements regarding the area of notifications and contrasts them. Fundamentally, WS-Notification and WS-Eventing are subdivisions of the Web Service Resource Framework (WSRF). The above-mentioned specifications are used primarily in high-security zones and businesses with sensitive data stored and dynamic, complex and asynchronous systems. Major drawbacks are the complexity to implement such systems and to develop as one main component for the system, and there is no way of keeping track of sent notifications through the system

Ildiko Horvath [5] states that with the quick acceleration of technological advancement, the increase in average lifespan, technical expertise, attitudes and even norms, which generally encourage fieldwork are results of entirely different generations in the industrialized countries. Not only does the generation gap within the family but the academic background does have an enormous gap. In this research, he examines how the inequalities through digital life impact the students' capabilities and their needs against the academic environment.

Sheila Xakaza-Kumalo [6] clarifies confirming that web-based forms of communication such as email, newsletters, chat rooms, group discussions, conferences, and internet-based playback applications may support this task. This article outlines his field of study, which examined the use of different forms of communication tools. The experimental pilot study investigated the correlation between frequency and interactivity rate, communication devices that have features promoting

interactivity, and factors affecting the use of communication tools in an internet-based learning environment.

Jingyang Wang [7] and the research team performed the research on instant messaging in an era where a strong demand for HTML5 kept rising. Web-based instant messaging platforms are becoming increasingly important. The approach is not only inexpensive, high network bandwidth utilization rate, without contemplating the deployment of user equipment and operating system variations, but also multimedia (image, text, and audio/video) real-time connectivity. This system adopts the Web-UI but uses Bootstrap to support and streamline the view for mobile devices and PCs to run as a comprehensive Web-IM.

Chengzhou Fu [8] and the research team describe a Cross-Platform Online messaging Mechanism that first emerged in the world in an evolving era of Instant Messages. The communication via IM across platforms requires reliability, security and usability. The messages are pushed via XMPP communication protocol to mobile clients and execute the shared database server to connect well with desktop users and web users. The HTTP protocol allows servers to interact with one another. Instead of the message's text, it transfers the push messaging ID, and then the specified server can request message content by ID from the database. The Java based server program is developed using Struts, Hibernate (SSH) and Spring Frameworks for better reliability. A Model-View-Controller Architecture is used to construct a web server and MYSQL for database operations. The database engine has a role in the process that transfers the information between the mobile server and the webserver.

Tong Nguyen Quynh Tram and his team state essential steps to be followed in creating UIs [9]. It takes time and effort to model and deploy user interfaces in the software development process, while a multitude of applications uses some kind of a user interface which is used repetitively. The user interfaces have many similar points in the form and content in the design of the information management software. Hence, a generalization of the conventional graphical user interface in applications has followed up the concept of "user interface design pattern". As per the team of researchers, it is cheaper and more effective to model a user interface followed by a template since it ensures that the design fits the criteria.

Matthias Jarke and Jürgen Koch pinpoint how Query Optimization helps to boost performance and functionality when applied to the system [10]. Database management systems are becoming a common tool to protect computer users from secondary storage management. They are designed to enhance software programmers' efficiency and promote computer-naïve end-users' access to data. For database systems, there have been two primary areas of study. The first is the exploration of database schemas that can be translated into the real world use and on which interfaces can be designed for various types of users. In a given application context, Query Optimization aims to reduce the turnaround time for a predetermined query language by combining query types. The

waiting time aim is justifiable only if the client time is the most critical cause of having a bottleneck.

David Isaac of MITRE Corporation [11] emphasizes the value of Relational Databases in Hierarchical Storage Management. Hierarchical storage management has the capacity to maximize data storage as well as optimize costs of access and performance by handling data transactions on various storage devices automatically. The issue with non-hierarchical systems is that they allow client interaction when identifying the origin of the data (using the DBMS), data retrieval (from the tape archive) and access to data (using the file system). This condition loosens the coupling between the subsystems of the data. The key goal is to make it convenient for end-users to access vast quantities of data. We can simplify and expedite data access within massive information systems by eliminating the syntactic and operational barriers between DBMS, file system, and tape archive.

Fu Yue [12] represents the strength behind a good User Profile Management system in large online communities. MIS (Management Information System) could provide information to back up companies or support the institution's management and decision-making processes. The growth of the economic level has progressively turned up the heat on university graduates for employment, while the continued improvement of the domestic economy has also complicated the working environment. On the whole, higher education institutions should have a student information management system for managing all sorts of information to raise the quality of management. So that a computerized User profile Management system for a university will ease the pressure on the administration staff and increase accuracy, updating speed and data retrieval process by a higher margin.

III. METHODOLOGY

Starting from the data gathering part, which was carried out in two different approaches, led the way for a state of the art Messaging platform meeting all the requisites. Interviewing a couple of responsible officials from the university to acquire information regarding the current workflow and the process of the implemented system was one approach. The academic officials expressed the need for a Message Broadcasting system aiming students. Next, a survey has been carried out targeting the university students using Google Forms [13]. It inquired students about how important and successful it would be to implement an advanced Messaging platform. A majority agreed to have a Messaging platform and stated that they lack such a system in day to day academic activities.

The most feasible development methodology for the system has been identified as the Iterative Waterfall SDLC since the scope and client requirements were fixed from the beginning. The process took a considerable amount of time to attend and research on the most critical functions of the I-Portal

Messaging platform and overcome the prevailing system's shortcomings. A suitable design results in an operation that is scalable, safe and effective. More effort in the design phase facilitates and reduces difficulties in implementation. The researcher worked with serious concern on various design strategies to ensure that the prerequisites of the intended audience that are already examined from the phase of analysis were encountered as precisely as possible. Feedback and error detection phases are executed concurrently and iteratively during implementation.

The initial prototype of the I-Portal Messaging platform included a complete functioning system with minor bugs that were addressed later and tested before implementing it. Minor features such as buttons and UI changes were made after the prototype release where security and validation sections included intense testing. Code quality has been adjusted to be on par with standard quality measures.

The final release of the I-Portal Messaging platform included all the documented work regarding the functionality of the system. It achieved all the functional and non-functional requirements as stated in the System Requirement Specification. The research group invested more time on testing the web app immensely using compatible test cases so that the system will be fit for an official release and be able to work on any given environment, across browsers.

In the implementation period, the research team designated to use direct implementation methodology for the process after doing a feasibility study on the university environment. A fresh implementation in any institute takes time to get adopted by the community.

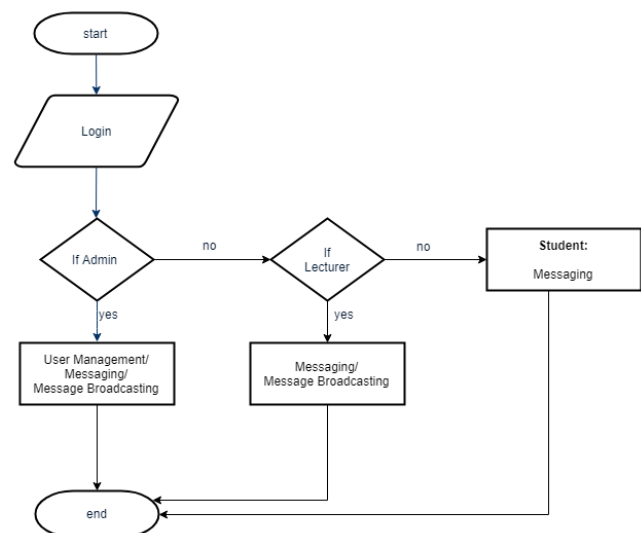


Figure 1. Flow chart depicting the underlying process.

IV. I-PORTAL MESSAGING PLATFORM

Online messaging has a vast application in the current world and using it for the education domain is one such instance that is beneficial in many aspects. Considering the past related work and having absorbed the objectives and limitations, this system is mainly developed to make student and lecturer interaction easier and productive. I-Portal is a web app optimized for every device despite the fact being old or new, navigating within the web app can be done smoothly. To illustrate its practicality, I Portal can be useful when a lecturer is unable to make it to the lecture due to an urgent reason. He/she can broadcast a message to all the students or to a selected group of students to engage in some other academic work during the lecture hours. This system comes in handy as students are notified via an alert if they are logged into the I Portal system and save time for a useful cause. The lecturer can reschedule the lecture on a particular day specified in advance via this message broadcasting feature in the I Portal web application.

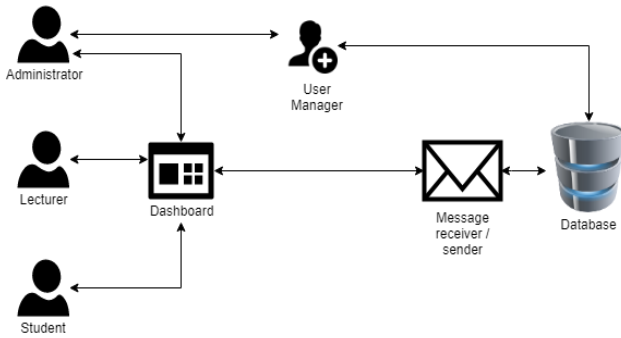


Figure 2. Architecture of the I-Portal Web application

Each category declared in the following sections, lists the most important functions performed by the I Portal web application. The screen captures related to each function are also attached henceforth. The plugins, libraries and programming techniques have been defined from Section [A] to Section [C].

A. User management

This section defines how the user management component of the system works and its importance. A necessary component that has been added to the I-Portal web application is the User Management Panel managed by an Administrator. The Administrator account is authorized to modify user accounts whenever needed. As a web application that is used by a vast number of users in a university, an Administrator account is vital. User accounts can be created, edited/ modified or deactivated at any time easily as students or lecturers cannot register directly. Once the user account of type Student or Lecturer is deactivated, the user is unable to login to the system without any valid reason from the academic affairs.

Laravel Login validation [14] plays a significant role in identifying and aggregating an inactive accounts list. Built-in Middleware [15] authenticates the access for user defined roles from the system. The passwords are hashed using the Hash feature in Laravel, which is then saved in the database as a hash code, unreadable. In addition, the administrator dashboard consists of three primary tabs (functions). Namely, Managing users tab, Messaging (unicasting) tab & and the Message Broadcasting tab which is distinctive to the Current administrators and Lecturer accounts.

When uploading user images to user profiles, a unique PHP library has been integrated to manipulate the images which act as a Laravel Façade. Namely, it is a PHP based open-source image processing and handling library named Intervention Image. [16]. It provides an easier and expressive way to edit and resize images and supports the most common image processing libraries currently. The User Management function, including above mentioned programming elements, work as expected with high reliability and manageability.

Id	Image	Name	Email	Role	Status	Edit
14		Greg Siewe	greg@gmail.com	Lecturer	Deactive	Edit
13		Jagath Perera	jagath@gmail.com	Student	Active	Edit
12		George Jackson	jackson@test.com	Student	Active	Edit
11		Kevin Durant	kevin@gmail.com	Student	Deactive	Edit
10		Stefan Salvatore	test10@test.com	Student	Active	Edit
9		Klaus Muehlson	test9@test.com	Lecturer	Active	Edit

Figure 3. User Management Section of I-Portal

B. Message unicasting

Message Unicasting or Messaging to a single user is a preliminary feature that is very popular amidst modern people and its application to the university affairs is no difference. This section acknowledges the Message unicasting component of the I-Portal Web Application which has been developed to assist high interaction rates between students and lecturers. The core functionality of a messaging system is to send notifications/messages to a user or a set of users. I-Portal also allows one to send messages to another. User groups can be selected on a parameter with the user role.

Laravel Sessions create a bridge between two authorized users to communicate over the web app and end the session whenever the user prefers. Instant delivery of the messages and reception of the messages from a third party user is relayed at an interval of 3 seconds to avoid query overlapping

and crashing the MySQL server which handles a massive amount of queries in a short period of time.

Whenever a user logs in and navigates to the Messaging tab, with the help of a JQuery script which is based on JavaScript, loads and handles all the new messages and users who are eligible to message. Backend manages the data retrieval and distribution using the customized AJAX controller as JSON messages. The unique user identities assist the system in circulating each message to the prompted user. Even though the process is of a complex architecture, the security and the optimized Frequent-querying mechanism obliged to provide fast operation. All the transmitted messages from each end are traceable and retrievable at any needed occasion.

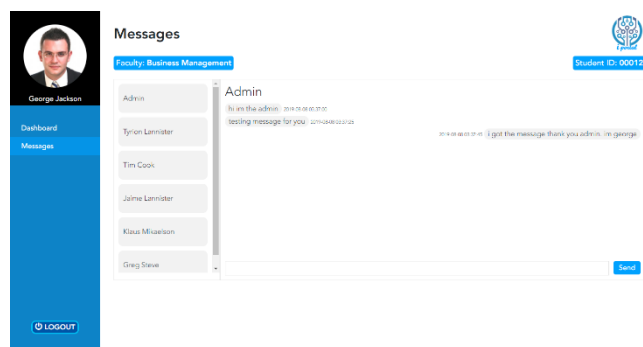


Figure 4. A conversation between the student and administrator

C. Message Broadcasting

The primary research component of the I-Portal system is the direct-broadcasting of messages to users. As stated in section [B], a similar mechanism is used to retrieve the available and eligible user list whenever a user logs in. But the Broadcasting feature is only available to the administrator and the lecturers. Hence student account will not indicate the Broadcast Message tab since the user role is assigned with low privileges. Messages broadcasted via this function is distributed as threads and are stored in the Database conforming to user Ids. The user selection option again advances the general broadcasting of messages since a user can exclusively send messages to users of choice or more importantly, all of the users who are currently available and active in the list. The backend will only detect the user Ids which have the boxes checked and eventually AJAX controller transfers data between the UI and the database as JSON messages each time a lecturer/Administrator broadcast a message.

It is convenient for the lecturers who have messages regarding academic activities, notify students of assignment extending and lecture cancellations etc. On the other side, in return students can point inquiries to lecturers after logging in. The usual three-second delay of message delivery has not

apparently affected the usability of the Message Broadcasting process.

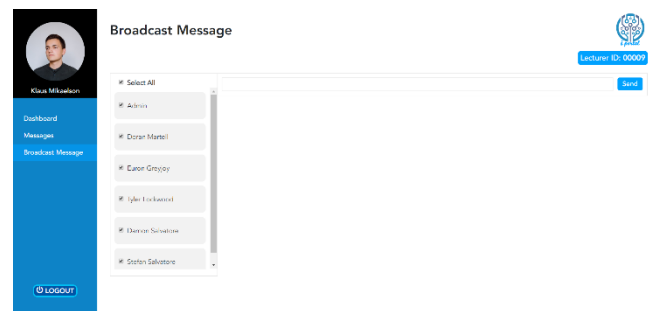


Figure 5. Message Broadcasting – Lecturer

V. DISCUSSION

The I-Portal Messaging web application has provided a solution for the modern university management system by assisting with a tool to increase communication within the university entities using state of the art programming technologies. The overall results and shortcomings are addressed in this section and challenges are defined onward.

A. Findings

It is recognized that, in the recent years, with the emergence of web-based instant messaging platforms/apps, an urgency was created among the universities. Some can criticize the need for a Messaging system as an unwanted component for the universities where sticking to traditional methods to pass information is better. However, the message broadcasting feature eases a lot of work in the communication process and can be characterized as a demanding feature in the modern world. Besides the backend development process, the research team focused essentially on the user interface segment to be optimized for mobile devices as well to cater to the targeted audience who are mostly tech-heads.

After going through many related work and analyzing them, it is evident that there has been no fully integrated messaging web application which combines a user management system along with it. Still, many of the researchers have contributed immensely regarding the domain in different aspects such as Database designing [11], Query optimization techniques [10] and Communication tools [6] can be named.

B. Problems & Limitations

When compared to other instant messaging web platforms, I-Portal uses only text characters to be entered into the message box where attachable files are not allowed. Hence there is less risk of viruses and other malicious threats get spread over the messages.

One can argue that instant messaging has deteriorated face to face communication and direct interaction from a perspective of social interaction theory. The negative consequences of a Messaging platform can be obvious, such as using vulgarity in communication since it is an open platform that is meant to use only for academic activities. Using profanity is unacceptable and on any platform, in consideration of I-Portal opting out curse words has not been implemented as it was not a requirement in the requirement specification. This system has been tested and run on a small-scaled server and received positive results as well. But if the number of users is high and increasing, a more substantial, well-equipped server and a database would be needed along with better knowledge to handle the load balance [19] which will cost a considerable amount.

Lack of knowledge regarding the usage of the system can be another issue that can directly affect the productivity expected. Training for the lecturers as well as the students regarding adopting the new web application is anticipated in order to make the most out of it. Integrating a video chat and a voice chat feature to the current Messaging platform has been in the preference list of the research team. But functioning under rules and regulations which are essential for a university, it was unattainable to integrate such a feature. The limitations as stated above, are features that can make the specified system a fully equipped web application as a total communication solution for the university. The research papers and related work which were analyzed regarding communication ethics [18] provided the research team heaps of information and knowledge to take a step forward in university management.

VI. .CONCLUSION

Instant Messaging is a current research field where mobile phone apps leverage real-world sensing through Internet / Web technologies that provide users with improved communication and advanced knowledge, which helps to make more rational decisions throughout academic career. This section exemplifies the factors analyzed after concluding the research work and also the future extendibility of the I-Portal web application with more features.

More than 15 research papers are studied and reviewed, grouping them into different categories where they represent either the area of application, the complexity of the interaction or the actors involved in the contact. Problems and shortcomings are defined and discoursed in this research as stated out in section V.

I-Portal is committed to provide users with a continuous, reliable and more personalized and enriched services. The usage of libraries such as Intervention [16] for Image processing/manipulation, Bootstrap [17] the front-end framework and the Laravel framework's built-in authentication

and validation has helped the research project to be more versatile and time saving. For further development ideas, the following innovations can be taken into consideration by future researchers.

- i. Creating a state of the art cross-platform mobile application with similar functionality.
- ii. Integrating voice and video features for communication purposes.
- iii. Voice typing feature can be integrated to ease the typing effort.
- iv. An SMS gateway can be implemented to send Messages via text message services across networks.

Summing up, the main goal of the I-Portal web application is to bridge the communication gap between the students and the lecturers which has been a significant step forward in the Instant Messaging era and all the related work which took into account massively paved the way for near perfection system for universities.

A. Abbreviations and Acronyms

MySQL – Structured Query Language, a full-featured open-source relational database management system.

UI/UX – User Interface/ User Experience

PC – Personal Computer

CRUD – Create, Read, Update, Delete

IM – Instant Messaging

SSH- Secure Shell

DBMS – Database Management System

SDLC – Software Development Life Cycle

Library - is a collection of classes and functions that helps to develop a software

JSON - JavaScript Object Notation

AJAX - Asynchronous JavaScript and XML

MIS - Management Information System

SMS – short message service

HTML – Hypertext markup language

XMPP - Extensible Messaging and Presence Protocol

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SkelatalGUI : Experience the Next Level GUI Validation Techniques

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Abstract— The highly increased rate of the developments of the software industry, playing a major role in electronic medium and the increased intelligence-based components comes to play. These software's have brought huge challenge to identify bugs, defects, UI/ UX quality and standards which are unique to their own industry recognized internal standards. Considering the standards SkeletalGUI supports for the international code and UI/UX standards in order to maintain quality of the software product and verify whether software's are built in best quality by reducing the effort and cost for the organizations to test build tools.

Keywords— Graphical user interface (GUI), User interface (UI), User Experience (UX)

I. INTRODUCTION

This project analyses the current available tools in terms of UI standards and software UI requirement validation and proposes a solution to carry out UI testing based on UI engineering standards and Customer needs. These tools are verifying the UI requirements based on inputs given to the system. However these tools are not designed to perform tests to validate UI standards. Given the complexity of image validation, it is a tedious task to innovate a tool that verifies an application /system with less human intervention. However, it's foreseen that the combination of UI testing and defined UI standards will provide efficient test results.

It would be useful to have a dedicated system to validate the UI standards of an interface. The solution proposed by the team mainly focuses on validating if the UI components have been designed in line with the UI rules defined by the industry accepted experts. Also, this tool combines the UI standards defined UI engineering and rules defined by a user/client for verification which has not been popular.

With the use of this software framework, it would be possible to efficiently improve the extensibility and reusability of automated test with less effort. The expectation is that the new software framework will improve software products quality and efficiency. Objectives that team have achieved through this research are: To identify the current features and facilities available for the users to determine the quality of UI, To identify the tools and frameworks which are designed to validate the UI engineering standards in application interfaces, To learn the advantages of using standards in designing the UI template and to test the template, To develop a tool that can be used to validate a give interface with UI engineering standards and norms in validating UI components. This tool can verify a User Interface in three different point of views. Namely, Image, Code and UI elements and their characteristics. Standards can be defined through each angle to establish quality of UI [1]

II. LITERATURE REVIEW

UI designing has evolved during the history and there are UI engineering standards and rules defined by experts to maintain the quality of the UI presentation of a software. Example, Nielsen and Molich's10 User Interface Design Guidelines explained in "Golden Rules of User Interface Design" article by Nick Babich [2].

As of today, most of the quality assurance guidelines are established by individual institutions and published to their employees, and most of these standards would be organizational based and would be different from one organization to another. In order to avoid poor quality in any software, the causes are identified, predicted and controlled using relevant measures. With more critical business processes being implemented in software, quality failures are a primary business risk. Therefore businesses give more priority to examining their software before launch. Quality Testing is the process in which the loop holes, oversights and failures are identified for further improvement/fixing. Automation of testing became popular recently as it can facilitate the testing with minimal human effort, by accepting guidelines for testing and suggestions for fixing. Also, the reporting of the outcome became very efficient. A test automation framework is a comprehensive set of guidelines used to produce beneficial results of the automated testing activity. These guidelines may include: Common practices, Assumptions for the desired outcome, Test tools (software) and interfaces, Test libraries, Coding standards and SQA Standards

First, analyzing some of the testing products available in the market. While studying the automation tools available in the market, selenium was identified as one of the widely used tools. According to the authors and publisher's opinions, Selenium is a set of different software tools each with a different approach

to supporting test automation. Most Selenium QA Engineers focus on the one or two tools that most meet the needs of their project, however learning all the tools will give you many different options for approaching different test automation problems. The entire suite of tools results in a rich set of testing functions specifically geared to the needs of testing of web applications of all types. These operations are highly flexible, allowing many options for locating UI elements and comparing expected test results against actual application behavior [3]. Advantages of using Selenium are no upfront/out-of-pocket costs, ability to run on multiple browsers, can work with multiple languages including C#, Java, JavaScript, PHP, Python and others. There are few disadvantages as well. Selenium is not a complete, comprehensive solution to fully automate the testing of any web applications. It requires third-party frameworks, language bindings and so on to be truly effective. Demands high-level technical skills, such as programming. It has no test management facilities. Test scripts are saved as simple files.

When comparing with UFT – Unified functional testing, HP QTP is an automated functional Testing tool that helps testers to execute automated tests in order to identify any errors, defects or gaps against the expected results of the application under test. It was designed by Mercury Interactive and later on acquired by HP. Full form of QTP is QuickTest Professional and full form of UFT is Unified Functional Testing [4]. It is easy even for a non-programmer to understand QTP and start adding test cases. Supports record and playback. Can edit scripts after recording. Also different recording modes are provided in QTP viz, such as, Normal, Analog & Low level. Excellent Object Identification process / mechanism. However, Cost is high as it is a licensed product. Cannot run multiple threads/instances Slow in execution when compared to even open source tools like Selenium [5].

Katalon Studio is a free automation testing solution built on top of open-source automation frameworks Selenium and Appium with a specialized IDE interface for API, Web and Mobile testing. Setup and installation are very simple. Katalon caters to the need of non-programmers by providing record playback feature and scripting in manual mode for test case creation. Along with that it has a relatively simpler learning curve which helps manual tester to easily create automation tests. For those who have good programming expertise, Katalon provides test case creation in scripting mode as well. Unlike Selenium the script creation is limited to Java and Groovy only. As of now there is no support for distributed testing. It cannot automate desktop applications like UFT and TestComplete do [6].

If we analyses the SQA standards and guidelines available for UI, Nielsen and Molich's 10 User Interface Design Guidelines will attract our attention. Jakob Nielsen, a renowned web usability consultant and partner in the Nielsen Norman Group, and Rolf Molich, another prominent usability expert, established a list of ten user interface design guidelines in the 1990s [2]. Note that there is considerable overlap between

Nielsen and Molich's heuristics and Ben Shneiderman's 'eight golden rules' [7].

III. METHODOLOGY

Given the complexity of image validation, there are no applications/systems verifying the UI standards of any system with the help of an automation tool. Our analysis revealed that a tool to verify the UI standards defined for a system in UI engineering or by a user/client is not in existence. Also, the amalgamation of both concepts has not been popular.

Data Gathering was a crucial part of project development. Data was gathered from software testers who test the GUI daily. Specific companies that carry out software development were selected for this process. Questionnaires and surveys were used to collect the opinion of testers and users who are currently using testing tool or manually carrying out UI testing.

- The testers were questioned in terms of,
- The frameworks that they are currently using.
- What are the advantages and disadvantages of using the tool?
- What are the challenges faced while manually testing these applications?
- The time consumed per test case when a specific scenario is tested manually and automated

Also, Discussions with the supervisor and UI/UX Engineers added more flavor to the content. UI Engineers were a good source to explain the limitations in automation and identify the scope for our project.

With the information gathered during the planning phase, requirements were organized and designed. This included functional and non-functional requirements. During the process of identifying the requirements, there were several challenges and they were overcome by discussing and brainstorming with Tech-Leads and Architects. While analyzing main functionalities, a solution which is giving more accurate, faster and efficient service was identified.

The most feasible development methodology for the SkelatalGUI is system prototyping since the expanding user requirement the scope can be upgraded anytime on requested with the prototyping. The prototyping leads to flexible and secure, efficient system and designing carried out with different perspectives and with the good system design system implementation is easy. The project most concern about to make sure that the target audiences requirements are finalized from the analysis phase have been met as accurate as given scenario. Image validation and coding verifications are also done parallelly to ensure the requested requirements and met.

Currently the industry is not following proper UI/UX validation standards for UI testing. SkeletalGUI includes set of functions that can validated the UI's on user level and the coding level

according to UI design rules and standards. Therefore, it can combine coding level validations and UI validations together and get and quality output of an application

Below is the main requirement identified during the analysis

- Set up the tool with the UI rule configurations
- Feed the system with UI requirements
- Input the designed Interface and its code to the tool
- Run the automated script and validate the UI
- Capture screen shots and verify the inconsistency or the validity of the UI
- Generate report with the results of UI & code validations.

The initial prototype of the SkelatalGUI is a complete functioning system with less bugs and those are addressed later and tested before implementing. As per the UI based development all the functional and validations checks are tested with boundary values and

validated against the given expected results. User input validations carried out and tested thoroughly since the end values should be reliable and accurate.

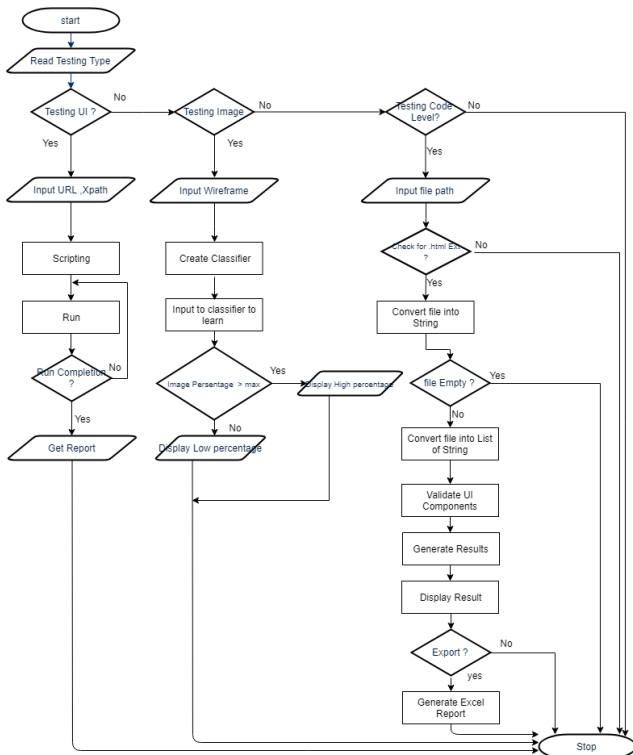


Figure 1. Flow chart of whole system with all processors.

III. . RESULTS

SkelatalGUI provides a comprehensive test results according to the given inputs. Inputs were analyzed and verifies by the algorithms generates reports according to any properties that have given to the system.

SkelatalGUI UI Validation Report

Report generated by: User, Thu Sep 26 16:33:54 IST 2019

This document describes something which is very important !!

Element Name	Details
search_Button	//*[@id="gh-btn"]
bgColor	rgba(0, 0, 0, 0)
TextColor	rgba(255, 255, 255, 1)
Border width bottom	0px
Height	40

Figure 2. Report of the button properties available.

Functions will work and find the available button properties of any given web element which is given or required by the client or the user after the system compare the input and output and generate a detailed report.

SkelatalGUI UI Element Compared Report

Report generated by: User, Thu Sep 26 07:15:18 IST 2019

This document describes something which is very important !!

ACTUAL RESULT AND EXPECTED RESULT NOT MATCHED :
 EXPECTED RESULT : height:40Matches with ACTUAL RESULT : height:40
 EXPECTED RESULT : width:89Matches with ACTUAL RESULT : width:89
 EXPECTED RESULT : textColor:rgba(255,255,255,1)Matches with ACTUAL RESULT : textColor:rgba(255,255,255,1)

Figure 3. Compared report sample

As the GUI validations user should give an actual and the expected screens of the system and will able to verify the missing and not correctly aligned elements according to the expected screen shot of the system.

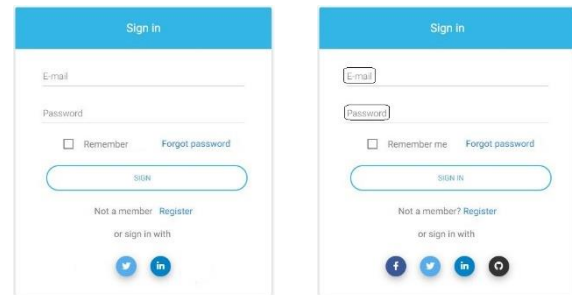


Figure 4. Actual Screen

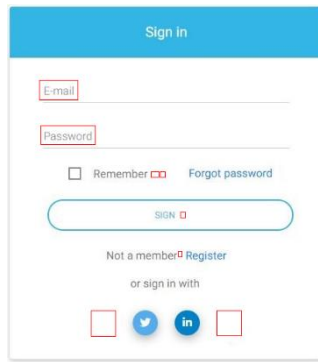


Figure 5. Expected Screen

After given the inputs to the SkelatalGUI GUI verification algorithm, analyzed and generates an new output showing that the areas that a not similar and those elements are highlighted with red color squares and after user will able to detect UI not similar elements with out and effort and will able to save time and show the results to the developers and fix the UI elements according to the expected screen.

In the coding verifications user can fetch any html document which is located in any location, system will read the given html document and analyze the coding level verifications such as not validated by the IDE's and generates an report with best coding standards that can be applied to the document to enhance the coding standard of the system.

Code Level Test Results

Report generated by: User, Thu Sep 26 16:37:15 IST 2019

Findings:

Validation of Style Link Component

Validation of Style Link Component. Line no: 9
Completed

Validation of Form Components

Validating form component. Line no: 17

Warning: action attribute missing.

Observation: target attribute not defined.Default setting will be used.

Warning: method attribute missing.Default method will be used

Warning:form component doesnt have any input types

Completed

Figure 7. Code level report

IV. CONCLUSION

The conclusion is currently the industry is facing and issue with proper UI/UX validation standards. In SKelatalGUI creates set of functions that can validated the UI's on user level and the coding level according to what we have currently testing in the industry is lack of rules and standards. For this the best conclusion can combine the coding level validations and UI

validations together and get and quality output of an application [9].

The testers stay around in 2020 present. Yet, testers should become aware that testing is a task that can be picked up by anyone. Not only by designated testers with quality informing or gatekeeping power. If you really care about your work, company, product and end users, well Quality comes from quality minded people. Having a shared responsibility in the development team towards quality and doing testing well (together) will make a difference in 2020. Haven't been able to define the tester role (or resource) since the sixties; why would we do that now? And, don't particularly like the word "tester", because it is treated as a resource type. Should think about people that have skillsets / qualities instead of being a mere (tester) resource.

Quality is in the eye of the beholder; it is important that testing is done from different point of views. Development is getting more specialized in new technologies and frameworks. So, if we were to pick one skill testers should develop or possess, it would be being able to catch up and learn how to test these new technologies as soon as possible. The accuracy of the system is tested and accurate enough to perform any UI component verify and can build reports according to the UI properties which is specific to user or the application under test. System will reliable on any web applications and .html file and for image validations .png/.jpg formats should be given to take a quality output. We also discussed that the developers will never become good testers and testers will never become good coders. The truth lies somewhere in the middle. Besides delving into requirements and ensuring common understanding between stakeholders and development teams, testers will need to become more technical to understand the risks sooner rather than later. Otherwise, they will have a hard time in 2020. The TestWorks Conf was a perfect example of (200) testers getting their hands dirty with test automation frameworks like Cucumber, FitNesse, Robot Framework, Serenity, Protractor, Mox, Gatling, Axini and Gal en Framework.

Testing can be taught and can result in a cultural change. Developers too can learn to understand the risk in technical implementations. Being critical about your own code and issues that can come out of it is crucial for effective test automation. We also expect developers to reach out to stakeholders and validate that their implementation solves the problem [10].

Future work and practices going to be followed in this research,

- Routing continuous delivery teams towards quality instead of being a quality porter.
- Investigating into requirements and generating common considerate between stakeholders and development teams
- One-to-one care impact of code changes in production
- Communicable up and learning about new technology being used to comprehend technical risk

- Rejecting testing holdups, recover slow response loops in continuous delivery pipelines
- Routing the team in resolving origin causes instead of setting indications

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SmartVoice - Conversational Interface

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Abstract— Talking to smart devices have come a long way from just voice to text conversations to actually being able to talk to an AI device. Compared to traditional chatbots, development of conversational User Interfaces have been remarkable. Conversational UIs consists of natural language processing, artificial intelligence, human-computer interaction and usability. SmartVoice is a technology that serves a different purpose compared to the traditional voice assistants. For an example traditional interfaces require touch assistance and UI navigation but with SmartVoice users can access their electronic devices through voice, using NLP technology common human phrases would be matched with the closest matching command. A simple voice command would go a long way if coupled correctly not to mention the advantage this brings to differently abled people. Once this technology makes its way onto consumer electronics it would completely change how people use their smart devices.

Keywords— Voice recognition, Conversational interfaces, Artificial Intelligence, Natural Language processing (NLP), Voice control, AI Assistant, Raspberry Pi

I. INTRODUCTION

The interfaces prevailing at the present has come a long way since its introduction to the users. Starting with simple non graphical CLI(Command Line Interfaces) where a monochrome screen with text based characters were displayed, advanced into GUI(Graphical User Interface), where icons were used to and it was more graphical and easier to understand. Then came the interfaces that were based on hand gestures, or simply put it touch- based interfaces, where user didn't have to control it via a peripheral devices like a mouse, instead could use hands where they can touch and interact with interface icons and other features. Rapid advancement in technology made the voice based interfaces a reality after touch based interfaces.

Conversational interfaces have a long history, starting in the 1960s with text-based dialog systems for question answering and chatbots that simulated casual conversation. Speech-based dialog systems began to appear in the late 1980s and spoken dialog technology became a key area of research within the speech and language communities. At the same time commercially deployed spoken dialog systems, known in the industry as voice user interfaces (VUI), began to emerge.

The focus of this project is based on Conversational Interfaces. SmartVoice is a conversational interface that will be embedded into day today consumer technological devices which will make things easier to the user by using voice commands instead of a touch or button based interface. A Conversational UI gives the privilege of interacting with the computer on human terms, whether it be simply turning on a light bulb or to control temperature in a microwave oven.

Build of SmartVoice will mainly emphasis on responding to key commands. The information is gathered through a survey on how the public will be using a conversational interface .The gathered information will be considered when developing the command phrases in order to make the interface more reliable. The early stages of the technology will be developed on a Raspberry Pi board. Natural Language Processing [NLP] technology will be used in the developing process, where the vocal data will be collected by the interface to process and understand the exact command the human stated.

A. Overview of the System

The focus of this project is based on Conversational Interfaces. Smart Voice is a conversational interface that will be embedded into day today consumer technological devices which will make things easier to the user by using voice commands instead of a touch or button-based interface. A Conversational UI gives the privilege of interacting with the computer on human terms, whether it be simply turning on a light bulb or to control temperature in a microwave oven.

In order to turn on the system, a trigger word is used, in this case it's Jasper. When the user call out the system by narrating "Hello Jasper" or "Jasper" the system will turn on and start listening through the microphone. Once the trigger word is said, SmartVoice will respond to the user asking how the system can help you. When it starts listening after the respond, the user should convey what command should be fulfilled by the system. Once the command is given by the user to the system, it then processes the said command, respond to the user once more and will proceed to perform the action.

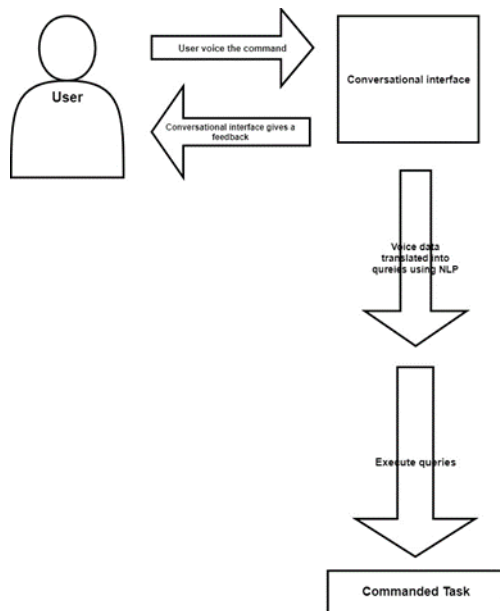


Figure 1 : System Architecture Diagram

The user will give a voice command to the system, the voice will be captured by the system and will be sent to the voice to text unit, and then the keywords will be searched for inside the modules, depending on the keywords the system will then find the relevant module to execute. The task will then be executed and the system will provide another voice feedback after going through the speech to text unit to tell the user that the task has finished successfully

II. LITERATURE REVIEW

A. SIRI

Siri is a shrewd right hand that offers a quicker, simpler approach to complete things on Apple gadgets utilizing voice and AI segments. It can reserve a spot, make a telephone call, set cautions and updates, get headings and discover any data that is mentioned.

B. Google Home

Google Home was discharged in November 2016 for clients in the United States of America. It ceaselessly tunes in (however doesn't record) for the wake-up word, "alright, Google." Once this is heard by the gadget, the client may proceed with their question. Its physical highlights incorporate a lot of hued LEDs which help advise the client regarding the status of the gadget (e.g., if it's stacking data), capacitive touch controls which can begin and stop music and alter speaker volume, and a quiet catch on the back (seen on right in which cripples the amplifiers. The Home incorporates Google Assistant as the insightful individual right hand, which is additionally accessible on Android telephones. The Google Home speakers can be

connected to give synchronized music in each room where it sits

C. Amazon Echo

The Amazon Echo was initially discharged in 2015 to Amazon Prime clients. It reacts to the wake word "Alexa," which enables the client to proceed once the gadget has perceived the enactment word, and alludes to the canny individual collaborator called "Alexa." Its physical highlights incorporate a quiet catch on the top to deactivate the receiver; a catch called the "Activity catch" which can mood killer a clock or caution, or wake the gadget, or empower Wi-Fi arrangement; and a light ring around the top which advises the client about the gadget's status. Underneath the light ring, there is the volume ring, which can be gone to physically change the volume of the gadget. At long last, there is a power LED on the back by the power port to show if the gadget is stopped in

D. Low Cost Self-assistive Voice Controlled Technology for Disabled People

Voice initiated frameworks can likewise be utilized in supporting impaired individuals or patients with sicknesses, for example, Parkinson's ailment. The fundamental two targets of this exploration is to control different home machines by voice, and the other is to empower seriously handicapped individual's development freely utilizing voice enacted fueled wheelchair, that give unwavering quality, security and solace

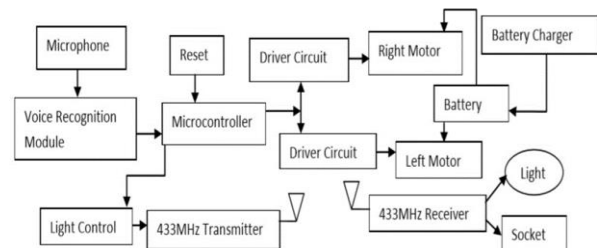


Figure 2 : Basic Components of a Wheelchair

E. Issues in multimodal human-computer communication

Issues in multimodal human-PC correspondence by Harry Bunt is an examination paper on how human correspondence is intrinsically multimodal in nature. The normal way individuals convey is by methods for communicated in language in mix with signals, emulates and nonlinguistic sounds. There are a few informative frameworks and a few physical transporters of the messages of these frameworks. Be that as it may, when associating with PCs all change. Directions of questions, normally by composing directions and by tapping on menu things. However, this the majority of this ought to be done physically by hand. At the point when a client controls a television, clothes washer this can't be considered as imparting,

it's only a straightforward communication between the client and the thing.

F. SpeechActs

Structuring SpeechActs: Issues in Speech User Interfaces by Nicole Yankelovich, Gina-Anne Levow, Matt Marx. SpeechActs is a trial conversational discourse framework. Is an exploration model that incorporates outsider discourse acknowledgment and combination with communication, common language preparing abilities, and different devices for making discourse applications. The framework incorporates discourse just interfaces to various applications including electronic mail, schedule, climate, and stock statements. One issue in the SpeechActs model is Prosody, or sound which is a significant component in discussions. For instance, as option in contrast to the expression "what did you say?" they've attempted to utilize "well?" and "huh?" yet couldn't imitate the sounds convincingly.

III. METHODOLOGY

Prototyping is the selected methodology for this project, considering its system requirements and complexity of the project. The main base of the system is the Raspberry Pi Model B+, which has a micro SD card containing Raspbian OS and Jasper with the necessary modules. The voice is taken in through an externally connected USB Microphone, for the output a speaker has been connected via the 3.5mm jack of the Raspberry Pi unit to tell the user that the task has finished successfully. *Figure 5* is a diagram of the afore mentioned system.

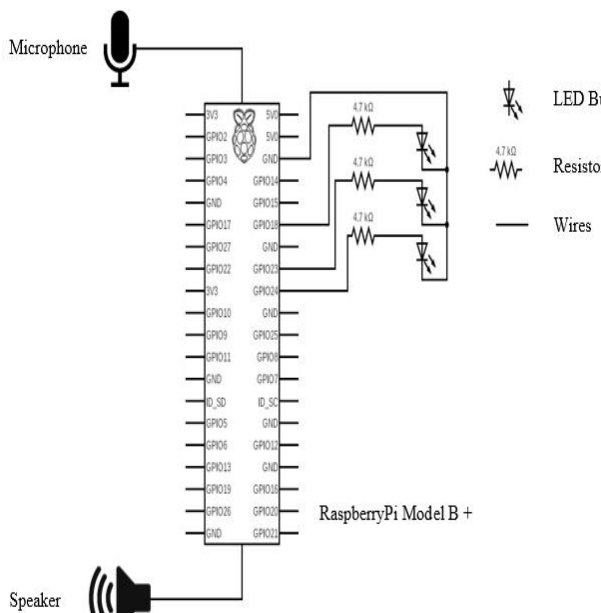


Figure 3

A. IMPLEMENTATION

Jasper was used as the base of the system to develop the voice modules, Jasper is an open source platform for developing voice controlled applications. The Raspberry pi was loaded with Raspbian OS which is based on Python and Jasper was installed. The modules that were written were based on the language Python. Modules were written to be triggered with key words relevant to the task the module would perform. The keyword to activate the system is Jasper, if anything else is said the system would not activate. A demonstration of one of the many modules implemented would explain this scenario.

Light [On/Off] Module:

- Accepted Keywords: "Light", "LightsOn", "On"
- Expected Outcome: Turn Light On/Off
- Unaccepted Keywords: Anything other than the accepted Keywords
- Expected Outcome: System would reply with phrases such as "I'm sorry could you repeat it", "Pardon"

The code segment in responsible for the above scenario would be:

```
import
random
import re
import os

WORDS = ["LIGHT", "LIGHTS",
"ON", "OFF", "BLINKING", "LAMP", "LED"]

def handle(text, mic, profile):

    try:
        cmd = 'sudo python /home/pi/OZ_pi/Lamp.py -i '
        if bool(re.search(r'\b(lights on|son\s.*light)\b', text, re.IGNORECASE)):
            mic.say('light now is on')
            os.system(cmd+"switch on")
        elif bool(re.search(r'\b(lights off?|soff?\s.*light)\b', text, re.IGNORECASE)):
            mic.say('light now is off')
            os.system(cmd+"switch off")
        else:
            mic.say('light now is blinking 5 times')
            os.system(cmd+"blink 5 1")
            mic.say('DONE... ')
```

Figure 4

IV. USER CHARACTERISTICS

Users who use the conversational interface can be in different types of categories. It can vary from a child to an elderly person. Smart voice will particularly help the differently abled. Specially the visually impaired. Since conversational interface is based on conversing with the particular device it can be really helpful for this category of users. Since there's no need of touch screens, any person with the basic knowledge of English can use Smart Voice, without the need to have a thorough understanding of technology.

V. RECOMMENDATIONS

In order to have a better functioning system, it is recommended to have a better microphone. With a quality microphone the voice inputs that will be taken by the smart assistant would be accurate and will result in accurate responses. In order to get responses and commands fulfilled quickly a better processor is recommended. The better the processor, the better the system works.

VI. CONCLUSION

There are several constraints regarding the system. The system is designed to be integrated into household appliances. But it would not always support each and every device. There is a possibility of if not being successfully incorporated to a device.

Another major constraint would be the constant need of power to keep the device running. Once the power flow stops, the system would fail to execute. Complex commands will confuse the system. The commands should be precise. SmartVoice cannot recognize languages other than English at the present. The user should have basic knowledge in English to use SmartVoice.

Internet connection is needed for the system to work. Unavailability of internet would result in the system to stop working.

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Awareness of Ethical use of e-resources among IT undergraduates in Sri Lanka

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Abstract— Electronic resource usage among the IT graduates has been growing at a rapid pace during the past decade. However, ethical use of these e-resources such as research papers, journals, software tools, blogs, video tutorials and many other is a critical factor to consider. This study focuses on investigating whether the e-resources are been used ethically and further to analyze the factors and barriers compelling IT undergraduates in Sri Lanka for misusing such resources. Total number of 190 Information Technology undergraduate students who are following IT major in leading state and non-state universities were used to collect sample data for the study using descriptive survey design. Preliminary analysis of data suggests that 26.3% of the participants had no understanding towards the ethical use of e-resources. 26.8% of the participants simply ignored the intellectual property rights of the e-resources that they utilized even though they were aware of the ethical background of using them. Further analysis of the sample data revealed the underlaying factors which caused these results. 19% of the participants had indicated that despite of the instructions given by the university to follow ethics, they were not strict on checking the whether the e-resources used in the continues assessments were proper. 24% of the students had given feedback highlighting that they had no understanding about the proper ethics when using the e-resources. The study therefore concludes that universities should cater at least one module in the curriculum to educate students on ethical use of e-resources and enforce strict rules to verify

Keywords— e-resources, ethical use, IT, tutorials

I. INTRODUCTION

Electronic or digital resource usage for academic purposes has seen a massive incline over the past decade due to many contributing factors. E-books, E-Journals, E-magazines, Image Collections, Multimedia Projects, E-patents are few examples that can be categorized as e-resources [1]. Yamzon et al in their survey had mentioned that the students prefer e-resources mainly due to perceived ease of use [2]. With the popularity of digital world, often newer books are only available in e-book format. These may be “born-digital” books with no print counterpart or they may be books long out of print. With e-books, students have more refined access to information. However, there are other researchers who suggests that preference on the e-books strongly depend on the subject. Especially a subject such as accounting, with the analytical knowledge required, accounting students found e-books impractical when solving problems or completing assignments [3].

Use of Internet to find resources for the assignments, projects and any academic related work is common among the students in undergraduate level. Dogruer & Eyyam in their study confirms that “students felt comfortable while using the Internet such as the search engines on the internet, which is easily and efficiently used and preferred by 80% of the

participants” [4]. Another factor to highlight regarding to the use of digital content is the anonymity of some content.

According to Bruce Weinstein, “Ethics focuses on the decision-making process for determining right and wrong, which sometimes is a matter of weighing the pros and cons or the competing values and interest” [5]. In academic context, ethics refers to plethora of moral obligations that one is bind to on several aspects such as crediting an author on their work, presenting your own original content, not engaging in academic cheating, protecting intellectual rights of a third party and many more. It should be noted that ethics are set of subjective ideals that exists within each individual’s personal understanding. Ethical boundaries are a way of maintaining such morals for a fair use of intellectual resources. List of ethical boundaries which are common for most undergraduates are listed below.

1. Student should recognize the value of the work made by others and should always act honestly in studies, advance the critical approach of the science community, truthfulness, communality, and Impartiality.
2. Students course and seminar work, and other theses are of the students own making, unless the student is engaged in pair or group work when the collaboration, is made visible in the credits or in some other appropriate way.

3. Appropriately mark down the references used and should not claim information obtainable through other sources.
4. Confidentiality
5. Respect for Colleagues
6. Respect for Institution

Even though there are many forms of ethical and moral obligations are listed by different universities, they all refer to the same ideology of better conduct of an individual in an academic context. However, it should be noted that the digital e-resources has created a vast collection of information sources for undergraduates to fulfill their survey needs for assignments and academic activities.

Information Technology undergraduates are special set of users who are heavily invested on the digital e-resources for their academic work. There are several contributing factors for the situation, and information technology stream being directly connected with digital mediums is one of the biggest. Most of the academic assessments in information technology undergraduate degree programs require students to refer online e-resources for completion. Although, the ocean of information sources can be seen as a blessing, there are several underlying issues that can affect the ethical boundaries and morals expected from an undergraduate student. For an example, if an assessment is given for the first-year students in an undergraduate programme to implement a simple calculator program, a student can simply perform a google search and get a written code. In this instant, the search term “calculator code” has generated more than 501,000,000 results containing the answer. Another example can be a case where the assignment is a project proposal for an inventory control system. Students can easily find thousands of ready-made proposals reports on demand to download.

A. Research Objectives

Aim: Investigating whether the e-resources are been used ethically and to analyze the factors and barriers compelling IT undergraduates in Sri Lanka for misusing such resources.

RO 1: Measure the percentage of students who misuse e-resources in Sri Lankan state and non-state universities.

RO 2: Evaluate the conditions that cause the students to misuse e-resources.

RO 3: Build a guideline matrix for the Sri Lankan state and non-state universities to enforce ethical use of e-resources.

II. LITERATURE REVIEW

This section begins by observing the previous literature on the ethical use of general and electronic resources in Sri Lankan and foreign universities.

Lavanya and Santharooban in their study on “Usage of Online Resources by the Undergraduates Attached to the Faculty of Agriculture, Eastern University, Sri Lanka” have identified that 72.7% of the participants use some form of an e resource for completing their academic studies [6]. Furthermore, they have identified several factors that discourage students from using e resources such as low internet connectivity. However, it should be highlighted that this study does not focus on the ethical use of these resources and the participants were not following an Information Technology related degree.

III. METHODOLOGY

A. Participants

The study was conducted by collecting data from 194 undergraduate students who are enrolled to Information Technology programs. The participants for the research were selected to represent undergraduate students who are following IT major in both state and non-state university/Higher Educational Institutes in Sri Lanka. The data collection for the research used an online questionnaire-based descriptive survey design. A detailed well-structured online questionnaire was designed including an adequate mix of both open ended and closed ended questions. Then questionnaire was distributed among a selected sample of 220 undergraduates. Out of which 194 responses were collected with overall response rate over 80%. The collected data through the questionnaire were analyzed using statistical methods to draw conclusion on the research objectives.

B. Measures

A structured questionnaire was given to each participant which was designed to collect the required data which mostly consisted of closed ended questions. First section of the questionnaire focused on gathering preliminary background information such as the age, gender, undergraduate programme and the university which they were enrolled with. Two sections of the survey utilized four-point Likert scale, Section 1, scaled from not used at all to used daily [7]. to collect information regarding various modes of e-resources and the frequency of using them. Given options were,

1. Search Engines
2. Video Tutorials
3. Google Scholar
4. E-books
5. Blogs
6. E-Journals
7. E-Magazines
8. E-Databases
9. Websites
10. Images

Section 2, which was designed to accumulate more specific details on participants experience towards commonly used modes of e-resources. five-point Likert scale was used on the identical e-resources list mentioned in section 1, scaling from dissatisfied to fully satisfied. Special section was introduced to the questionnaire in section 3 to solidify the answers provided by the participants by offering them to mark or type an actual popular e-resource that they utilized for academic context. Following list of popular e-resource examples were given in the survey and additional space has been provided to add any miscellaneous entries.

1. Wikipedia
2. Stack overflow
3. Github
4. Quora
5. YouTube
6. Code Project
7. XDA Forum

Latter sections of the survey were designed to inquire the awareness of the ethical use of e-resources and to question the guidelines and regulations placed by various universities and institutions to ensure ethical use. As an extension, a question has been placed to investigate whether the participants take time to verify the accuracy of used e-resources.

IV. ANALYSIS OF DATA

Out of the 194 active participants of the study, 61% had mentioned that they used some form of e-resource whenever they were attempting an assignment where 36% agreed on using an e-resource occasionally and 5% rarely. Only one participant had mentioned that he/she had never used any form of e-resource for any academic work.

Study results clearly indicates that the usage if the e-resources is extremely high among the IT undergraduates in Sri Lanka regardless of the university, institute or the programme there following. The question that was targeted was whether the students who utilize these resources consider the ethical boundaries of usage of such materials. Even though 74% of the participants acknowledge the awareness and the ethical usage of online electronic resources, further investigations to the answers led to a different figure. Majority of the 74% who had mentioned the awareness and correct usage had given inconsistent answers to the Q1, Q12, Q3 listed below making their claims invalid. For an instance, 24% of the undergraduates who acknowledged the awareness had failed to provide a valid standard citation style they used. There is a gap between considering about ethical issues and following a standard mechanism to correctly practice it due to the 13% of the students who had mentioned that they considered the ethical issues but did not possessed any awareness on a method. 26% had clearly stated that they did not contemplate the ethical

aspects at all when using e-resources which increases the actual proportion of undergraduates who does not reflect ethical borders of e-resource usage to 50%. Study also inquired whether the university or institute had provided adequate instructions on ethical usage of e-resources or any programs were conducted to spread the awareness among the students also whether they were evaluated based on the ethical usage. 74% of the total participants had indicated that university or institute that they were involved in did provide means to enforce and encourage the proper use of such resources.

Table 1: Consideration of the ethical usage

Factor	Number of responses	Percentage as of the sample
Considered the Ethical usage	142	73%
Did not consider the Ethical usage	52	26.8%

Table 2: Awareness of the ethical usage

Factor	Number of responses	Percentage as of the sample
Awareness of the Ethical usage	143	74%
Not aware of the Ethical usage	51	26.3%

Table 3: awareness of the ethical usage and consideration

Factor	Consider the Ethical usage	Did not consider the Ethical usage
Awareness of the Ethical usage	62%	12.5
Not aware of the Ethical usage	11.9%	14.9%

Table 4: Knowledge of the referencing

		Know the referencing style	Does not know the referencing style
Awareness	Yes	50%	24%
	No	17%	9%

The questionnaire used collected details about the knowledge given to the students from the academic institution about the ethical use of the e-resources. As given in Table 5, 73.6% of participants have mentioned that the academic institute had provided training on the ethical use of e-resources. Out of those who have been trained on the ethical use 73.6% have considered the ethical use when occupying such resources. Although many students consider the ethical use, there are 26.4% who have not considered the ethical aspects. Further analysis by incorporating more factors reveled other problems that cause students to ignore the ethical use.

Further analysis was carried out to identify whether providing instructions to the students about the demerits on misuse of e-resources had any impact for considering the ethical use. According the Table 7, 50% of the participants had considered where 16% ignored. This clearly indicates that there are some students who ignore the ethical use of e-resources although it was clearly instructed that there will be penalties on such misuse.

Table 7: Penalties and the ethical usage

		Assessment instructed about the penalties	
		Yes	No
Considered the ethical use	Yes	50%	23%
	No	16%	10%

Table 6 shows how the demerits for misuse of e-sources had changed the results. Even though, the institute has provided training and penalties for misuse of electronic resources, it's clear that about 22% of students had ignored the ethical aspect of the e-resource usage.

Table 5: Institutes Involvement

		Academic Institute provided the training on ethical use of e-resources
Considered the ethical use	Yes	73.6%
	No	26.4%

Studying further on this by adding more factors it was identified that although, students who have gone through a training and the modules they have taken in their respective courses have highlighted the importance of ethical use of e-resources, 25% of students have not considered the ethical aspect simply because the penalties for misuse were not defined in the respective assessments.

Table 6: Demerits of the Institute

		Demerits were indicated	
		Considered the ethical use	Did not consider the ethical use
Academic Institute provided the training on ethical use of e-resources	Yes	78%	22%

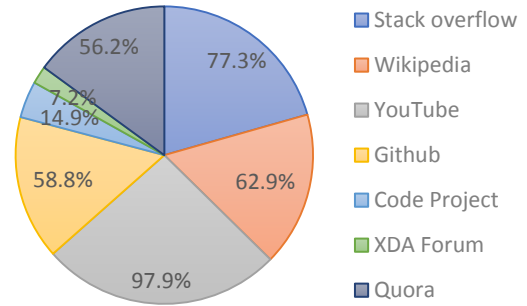


Figure 5: Utilization of E-Resources

YouTube [8] has been ranked as the no.1 source for harvesting data with 97.9% of the participants mentioning it as a mostly commonly used source where Stack Overflow [9] and Wikipedia [10] are closely behind with 77.3% and 62.9% mentions respectively. Use of YouTube, Wikipedia and several other sources mentioned by the participants for academic activities had been long debated by researchers in academia. [11] However, this study does not focus on the credibility of the sources but rather the considerations of the ethical boundaries of using a resource.

V. . CONCLUSION

E-resource usage among IT undergraduates in Sri Lanka can be placed at the top with almost all the participants confirming to have used some form of an electronic resource for their academic work. However, the high usage of these online materials has raised ethical questions regarding the proper usage of such resources. Even though the universities and institutions enforce guidelines and rules to further the ethical boundaries of e-materials, students seem to focus less on the ethical boundaries. Different universities and institutions represented in the study seems to be occupying different strategies to establish ethics towards using such materials in academic context. Awareness towards the e-resources and their usage can be deemed sufficient, raising a more general question of not using the ethical practices. In conclusion, a mechanism to evaluate the proper ethics used for academic work which uses a qualitative and quantitative approach is recommended to be introduced to the curriculum as early as possible.

VI. FUTURE WORK

Further investigations should be carried out through the universities and institutions to measure the extent of assessing the practice of ethical use when using electronic resources by the students. With a proper model integrated into the curriculum to increase the awareness of ethics of using e-resources and to evaluate the usage is to be carried out as future

work which can be used to mitigate the ambiguities between the universities and institutions on enforcing rules and regulations for e-resource usage. Increasing the sample size represent non-IT students can further enhance the study results to better understand the relationship of e-resource usage for different subject streams.

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Cross Ads: A service to extract advertisements based on different sources

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Abstract— “The key factors for the success of the World Wide Web are its larger size and the lack of centralized control over its contents”. But because of these factors, there are some serious disadvantages and constraints for the users, the lack of authenticity of the information found online and the information that the user seeks may be spread in multiple sources are some of them. In this research, we address the second problem of the above mentioned. E-commerce is a rapidly developing area on the internet. The first step for the process of E-commerce is it find the desired product, item or service. For that purpose, we have developed a system (Cross Ads) that can fetch advertisements that are posted on popular classified ad publishes in Sri Lanka. The system Cross Ads uses web scraping technology to collect the advertisements. After collecting advertisements from different sources, the system checks for duplicates, the perfectly matching duplicates will be automatically removed and the partial matches are sent to be reviewed by an employee. The users are provided with a free to download mobile app. This mobile application can be used to view the advertisements and navigate to the advertisement publisher’s classified web site. Here, we are not viewing the advertisement’s details in our application, instead, we just direct the user for the particular web URL. According to this method, the users of the system can search for a certain product or service without navigating to different classified advertisement publishers for comparison. Instead, they can get instant search results of advertisements and compare, sort the results according to their preferences. All in all, by using our system, the users can save lots of time and cost with a little effort.

I. INTRODUCTION

While there were many Web services that help users to find products and services to buy, there were none which actually try to direct the user to the correct source of the advertisement. The typical, rather the conventional way of buying and selling goods is performed by exchanging goods in a market. This method is very inefficient, time-consuming and sometimes costly. With the advancement of technology, the traditional commerce depreciated and new methods emerged. People developed platforms and systems to contact potential buyers to produces. These systems have different types of functionality, the user has to choose the best and the most related system to use among tons of available services/systems. Thus, lots of time is required to compare the available sources and choose one as needed. This can be eliminated by gathering all the information about products available to one place from all available sources. It will be a one-stop-shop to a user to shop in different online shopping systems by logging in to one system. For Cross Ads, we are focusing on advertising websites that are facilitating users to buy things easily. All standard advertisements have to go through a procedure to ensure the validity and authenticity of the posts. First, the data is Scraped, then they are de-duplicated using, image and string Deduplication.

The rest of the research paper, as follows. In section II, a short overview of related work is given. The conceptual design for Cross Ads in and the demonstration of the proposed concept, in

a comprehensive software prototype, is in Section III of this research paper. In section IV, the results that we have gained after implementing the system according to our methodology is exhibited. And in section V, Discussion, we have discussed the limitations of the system with future works.

II. LITERATURE REVIEW

In this section, the main areas inspiring our work with other research paper references that are related to Cross Ads are discussed.

Researchers intent the desktop application to be hosted on their own server. The desktop application has to scrape the sites and store the links and the basic information about the posts in a database that is hosted in Microsoft Azure service. For example, Ikman.lk site provides 400 pages for the user to view. Each page has 25 advertised posts. The desktop application has to save details about all of these posts. If there are 10 such sites, one session of scraping will introduce a huge amount of data to our database. Therefore, as a solution to that, the desktop application consists of a deduplication component. First, it checks for string duplications and removes the data or sent to be reviewed, then it will check for image duplicates and removes the data or sent it to be reviewed. Also, the system monitors for post deletions, link removals and tally them with the server in real-time. To process a large number of

information, we need an efficient way. For that, the system is implemented using the best algorithms and methods. Unless the system would be a huge failure.

For the development of the system Cross Ads, extensive research has been done for existing systems, but there wasn't a single research based on the system functions and requirements. Therefore, the research is conducted by segmenting into 4 different sections namely;

- E-commerce.
- String de-duplication.
- Image de-duplication.
- Web-scraping.

For the string deduplication, we referred to the 'Detection and Elimination of Duplicate Data Using Token-Based Method for a Data Warehouse: A Clustering Based Approach' research paper.

"The process of detecting and removing database defects and duplicates is referred to as data cleaning. The fundamental issue of duplicate detection is that inexact duplicates in a database may refer to the same real-world object due to errors and missing data. Duplicate elimination is hard because it is caused by different types of errors like typographical errors, missing values, abbreviations and different representations of the same logical value. In the existing approaches, duplicate detection and elimination is domain-dependent. These domain-dependent methods for duplicate elimination rely on similarity functions and threshold for duplicate elimination and produce high false positives." [1]

For the e-commerce component, the paper, 'Development of On-line Shopping Mart System for Developing Countries' and 'Investigating Online Shopping System in Iran as a Developing Country' were referred. "In Nigeria and most Developing Countries, buying and selling of goods are done in a market. This situation is faced with diverse problems. These problems include the need for buyers and sellers to come into physical contact, the necessary need for potential buyers to visit the shop and non-flexibility in time usage. In order to overcome these problems, an Online Shopping Mart system ('EasyShop') is developed" [2]. "The lack of necessary reliable infrastructures in developing countries has reduced electronic commerce growth and development. Online shopping system analysis and design was evaluated in Iran as a developing country. National banking & delivery systems along with cultural & training challenges were evaluated too. Based on Iran's governmental services constraints, we presented an appropriate architecture for large scale online shopping systems" [3].

For the scraping component, 'Web Scraping for food price research' paper was referred. "Collecting domain-specific documents using focused crawlers has been considered one of the most important strategies to find relevant information.

While surfing the internet, it is difficult to deal with irrelevant pages and to predict which links lead to quality pages" [4].

For image deduplication, 'A sound algorithm for region-based image retrieval using an index' paper was referred. "Region-based image retrieval systems aim to improve the effectiveness of content-based search by decomposing each image into a set of 'homogeneous' regions. Thus, the similarity between images is assessed by computing the similarity between pairs of regions and then combining the results at the image level" [5].

III. METHODOLOGY

Cross Ads system has 4 main software components. They are;

- MS SQL Database
- RESTful server application
- C# Desktop application
- Android mobile application

All the scraped data is stored in a Microsoft SQL database. Since the MS SQL server database is scalable and easy to work with the .NET framework, we chose it as our preferred database. We used LINQ to SQL [11] to perform read, write, update and delete operations to the database.

Since the server application is built on the ASP .NET Web API platform, it will be platform-independent. Also, the application will be hosted in an online cloud service. The platform of the mobile application is Android. We are targeting SDK version 27 for the development.

The desktop application, which will be written in c# and WPF technology [9], will be used to harvest the advertisements posted in different sources. And also, the same application will be used to detect and remove duplicates too. The WPF application has 4 sub-components. They are;

- Cross Ads Scraper Console Application.
- Cross Ads Link Validator Console Application.
- Cross Ads De-Duplicator Console Application.
- Data Handler WCF Service.

Cross Ads Scraper is a console application that is written in the c# language. It is responsible to scrape the data from different sources in which the structure and procedure are predefined and write the results to the database.

Cross Ads Link Validator is a console application that is written in the same language as the scraper. The Link Validator validates the advertisement's links by resolving only their headers. Using this method, the process is much faster and efficient. Particular advisement can be a one-stop state or expired state. This application is responsible for managing that state.

Cross Ads De-Duplicator shares the same technology as the previous applications. It is responsible for removing the duplicated advertisement records from the database. Only the perfectly matching records will be deleted automatically i.e. two records has the same URL. Partial matches are sent to be reviewed by an employee.

Finally, the Data Handler service. It is a WCF service [10]. And it is used to connect all the sub-components with the main WPF application. And also, this service contains the database connection and acts as a central server for the database access.

All the above-mentioned components and applications work together to build the final working Cross Ads system. Some components are automatically started as well. For, example, the scraper can be configured to run periodically.

According to our implementation methodology, Rapid application development, the system Cross Ads, goes through four main phases [6] namely,

- Figure out the requirements
- Build prototypes.
- Testing.
- Implementation.
- Figure out the requirements

According to our intention and understanding, the main requirement of the Cross Ads system is to harvest the advertisements from different external sources and display all of them in one convenient place, so that the users can save time and money. Since we build prototypes and test them individually, we don't have to finalize and lock the requirements in order to proceed to the next phase of the life cycle. Initially, our main requirement was to harvest the data and store them in the MS SQL database. After that, we added a De-Duplicator then a link validator and finally combined them with a WCF service.

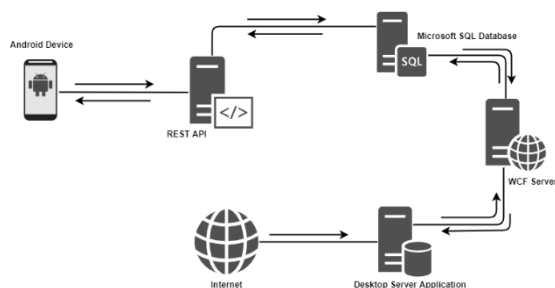


Figure 1 (Architecture Diagram)

- Build Prototypes

Our software development methodology was Rapid Application Development (RAD), so it shouldn't be surprising that the team will start working on building functional models right away. Once we've got the requirements, deadline, and budget figured out (which we have figured out but pending to be reviewed and approved by the supervisor), the engineers and

designers in our team will create and improve upon working prototypes. Until it is ready to unveil the finished product, this phase cycles. Each and every prototype is built, demonstrated to the users or to the supervisor and refined according to the feedback received.

- Testing

After the prototype phase has been finished, the testing phase begins. In this phase, the application is tested thoroughly according to the below-mentioned testing techniques.

- Black Box testing
- White Box testing
- Unit testing
- Implementation

Once we have a working system, we are going to implement the individual components and integrate the implemented sub-components to work as a system. Also, we will actively maintain and update the system as needed.

All in all, we have decided to implement the system, Cross Ads, according to the Rapid Application Development Methodology. Since the quality, time and cost are reduced due to prototyping.

IV. RESULTS AND DISCUSSION

The mobile application, as well as the desktop application, has user and employee authentication respectively. For the employee authentication, the passwords are encrypted using a salt function and also the type of employee can also be defined. The relevant UIs can be seen in Figure 2 – Figure 5

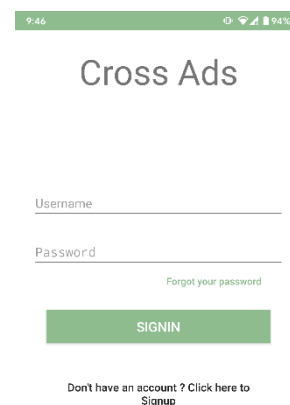


Figure 2 (Login Screen Mobile App)

Create Your Account Here

User

User

User@gmail.com

0771234567

SIGNUP

Already have an account?

Figure 3 (My Profile Screen Mobile App)

Login

Username

Password

Forgot Password?

Login

Figure 4 (Login Screen Desktop Application)

CROSS ADS

Dashboard

Data Gather

All Ads

Duplicates

Settings

Employee ID	Employee Name	MC	Phone	Address	Salary	Notes
10001	Adithi	1000000000	0990000000	Colombo	2000000.00	Change Password

Search Filter

Type Name to search...

Figure 5 (View Employee Desktop Application)

web site's relevant advertisement's URL. Thereby the content ownership is maintained. For the mobile app users, there is an extra feature to save desired advertisements. The saved advertisements are tight to a particular user so that he can only view and edit his/her list. Figures 6, 7 and 8

CROSS ADS

Dashboard

Data Gather

All Ads

Duplicates

Settings

Image	Model	Price	Location	Date	Action
	Volvo V40 2014	1,200,000	Sri Lanka	2019-09-24T22:49:10	Cancel
	Toyota Prius 2010	1,200,000	Sri Lanka	2019-09-24T22:49:10	Cancel
	Mazda Bongo 1996	1,200,000	Sri Lanka	2019-09-24T22:49:10	Cancel
	Suzuki Wagon 2017	1,200,000	Sri Lanka	2019-09-24T22:49:10	Cancel
	Mazda Familia 1991	1,200,000	Sri Lanka	2019-09-24T22:49:10	Cancel
	Honda Fit GFI 2012	280,000	Sri Lanka	2019-09-24T22:49:10	Cancel
	Suzuki Swift 2003	1,200,000	Sri Lanka	2019-09-24T22:49:10	Cancel

Figure 6 (View All Ads Desktop Application)

Cross Ads

Search

Categorize

Choose Category

- Cars
- Vans
- Motor Bikes
- Lorries
- Houses
- Lands
- Phones

Image	Model	Price	Location	Date
	Suzuki Alto 2015	280000.0	Sri Lanka	2019-09-24T22:49:10
	Maruti Suzuki A-Star 2011	205000.0	Kaduwa	2019-09-24T22:49:10
	Suzuki Alto 2015	1765000.0	Matale	2019-09-24T22:49:10

Figure 7 (View All Ads Mobile Application)

After logging in to the system, both the actors can view all the advertisements. The advertisements can be searched by category or using a keyword. The sorting function for both the mobile and desktop applications will be implemented in future builds. When the listed advertisements are clicked, the user/employee will be directed to the advertisement publisher's

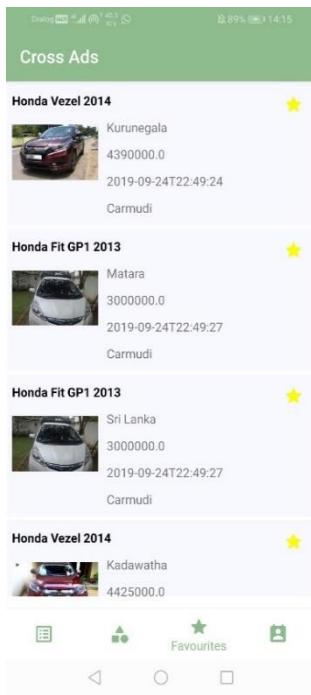


Figure 8 (Favorites Screen Mobile Application)

Employees of the system can scrape the websites and collect data manually or they can automate it with the provided configuration options. When scraping, the details and the progress is shown in the desktop application's 'data gather' UI (see figure 9). Right after collecting the data, the system automatically checks for duplicates. That process's details, as well as the progress, can also be monitored within the application using the 'De-Duplication' UI (see figure 10). The De-Duplication UI is divided into two parts, one is for the string comparison and the other is for the image comparison. First half of the process, the system compares the ads by their title. Then those ads are again compared with their images. In this way, the whole process will be efficient and reliable (see figures 10 and 11).

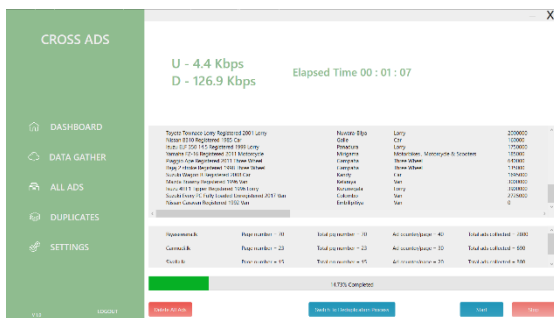


Figure 9 (Data Gather UI Desktop Application)

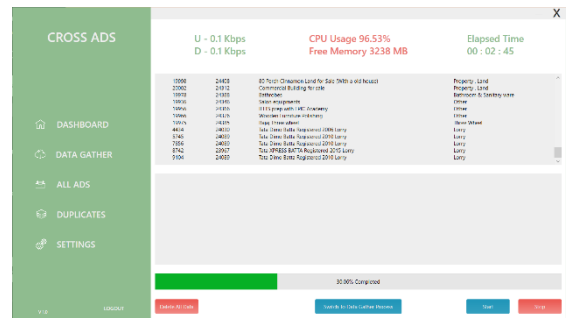


Figure 10 (String De-Dup Desktop Application)

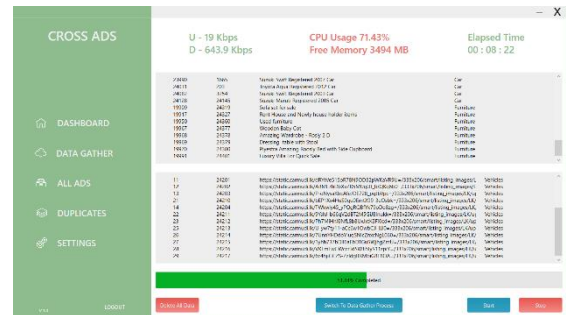


Figure 11 (Image De-Dup Desktop Application)

After the De-Duplication process ends, the employees can review the results. The system consists of a UI providing manipulating controls to view and delete a particular advertisement if necessary. This function is possible to execute to string duplicate results as well as image duplicate results too (see figures 12 and 13).

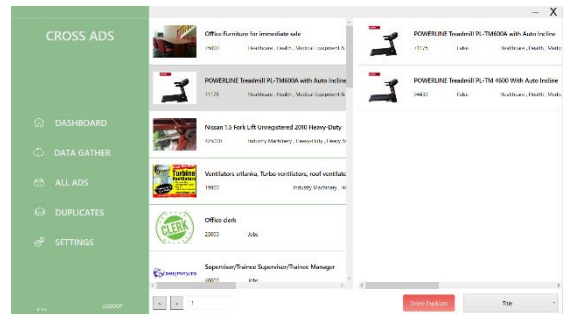


Figure 12 (String/Title Duplicate Results Desktop Application)

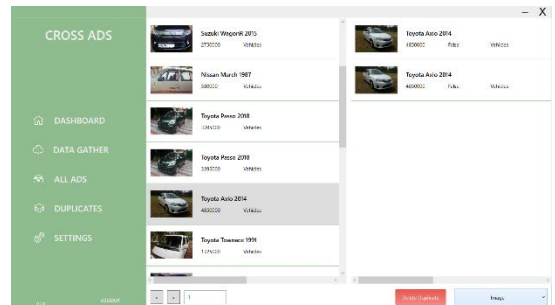


Figure 13 (Image Duplicate Results Desktop Application)

V. DISCUSSION

Since this system is mainly based on online advertising websites, as the system has to gather data from the sites/sources we have selected (E.g. Riyasewana.lk, Carmudi.lk, Ikman.lk, etc.) mainly, the data we take is depending on those sources. And also, the title of the advertisement in the system's database will compare the string with the advertisement's title and get a unique number. And to work the system reliably and efficiently we need the optimal number of posts we required and server-grade good hardware too.

Researchers are supposed to improve the mobile Application with a messaging Service for clients to communicate with dealers more effectively and quickly. And also, a filter ad by source feature will be implemented. The system will be developed to get ads that are published on Facebook also. And to load newly updated ads the system will be implemented to update advertisements.

VI. CONCLUSION

Cross Ads is a system that simply directs users for ads they look for rather wasting time on searching the same ad over and over again which has been duplicated. We have built a System with a desktop application and an Android application that can scrape and de-duplicate advertisements and it is very user-friendly, time-saving and reliable to use.

We are excited about this work and believe it has the chance for users to buy products or services saving their precious time and money since the Cross Ads system supplies the service without ad duplications from multiple sources

VII. ACKNOWLEDGMENT

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EasyList – Shopping Assistant Mobile Application

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Abstract— In Sri Lanka, there are several major supermarket chains that have emerged, especially for food and grocery items, and the provision to entice more customers by establishing shopping websites and mobile applications. The field of mobile shopping is developing rapidly and changing the way to customers for gather information from multiple sources, check for availability and compare prices with sufficiency of understanding to use shopping applications. EasyList is an android based shopping assistant mobile application, which is to ensure that any person will be able to use it solitary with the assistance of unique features excluding to existing shopping applications and technologies to pledge with easiness to the buyers and sellers of groceries. The application comprises with voice recognition technology to create list of items by user's voice in Sinhala, GPS technology to record the closest location of the grocery which is able to fulfil the buyer's list of items, data mining techniques to determine the patterns of purchasing items of the buyer to exhibit the suggestions of most selling items. The key benefit of this android shopping assistant mobile application is to preserve a plain selling relationship between the buyer and the grocer. Furthermore, this paper explains the development and deployment of EasyList which is consist of various functions, benefits and, to dispense the guidelines for future development of shopping applications.

Keywords— shopping assistant mobile application, voice recognition, data mining, suggestions about recent selling items, Global Positioning System (GPS), speech-enabled platforms, m-commerce.

I. INTRODUCTION

In the current world newfangled people have a bustling lifestyle with the workload they have to complete and achieve in day-to-day life. That will affect to fulfil the daily needs of them such as visiting the groceries every day by searching the necessities to purchase and standing in the cashier queues until the feet hurt. Most of the groceries are incapable of providing vehicle parking for the customers, which is the reason to intensify the entrant of customers to the supermarkets. Apart from that, in groceries the manner is to request the item and the quantity to the seller and purchase it which is not a preferable of every customer and if an item is not available in the grocery, customer should keep seeking to other groceries until they fulfil the list of items.

EasyList Shopping Assistant Mobile Application can impart the buyer to order the items by typing the items names or by voice command and see the location of the closest groceries with the availability of items in the list. This mobile application can exhibit the buyer behavior, which is important and quite applicable to the grocery application to display the suggestions regarding of most selling items and it will imperative for the entrepreneurs to collect valuable data about the buyer.

The main objectives of this research are,

- To identify and evaluate existing online shopping assistant applications.

- To develop a shopping assistant mobile application with voice recognition for English and Sinhala to allow users to search items.
- To develop a shopping assistant mobile application which can exhibit the availability of items in groceries with the buyer's required items.
- To develop a shopping assistant mobile application with GPS technology to display the closest groceries to the buyer.
- To develop a shopping assistant application to identify and display most selling items to the buyer.

The rest of research paper is organized as follows. In Section II there will be a description regarding the related work. The methodology, findings and evidence which contains the interfaces, algorithms and flow charts in the application will describe in Section III and IV respectively. In section V conclude the paper with the limitations, recommendations and future work of EasyList.

II. LITERATURE REVIEW

A. Voice Recognition

Voice recognition has been used in several researches in many years. In 2016 S. Akhter et al. [1] has used voice recognition, to develop a device which control appliances via human voice. They have used Google Voice search software as voice capture device. This project was called voice controlled electrical

appliances. User's voice was an input to activate the electrical appliances through this system. K. Tabianan et al. [2] in 2018 has done a research to study the way of life for a procrastinator and its management of time. The significant feature of the application was the procrastinator users did not require to type the commands into the mobile phones but just use voice as input. A. Ravi et al. [3] in 2018 developed a system which was designed to assist and provide support in order to fulfil the needs of elderly and disabled people at home. In this project, a voice controlled wireless smart home system has been presented for elderly and disabled people. M. Navya et al. [4] in 2019 developed a child tracking system for every child who was attended to the school. The system was including a child module and two receiver modules for getting the information about the missed child on periodical basis. The system focused on recording a child's cry and when it matches with crying of the child in school the text message containing the location of a child will be sent to the parent and by using longitude and latitude values the location of a child can be traced by using app in the parent's mobile.

'EasyList' provided voice recognition technology to make a satisfied buyer for the groceries to create lists of items. The user is able to select English or Sinhala language that he/she prefer to display in the interfaces. For this reason, the users get an user-friendly interfaces to communicate with each other to accomplish their needs.

B. Data Mining

In 2014, S. Abdulsalam et al. [5] has published a research paper which was focused on how market basket analysis could help by providing leverage for business intelligence through Association rule mining. A transactional database was created and mined by using Apriori algorithm implemented in Java programming language. S. Forouzandeh et al. [6], in 2014 published another research paper named, 'Content marketing through data mining on Facebook social network'. Researchers analyse the users' behaviour; Nevis application is utilized, and through data mining techniques and individuals' interest level in the contents is measured whereby it was specified which content is more liked by the users. The results of the study prove this claim that content marketing is beneficial, whereby different goods can be introduced to the users, and a recommender system can be designed based on investigating the users' behaviour and likes given to different contents, and their preferences can be compared with their profiles and then based on the similarity between their profiles and liked contents, they can be suggested to purchase related goods. In 2015, J. Gerrikagoitia et al. [7] done a research in an e-commerce site which can help buyers in their purchases. This requires precise knowledge of the buyer's preferences. The researchers did a survey about the E-marketing and identify the better data mining techniques and algorithms for improve the

own marketing and sales processes, the content of web site and e-shop and, identified the e-Marketing Strategies and deciding for certain e-marketing trends and figure out the possible data mining solutions. M. Kaur et al. [8], in 2016 published a research of MBA (Market Basket Analysis) in marketing which was provide the information to the seller to understand the purchase behaviour of the buyer, also it can help the seller in correct decision making. Researchers used ARM-Predictor Algorithm which is trying to capture the changing trends of transactions in Market Basket Analysis.

EasyList used the data mining techniques to exhibit the most selling items suggestions to the user hence that will help to convenient the sellers' marketing of items. By analysing set of data regarding the purchased items in a particular time period to discover a pattern of purchasing items which can provide the results by using Apriori algorithm display the suggestions to the user in EasyList.

C. GPS Tracking

W. Bouten et al. [9] in 2012 developed a device based on GPS tracking system to achieve an optimal tracking system for free ranging birds without the need to recapture them. The advantages of this GPS device, measurement intervals can be set for different times of the day, different geographical areas can be covered. Besides from that, with free ranging birds, it is impossible to systematically test all combinations of factors that influence the solar yield and power use and thus the number of measurements that can be made per day. S. Sultana et al. [10] in 2015 proposed a location based smart time and attendance tracking system based on the concept of web services which is implemented as an Android mobile application that communicates with the remote server in which the database is located. The advantages of this research are, system provides a solution to manual attendance taking problem, system can track the employee location when they are coming to the office and leaving office area. In 2016 R. Cheng et al. [11], did a research to proposed a system based on GPS, Bluetooth Low Energy (BLE) beacons, and Near Field Communication (NFC) technology. This system provides both a user localization service and an automatic guidance function, the app functions in both outdoor and indoor environments and thus provides a seamless and, localization/guidance function as the user moves from one environment to the other. In 2018, A. Abhang et al. [12] developed smart bag tracking system which can inform where the bag is and where it has been, how long it has been. The system sends the location of bag to User's smart phone when the user wishes to check the bag location, which is a main advantage of this product, it also informs the user how long his bag is far away from its user and this smart bag is able to send a text message or exact location to the user.

EasyList use the GPS technology to track the closest locations of the groceries to the buyer. When the buyer creates the lists

of items, system will exhibit the closest groceries near to the buyer with the percentage of available items in the groceries. The similarities and differences between the existing shopping application and EasyList were summarized in Table I.

III. METHODOLOGY

According to Software Development Life Cycle (SDLC) Prototype methodology was used to develop the system. Until the project accomplish all the objectives analysis, designing and implementation phases were performed simultaneously and iteratively.

A. Analysis of data

The team has conducted two techniques to gather all the data which was primary data gathering technique and secondary data gathering technique.

1) Primary data gathering technique

Since this is a shopping assistant mobile application, the population to gather primary data was grocers and buyers. The sampling method was Nonprobability, ‘Judgement sampling’ to get responses from the online shopping users and sellers. Then the online survey for buyers and a questionnaire for sellers conducted to measure every element of the population in order to describe the characteristics of the population.

TABLE I. PRODUCT PERSPECTIVE [13]-[16]

Features	Keels	Snapcart	Grocerypal	Amazon	EasyList
Make list of items in Sinhala voice	×	×	×	×	✓
Display the closest grocery location	×	×	×	×	✓
Display the availability of items in the list	×	×	×	×	✓
Display the suggestions of most selling items	✓	×	✓	✓	✓
Display all the instructions in GUI in Sinhala	×	×	×	×	✓
Delivery options	✓	✓	✓	✓	✓
Online purchasing	✓	✓	✓	✓	×
Calculate total bill	✓	✓	✓	✓	✓
Search items	✓	✓	✓	✓	✓
Email verification	×	×	×	✓	✓
Mobile application	×	✓	×	✓	✓

2) Secondary data gathering technique

The research team studied literature reviews regarding of technologies and existing systems to identify the project scope and the research gap. (Please refer Related Work for furthermore information).

B. System Design

Fig. 1 exhibits the system architecture diagram of ‘EasyList’. The main users of the system are admin, buyer, grocer, deliverer. The admin creates the database to the application and that database is connected with the webserver. Webserver is connected with the internet. Buyer, seller and deliverer are connected with the internet through their mobile phone to connect with the database. The seller can select the items and add the quantities with prices which are available in the grocery, through the mobile device. Then the information about the grocery and the item details are stored in the webserver.

Any user can view the items in the groceries and when the user needs to order items, they can register with the application. SMTP servers are connected with internet to send emails and to send the verification code to the users when they are registering with the application. By selecting the items and the quantities buyers can create item lists, and that list will send to the database through the webserver to display the grocery which is closer to the buyer’s location plus the highest valued item availability for buyer’s list. After that, from webserver seller will be received the order information and the seller can confirm or deny the order. When the buyer notified the confirmation by the grocer, and if the buyer selects the method to receive goods by delivering, the grocery location, the buyer location and the order information will be sent to the deliverer.

C. Development of EasyList

To develop the application the research team used Java programming language in Android studio 3.1.4 with SDK, NetBeans IDE 8.2 with JDK and Firebase.

1) Voice Recognition

Fig. 2 shows the flow chart of voice recognition component in EasyList mobile application. This component can recognize two communication languages which are Sinhala and English. The user can select the preferred language at the beginning to operate the function and give the voice command to search items. Then the voice command converts to English and search the item name in database. Then if the item found it will add to found item list and display the item to the user. Cloud Speech-to-Text API used to develop this component of speech recognition. The Fig. 3 shows the voice recognition interface which can identify and translate the Sinhala voice command to English and display the selected items, which is exhibits in Fig. 4.

2) Nearest Grocery Location Recorder

Fig. 5 is the flow chart to find the nearest groceries to the buyer. First the buyer can select the location from custom

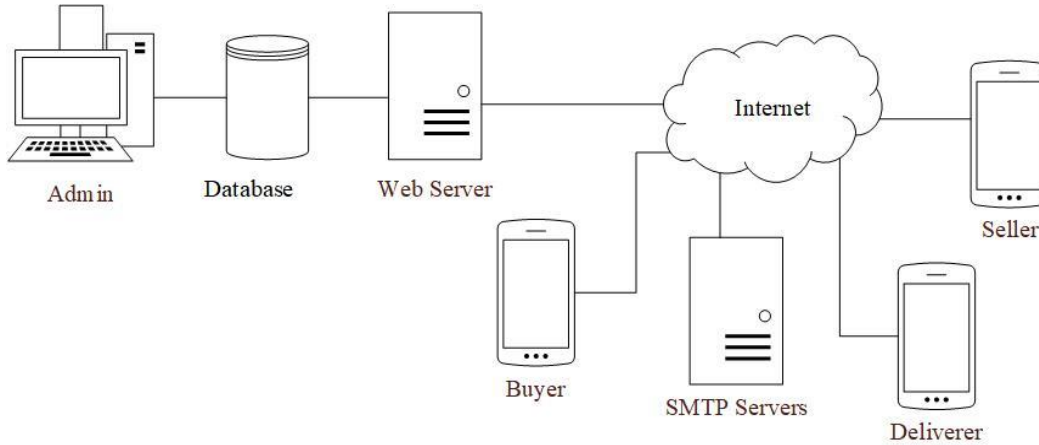


Figure. 1. System architecture diagram

4) Top Selling Items

Fig. 9 is the flow chart for data mining technique which was used in EasyList mobile application. As in Fig.10 the sellers' home interface it exhibits top selling items. It gets the ordered items as in Fig.11 and calculate the 'item support' by Apriori algorithm to get the top selling items. Then according to descending order this function gets the top 4 selling items and search that items in database to display in the application as top selling items.

location and current location. Then the function calculates the distances of registered groceries with the buyer location. From buyer's location to grocery location the distance should be within 2 km otherwise every grocery of the map will be displayed to the buyer and impractical to find the nearest groceries. Then the selected groceries add to the nearest grocery list and display the grocery locations to the buyer. Google Maps API used to record the locations of the groceries to display the closest grocery to the buyer. As in Fig. 6 the buyer can see all the groceries which are located within 2km from the buyer's location and the closest grocery.

3) Availability of Items in Groceries

To check the availability of items in groceries based on buyer's item list exhibits in Fig. 7. After finding the nearest groceries, the inventory of each grocery will be searched from this component. Moreover, the total price, available items and non-available items will calculate for each grocery and display to the buyer. Then buyer can view every detail of purchasing grocery items by using this mobile application. Fig. 8 shows the item availability of each grocery, the total bill value and view the available items and non-available items

IV. RESULTS AND FINDINGS

The table 2 demonstrates the results of EasyList which was calculated by using 10 different android mobile phones. The mobile phones are,

- Samsung A20
- Samsung J7 Pro
- Samsung A7
- Huawei Y3
- Huawei Y5
- OnePlus 7 Pro
- Nokia 5.5
- Nokia 8

- Xiaomi Redmi Note 3
- Xiaomi Pocophone F2

Moreover, number of 10 items used as constant values to calculate the accuracy of search items.

The selected item names are,

- Rice
- Coconut
- Sugar
- Biscuits
- Banana
- Soap
- Coconut Oil
- Milk Powder
- Dhal
- Onions

The total average of accuracy in EasyList is 67.6% which was calculated with 10 attempts from English and Sinhala language. In Table II and Table III exhibits the number of succeeded attempts and fail attempts for seller and buyer functions respectively. Based on the results the average of accuracy was calculated using formula (1).

The accurate value depends on the speed of internet connection which effects to speed of loading data. The user's voice commands will be different with the pronunciation of words is different reason of that the application may ask from user to give the voice command several times in order to capture the correct word the user provides. To process the application user needs to turn on the mobile GPS to get the locations of the groceries and the current location of the buyer and that affects to drain the battery life of the mobile and the application is not process smoothly.

V. . CONCLUSION AND FUTURE WORK

In the current world newfangled people have a bustling lifestyle with the workload they have to complete and achieve in day-to-day life. That will affect to fulfil the daily needs of them such as visiting the groceries every day by searching the necessities to purchase and standing in the cashier queues until the feet hurt. Most of the groceries are incapable of providing vehicle parking for the customers, which is the reason to intensify the entrant of customers to the supermarkets. Apart from that, in groceries the manner is to request the item and the quantity to the seller and purchase it which is not a preferable of every customer and if an item is not available in the grocery, customer should keep seeking to other groceries until they fulfil the list of items. By providing facilities to search items by the native language through voice, select the grocery which can fulfil the customer's requirements will be essential to the customer to avoid the above-mentioned problems.

The future works of EasyList are to develop the application as mobile platform independent, which will operate in other mobile platforms. If this application can include more communication languages then, different country users are able to use the application. Moreover, this application can be included online purchasing and online delivering which will be more efficient to the users of this application

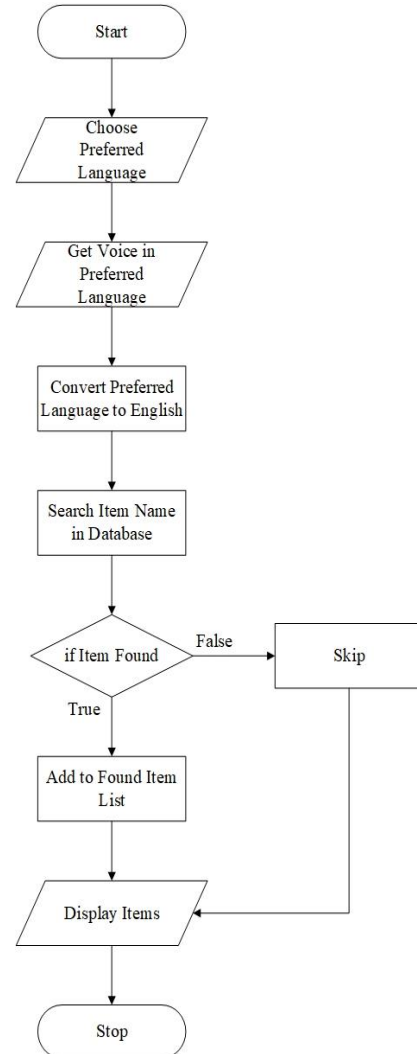


Figure. 2. Voice recognition flow chart

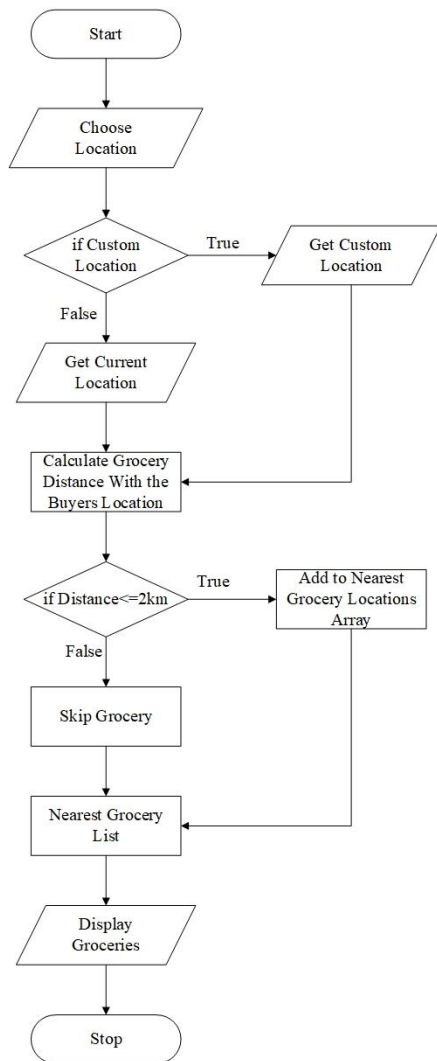


Figure. 5. Nearest grocery tracker flow chart



Figure. 3. The voice search of items interface

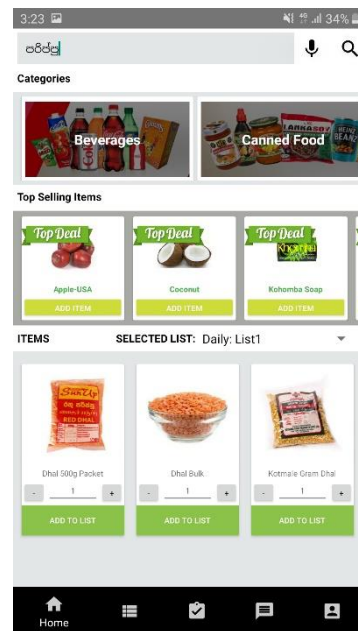


Figure. 4. The result for voice searched item interface

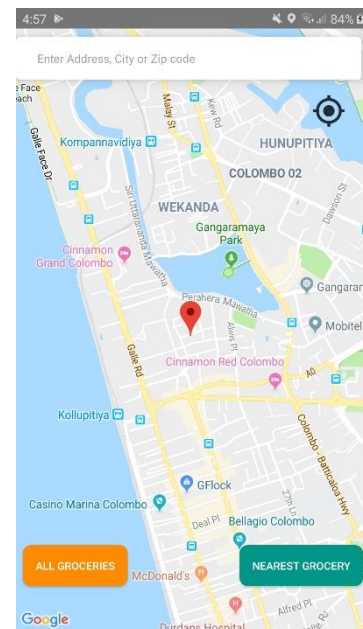


Figure. 6. The map of groceries interface

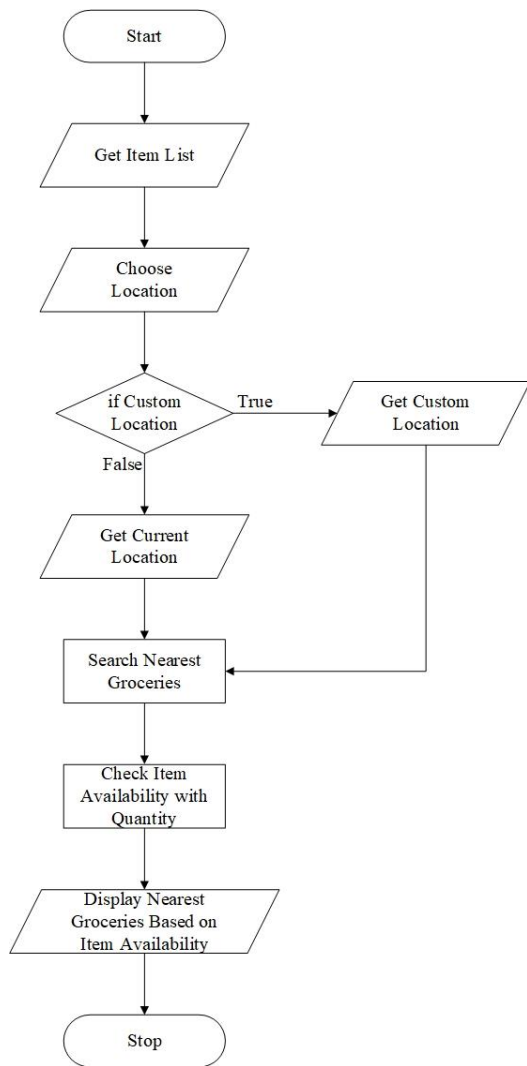


Figure 7. Availability of items flow chart

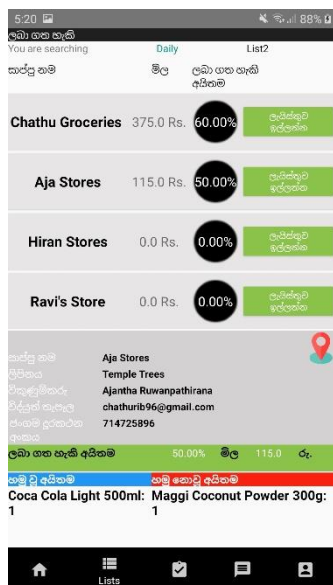


Figure 8. The item availability

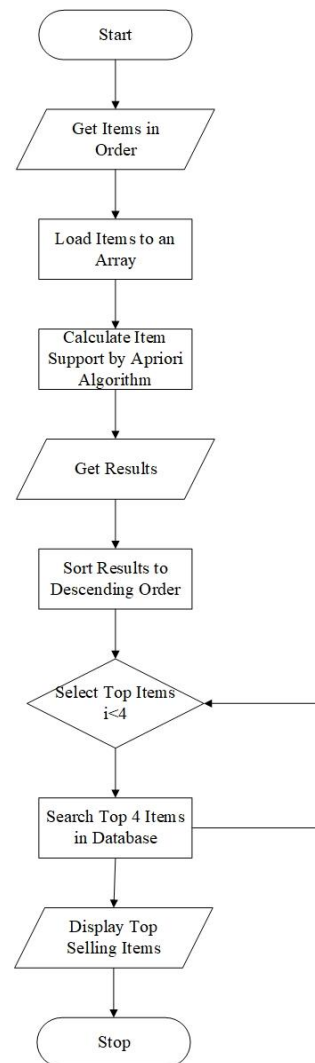


Figure 9. Top selling items flow chart chart

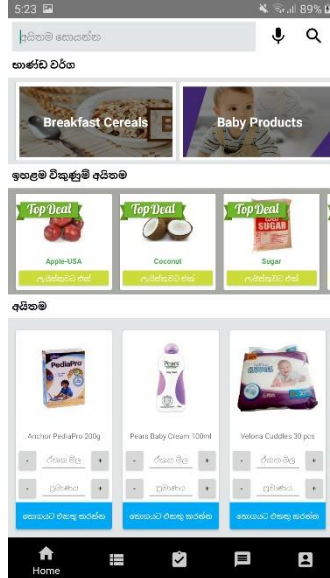


Figure 10. The seller's home interface

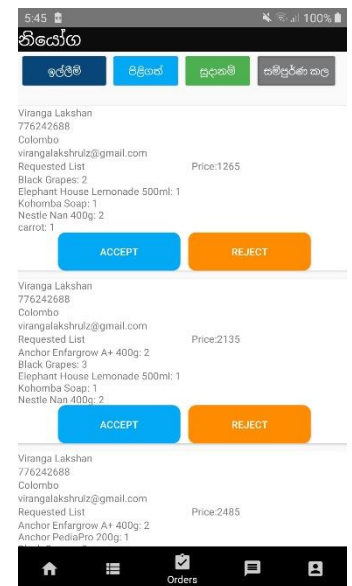


Figure 11. The seller's orders interface

Table II. Table of accuracy results - Seller

Functions - Seller	Number of attempts for each function = 10			
	<i>English</i>		<i>Sinhala</i>	
	<i>Succeeded</i>	<i>Fail</i>	<i>Succeeded</i>	<i>Fail</i>
1. User Interface Language translation	8	2	6	4
2. Search 10 Constance Items by voice	7	3	5	5
3. Search 10 Constance Items by typing	8	2	5	5
4. Get the Grocery Location	7	3	7	3
5. Display Top Selling Items	8	2	8	2
Total Success Attempts	38/50	-	31/50	-
Total Fail Attempts	-	12/50	-	13/50

Table III. Table of accuracy results - buyer

Functions - Buyer	Number of attempts for each function = 10			
	<i>English</i>		<i>Sinhala</i>	
	<i>Succeeded</i>	<i>Fail</i>	<i>Succeeded</i>	<i>Fail</i>
1. User Interface Language translation	8	2	6	4
2. Search 10 Constance Items by voice	7	3	6	4
3. Search 10 Constance Items by typing	8	2	5	5
4. Get the Current Location	6	4	6	4
5. Get the Custom Location	7	3	7	3
6. Display Closest Grocery	7	3	7	3
7. Display Top Selling Items	8	2	7	3
8. Display Availability of Items in the buyer's list	7	3	5	5
Total Success Attempts	58/80	-	49/80	-
Total Fail Attempts	-	22/80	-	31/80

$$\text{Average of EasyList Accuracy} = \frac{\text{Total number of Success Attempts}}{\text{Total number of attempts}} \times 100$$

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HelloYou: A Mobile Serious Game Application - To help cope with Depression and Anxiety

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Abstract— In present it is a perceivable fact that mental disorders and deteriorating mental health has become more ubiquitous among the international populace and in Sri Lanka alone, the issue has become a repressed problem that propelled suicide rates to the thirty first highest overall in the world. The HelloYou application intends to provide an easily accessible mobile game application to give users a therapeutic experience to alleviate anxieties and disorders that lead to depression. While the system is no real substitute for real professional help or medication, the research team wishes the application to help in any minute way to relax and comfort users to suppress symptoms of their disorders from interfering with their ability to function and live a relatively enjoyable life. Being a mobile gaming application allows users to use HelloYou at their leisure or in any location. Ideally, this application can provide an easily accessible substitute to therapy to help alleviate and cope with the user's anxiety and depression.

Keywords— Mobile Game Application, Android, Health and Wellbeing, Mental Health, Mental Disorders, Depression, Anxiety, Unity Framework

I. INTRODUCTION

Nowadays, Mental Health Disorders (MHD) have higher economic and emotional cost on the community when compared to other chronic illnesses, but they also present a major public health concern as well. Epidemiological research has proven that around 15% of the population experience a Major Depressive Episode (MDE) at some point in their lifetime [1]. Depression and anxiety have been a major health issue in the society across every age group. Due to many reasons people has fallen victim to these health conditions. According to the records of WHO, over 300 million are suffering from these mental health disorders.

People who are suffering from these health problems can't do their daily work or conduct themselves socially in a proper way. Because of their behavioral patterns they are rejecting and are rejected from society. They feel loneliness from rejection by others. Daily, they are drowning down from their morality. In the end, the patient will end up with the thought of suicide. This is the worst case scenario of depression and anxiety. Cause and effects for these disorders are similar. The worst case situation can result in people who suffer from depression ending up with thought of suicide.

That is why society needs unique ways to cope with and recover from depression and anxiety.

In recent years, extensive evidence and clinical guidelines suggest that efficacious treatments for depression and other chronic mental disorders include both pharmacotherapy and psychotherapy [2]. Pharmacotherapy is an effective, evidence-based medical treatment therapy using pharmaceutical drugs. Psychotherapy, also known as Talk therapy, is a term for

treating mental health problems by talking and listening to one another, rather than use medication, although in some instances, medication is also provided. Psychologically, this method tends to be more effective for a variety of mental and behavioral health issues and across a spectrum of population groups [3]. Therefore, the average effects of psychotherapy are considered larger than the effects produced by many other medical treatments. Hence, having sessions of small but simple conversations with potential victims or those who are already suffering, can help to minimize them from having difficulties. With timely immergence of new technologies, human-to-human interaction doesn't have to be a thing, and can be replaced by a relevant application of technology, as always. On a recent survey conducted by ourselves on college students, on mental health problems and prevention, we found out that out of those who are potentially suffering from some type of mental health disorders, majority did not want to share it with another human but preferred to interact with an system; a non-human entity.

Unsurprisingly, this sort of outcome was expected and it is safe to assume that this is because the modern societies are in fact, tightly bonded with terms Privacy and Prejudice (being judgmental of someone without context). Accordingly, many students in the above conducted survey, tend to think that there's more privacy and less prejudice, when interacting with a mobile application, rather than with a live human. However, there are new immersing technologies that can cater the above requirement and mobile applications are one of them.

The purpose of creating "Hello You" game is to help the community. This game is implemented specifically for people with mental health issues such as depression and anxiety. The targeted age group demographic for this game will be between

15 – 35 years. The research team will use 3D animations to bring a unique experience for users suffering from depression and anxiety. With the use of this game, users will be able to interact with so many activities that can help cope with their loneliness and can help them to free their mind by distracting their focus onto different things

II. LITERATURE REVIEW

The possible intervention potential of video games had always been a point of interest in the field of therapy. With great advances in mobile app and game development in just the past few years and the greater awareness on the threat of depression, it has become the logical conclusion to combine these elements to create the next step in treatment of depression and anxiety.

Depression is a serious issue and can benefit from examining every avenue that exists to counter it and anxiety can benefit greatly from an application like this. Mobile games are an especially vital format for this task.

Keeping these past mistakes in mind and learning from them, we did our best to make “HelloYou” the finished product of all those years of research and experimentation, successfully creating a mobile gaming application that helps users that suffer from depression and anxiety

A. Games in Treating Depression

Games, while looked down upon as serious medium by many, have already found a place in medicine and history has precedent for games treating mental disorders exceptionally well with even something as simple as Tetris being used for the treatment of PTSD [4]. Games have even been mentioned to be a suitable supplement to therapy [5].

This is because of their inherent retention and intervention ability [3]. Meaning, users and patients are interested in playing games, dedicating all their attention and for great controlled periods of time. When these games are treating their disorders, this gives games a greater potential for success than most therapist supported traditional techniques for treatment [5].

Therefore, this is why games are worthy of being used as a tool for treating depression and anxiety thanks to their great appealing, engaging and effectiveness potential. However, a noted disadvantage was how its effectiveness was only limited to those with mid-level depression, which our systems primary demographic [7].

B. Similar Applications

There have been a great many attempts before but of the multitude of gaming applications used to treat depression, there have only been few that have gained any traction in the field [7].

1) SPARX

The most well documented of the lot, SPARX is a simple RPG style game that uses simple puzzles and quests to progress the player through the game. Much like the other games that used puzzles, the skills used to solve these tasks were somehow tangentially related to reality and how to cope with depression.

2) Breath of Light

Using obstacles and other game objects to divert and redirect energy to its destination, Breath of Light is a simple puzzle game that does not aim to challenge the user but to relax them. With gorgeous backgrounds, stunning particle effects and hypnotic sound design, the game simulates meditation to stimulate and distress the mind. It doesn't have scores or numbered puzzles and the only indication of progression is the progressively increased complexity of puzzles.

As a relaxing game, the developers succeeded in creating a visually pleasing time waster but fails to achieve more than simple relaxation. With no dialogue, narration or anything beyond simple symbolism to convey anything, the app cannot be used for the purposes of treating anything more than tiredness and stress. There's the additional challenge of this game costing money. Many aren't willing to pay for an app with such vague uses [10].

3) Personal Zen

The application with the most scientific backing behind it, Personal Zen is a serious game that gamified attention bias modification training to reduce stress and anxiety in users and promises to do so with no more than just 10 minutes of a user's day. The game is wholly customized to the individual user, allowing them to set personal goals, track stress levels, earn achievements and even choose however much they wish to play.

The game seemed to be the best set up for success but middling to bad reviews bogged down the application from greatness. While everything looked great on paper, the presentation was not well received and wasn't appealing enough to gain any traction [9].

4) Self-Care

A simple application with just enough interaction to be labelled a game, #SelfCare is a free to play application that spreads the message of self-care by simulating staying in bed all day. The app takes the user through mindful mindlessness in simple tasks like picking up laundry off the floor or playing with a cat and all the while gives wholesome tips and messages that help users take better care of themselves in reality as well.

As a great game should, this application betters a user's experience both in-app and out of it thanks to its wholesome

message of self-care. However, its scope of setting is just bit too limited to be universally applicable and goes a little too far into the mindlessness than mindful at times, refusing to give users any chance of a challenge. [8]

C. Depression and Anxiety

As a deeply uncertain science, most treatments or research into the causes for depression are not usually universal however, research into the disorders have narrowed down certain conditions that may cause it.

Studies have found that negative feelings and tiredness experienced in the workplace has a tendency to stick deeper into the subconscious, commonly causing depression and anxiety. This deep-seated issue cannot be easily solved with rest after work but research has found that periodic periods of rest within work hours can help dispel these negative feelings [6].

Games have been proposed for this task as games have the ability to physiologically detach the user from their environment, distracting them from the pain and tiredness and allowing them to not just cope with these emotions but to recover from them [6].

So, from this, it can be gathered that the “HelloYou” is useable in any situation or environment like the workplace to promote physiological detachment while also giving the user full control over the usage period.

D. Mobile Gaming Applications

Most applications that have been used to treat depression in the past have been primarily PC applications, usually of the Cognitive Behavior Therapy variety or VR games which have even greater suspension of reality and thus greater intervention potential [4]. However, when coupled with the earlier research, the ability to use the application anywhere, at any time for as long as the user likes becomes a requirement and to this end, the best possible platform for a gaming application to treat those with depression and anxiety is the mobile smartphone.

This format is best as mobile gaming has come to nearly overtake the traditional gaming industry and the unprecedented reach and accessibility is greater than its counterparts.

III. METHODOLOGY

After careful consideration of the system and its requirements, the research team ultimately decided on the “Prototyping Methodology” to develop the “HelloYou” application. Deferring to existing research on mobile application development, it has been decided that “Prototype methodology” is best suited for it

To start, the research team published an online questionnaire to better understand the requirements that need to be faced when undertaking the building of an application made to handle a delicate subject such as depression. Through online link sharing amongst peers, the survey produced sixty responses and out of those, over sixty percent have claimed to have experienced depression. Though not clinically diagnosed, the responses have made it clear that the majority of responders are 20+ adults suffering from mid-level depression and research has shown that to be the perfect demographic for the treatment of depression and anxiety through serious games. As a vast majority of responses have claimed to have mobile phone with and android OS, the research team deduced the need for an android gaming application to be the best approach to reaching the widest possible user base.

With the means settled, the next steps set themselves. Using existing applications and prior research as reference, the application was designed to be simple, attractive and responded to the user’s feelings, mood and environment.

Data Gathering.

Data gathering was done by conducting an online survey targeting undergraduates and freshly graduates.

Do you prefer to play stress relief games?
155 responses

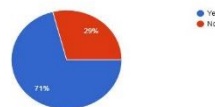


figure 6

How often have you been bothered by feeling nervous, anxious or on edge over the last two weeks?
155 responses

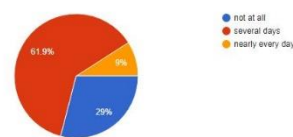


figure 7

Have you ever felt hopeless?
155 responses

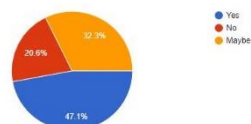


figure 8

Do you recommend stress relief games to others ?
155 responses

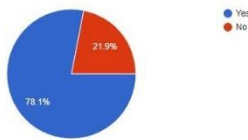


figure 9

A. User Mood Sensitivity

Research showed that it was important for a user to be able to use whatever aiding application they were using, whenever and wherever and that a feeling of progress was important, so denote the passage of time within the application itself, the UI background would change, creating the impression of passing time, creating a sense of progress.

However, a problem may arise when dealing with the ever-changing mood of an unstable mental state, so in order to get an idea of the user's feelings, the very first thing the application does is ask the user through simple answers and then adjusting the application's three activities accordingly

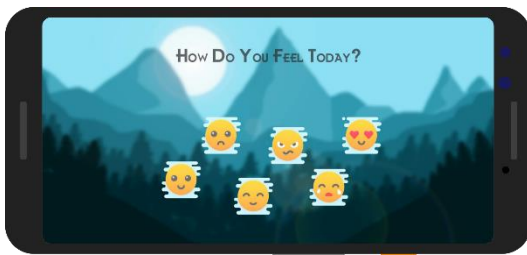


figure 10



figure 11

This Menu Contains some Moods which person can having in the moment. User must select the mood he/she currently at. Game floor will be based on the Mood. Then directing to the home where character with various animation present.

B. Music Player

The first of these activities is a simple music player with preloaded songs, chosen specifically to cater to the sensibilities of those stressed or depressed. As one of the most universally accepted methods of distressing, listening to music can allow users to relax with minimal interaction on their part, however to add a layer of customizability, users can interact with multiple music players, each preloaded with an instrumental track, which altogether create a complete song. At the user's discretion, they can choose which instruments they would like to hear or leave out and create their own musical experience.

Depending on the user's mood, the options of music available will change, such as a slower instrumental if stressed or an upbeat song when in a happier mood.

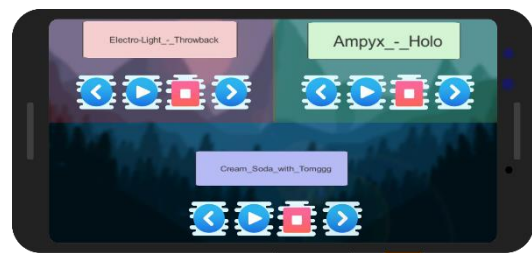


figure 12

There are two versions to this application. The version seen here, the one the user gets in a better mood presents three players each preloaded with music from a specific genre for the user to listen at their discretion. The other, a four-player version to this, is presented to a more vulnerable feeling user and is each preloaded with an individual instrument that combines to form a specific song. The user can customize the song by muting these instruments to form a unique listening experience.

C. Puzzle Game

Research on serious games have shown that distracting a mind addled by deep seated stress can allow for it to begin to really heal, something that cannot be achieved by simply relaxing. So, to this end, HelloYou has two gaming applications for the user to enjoy, the first of which being a Puzzle game. Simple in its design, puzzle games are perfect for stimulating and creating a sort of challenge that does not frustrate users.

With no real room to lose and only having the option to win, the Puzzle game allow users a sense of progression and achievement with every pattern they resolve, the complexity and difficulty of which will vary greatly according to the user's mood.

D. Ball Run Game

For users looking for more of a challenge that allows for extended uninterrupted endless gameplay, this game can be used for as long as users wish, letting them dictate their own playtime. With more complex assets and a more involved gameplay loop, this is the main attraction for gameplay provided by the HelloYou application.

The user's mood will not only dictate the game's difficulty, speeding up the ball accordingly, but also changing the game environment to suit the time of play as well.

```
0 references
private void OnCollisionEnter(Collision collision)
{
    if (GameManager.singleton.GameEnded)
        return;

    if (collision.gameObject.tag == "Lose")
        GameManager.singleton.EndGame(false);
}
```

figure 13

The above code segment is from the Ball Game portion where collision capturing functions are.



figure 14

The above diagram is a screenshot from the Ball Game in which the user has to pass the ball across the finish line.

IV. CONCLUSION

It cannot be understated how important mental illness is and how delicate a process treating it can be. A mobile application can never completely replace the value of trained medical professionals in doing so, but even still, research has demonstrated such serious games can be of great benefit regardless [5]. Thus, the focus of the HelloYou application has always been to aid in the coping and treatment of depression, anxiety and their root causes, stress without the constraints of time, place or money.

The research team designed HelloYou's features after extensive research and feedback from both medical professionals and those suffering from depression and anxiety. Those results are reflected in the application's design. 3D assets and all of its aesthetics were built with the demographics' requirements in mind, creating an attractive and soothing environment for users to not only enjoy but return to. Activities

built to create a stimulating and distracting challenge that can instill a sense of progression and achievement without the frustrations that only elevate stress and an emotional response system that adjusts the system to suit the user's emotional state, changing both the environments and the gameplay accordingly.

For the future, the research team has left the groundwork to easily add on even more appropriate activities that benefit the treatment of depression and anxiety to add more variety to the user's options. Online feedback may greatly benefit users if collaborated with trained professionals to track their progress. Multi-platform compatibility is must to reach an even greater user base. With effort, HelloYou can potentially greatly benefit those suffering from depression and anxiety.

V. TESTING

Testing was conducted by distributing the completed system among undergraduates and freshly graduates who are the primary demographic of our application and also to the medical professional competent in mental health treatment who acted in an advisory capacity.

We received feedback from both parties with constructive criticism and opinions through an online survey. The research team took this criticism under advisement and will be sure to implement updates to further improve the application in the future.

VI. LIMITATIONS

- Modelling 3D character avatars to be both appropriate and attractive proved to be a difficult challenge to overcome within the limited time frame.
- Problems developing the app with Unity, such as high fidelity assets and larger number of moving parts on low performance pcs required more RAM than available when assets were loaded.
- Problems were faced when finding appropriate games suitable for coping with depression anxiety while maintaining a balance of challenge without frustration as no two people are the same.
- Problems were faced when finding both high end and low spec mobile phones for testing as the higher end systems were beyond the research team's budget or assets.

VII. FUTURE WORKS

- HelloYou can be developed for iOS, reaching out to a massive yet currently untouched mobile user base.
- HelloYou can be developed as a Facebook built game to achieve an even wider reach through social media,
- Add a Chabot with a counselor to help users receive professional help that gaming cannot otherwise provide and to allow therapists to track their patient's progress

Create more Realistic 3D Characters that user can interact with to even better expand HelloYou's appeal

VIII. ACKNOWLEDGEMENT

Ideas and concepts presented in this overview were developed thanks to the initiative of the authors but they would like to thank all individuals and groups who have contributed to this study.

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Voice Me – A Diary built on your voice command

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Abstract— The current population has tremendously become busy with the competition of living where people are not comfortable in spending time to maintain a day to day diary. As a solution, this project proposes a voice diary where individuals can continue keeping logs in the diary while engaging in other activities through voice. There are similar applications in the market, however, the majority of the applications have failed to provide facilities such as the application security, voice to text translation, image capturing with geographical location and mood selection. The research was conducted to investigate the reasons for individuals for not maintaining a diary, where the main issue stated was the time consumption in maintaining a diary. Other problems were also noticed stating inability to capture images, less security, reliability issues, and document creation issues. In this system, all the stated problems are addressed where the user of the diary application can use voice to maintain the diary, use PINs and Passwords to create security, capture images with the geographical location, backup facility, and the PDF converter to convert the diary entries into the documents. The main outcome of the proposed system is to provide reliable and efficient feedback in the diary operations with the implementation of detection of homonyms and the generation of the PDF document. By introducing the background to the research, this paper provides insight into the methodology, results, and discussion. Furthermore, it impacts the ways of handling diaries and the ways of the voice recognition-based systems and it provides the guidelines for the future development of Voice Me E diary.

Keywords— Voice Diary, Voice to Text translation, Image capturing with geographical location, Application Security, Backup facility, PDF Converter, Homonym Detection

I. INTRODUCTION

voice as the input and converts the voice to text to create a diary entry. The project was developed to be used in the android platform where a majority of the users are using android mobile phones according to the primary data gathered. The created diary entry is checked for grammar and spelling mistakes highlighting the homonym detection and suggestion. The diary entry can be saved in the format of a PDF document where the user can print the document in the future. The android app facilitates adding images to the diary entry, adding geographical location, mood selection, back up facility and enhancing security with passwords and pins. The diary entry can be styled with different font variations and colors. The diary entry will be saved in the particular date and time.

The following diagrammatically explains the overview of the application.

The development of voice recognition has been tremendous in the recent past years. However, the voice to text conversion has been limited only to execute simple commands and the conversion of single words. Document processing through voice-to-text technology has been addressed by a handful of researchers. However, the researches did not achieve hundred percent of planned objectives since the voice recognition software was unable to identify isolated words, connected

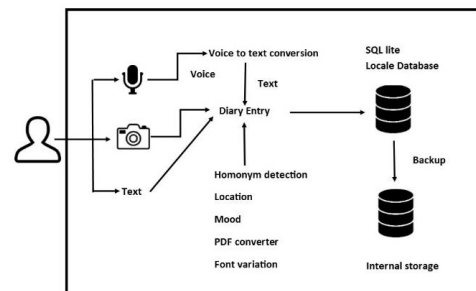


Figure 15 - Overview Diagram of the project

words, continuous and spontaneous speech[1]. The voice recognition software was developed to a stage where it can be used in low resource environments where Automatic Speech Recognition and Machine Translation is not available. However, the research failed to produce any pseudo term for half of the utterances[2]. Hence producing a document with full length sentences via a voice input is the next leap in voice recognition software.

In this project, document processing through voice input is embedded in to an E-diary application. Hence the users will be able to have a new experience in documenting their journals, notes, daily diaries, etc. Furthermore, the technology can be

used in various applications specially in the software that is designed for visual impaired personals. Moreover, this technology can be developed as a help for handicapped people where they can create documents on their own without needing assistance. Since the project idea is next in line in developing the voice-to-text conversions, the researchers will be able to carry out more researches in fine tuning the component proposed to suit the application the research is been conducted on

II. LITERATURE REVIEW

A. Voice to Text conversion

Warnakula et.al in the year 2014 presented the idea of implementing a speech recognizer and a document typing application for English speaking users with Sri Lankan accent[1]. For the software to understand the Sri Lankan accent, a small-scale voice corpus of 8000 record sound file data which can be extended and enhanced in the future, was generated. The Hidden Markov Model, which is an open software owned by the University of Cambridge was used as the toolkit. However, the system was unable to identify the end of sentences, isolated words, connected words, continuous and spontaneous speech. Furthermore, only 40% - 50% of the words were correctly recognized by the speech recognizer in a quiet environment and 30% in a noisy environment. Identification of ambiguous words was not addressed and a feature was proposed to be implemented as future work to let the user select the correct word whenever the words are misspelled. The current system is designed as a desktop application. Implementing the mobile version of the system for different mobile operating systems is included in future work. In conclusion, a basic system was developed to provide a fast method for document writing on a computer.

Nafis and Hossain in 2015 presented a laid down a foundation for speech to text conversion in real time[3]. The research was able to implement an online, low cost, fully functional speech to text converter. The accuracy of recognizing a word correctly was calculated to be 75%.The component can be integrated with systems such as Interactive Voice Response Systems, Voice dialing in mobile phones and telephones, Hands-free dialing in wireless Bluetooth handsets, PIN and numeric password entry modules, ATMs, Data Entry Works and in the classroom work for disabled students. Even though the component facilitates real-time conversion at low cost, the component needs the Visual Studio to be installed to run the application. The application only handles words and numbers and not advanced to identify full sentences.

Rubanath et.al in the year 2016 developed LANGUAGE, a desktop application designed to enhance the English and pronunciation skills of the student in primary schools[4]. The system compares the user's input voice with the British

standard. The system has encountered the typical challenged faced by speech recognition systems, the accuracy of the output depending on the input voice, encountering very different ways of the pronunciation of the same word. However, the system merely checks the pronunciation of the word taken as the voice input. Moreover, a document is not created using the recognized speech segments.

In 2017, Bansal et.al presented a speech-to-text translation model without using speech recognition[2]. The research was conducted in low resource scenarios excluding Automatic Speech Recognition and Machine translation. Even though this system has enhanced speech recognition and laid a foundation for low resource environment-based speech recognition, quality is the main limitation since UTD fails to produce any pseudo term for half of the utterances.

B. Homonym Detection

In 2019, Wang et.al presented a research paper on exploring the methods for the automatic detection of errors in manual transcript [5]. The project proposed a novel acoustic model-based approach, focusing on the phonetic sequence of the speech. While given the well-trained hybrid ASR system, speech recordings, and the corresponding transcriptions the system investigates both the linguistic and phonetic contributions to detect the errors in the transcription. The mismatch between the alignment and posteriors from the classifier is utilized.

In November, 2019 Asami et.al proposed a system where recurrent out-of-vocabulary word detection on distribution of features are possible [6]. The main highlights of the presented system are a novel method for robustly detecting out-of-vocabulary (OOV), focusing on the consistency of the recurrent OOV words, the degree of the consistency was measured by distribution features and the proposed method achieves over 60% relative reduction in false alarms.

In January, 2019 a conference was held as a preliminary study on detection of behavioral features at conversation breakdown in human-robot interactions [7]. The research problem addressed here was that the Robot cannot recognize the conversational breakdowns. Hence it was proposed to detect human motion characteristics when conversation is not established. The behavior during the conversation was measured using an RGBD sensor, and the measured data analyzed through FFT analysis.

C. Similar Systems

Speech notes[8] which was lastly updated on June 16, 2019 with a current version of 1.64 is a product produced in Israel. It has content rating 3+. The application implements voice to text conversion and back up facility. However, the application does

not implement app locks, addition of images, spell checker, mood selection and document preview.

Voice Notes[9] presented by the Pacific Fisher Group which has a last update on June 13, 2019 with a current version of 3.63 has a content rating of 3+. The application implements Voice to text conversion, Text input, and the back up facility. However, the application does not provide an app lock, Addition of images with geo tags, spell checker, mood selection, and document preview.

Voice Diary with Photos and Videos[10] presented by the Halojen group updated last on July 3, 2019 with a current version of 2.22 and a content rating of 3+. The application only records voice and plays it to the user but does not convert the voice into text. Facilitates the back up functionality. Does not implements the function to add images, check spellings, select moods and to convert the diary entry to the PDF format.

Daybook[11] presented by Big head techies was last updated on July 6, 2019 with a current version of 4.7.28. It has a content rating of 3+. Though the application implements voice to text conversion and mood selection it does not have the capabilities of taking the text input, capturing images with the geo tags, backing up to a cloud storage, checking spellings and previewing a document.

Diario[12] which is a product of Pixel Crater Ltd. Updated to its latest version of 3.71.6 on July 6, 2019 with a content rating of 3+. Diario does not facilitates voice input, app lock, back up, spell checker and preview document. However, it has the functionalities to get the text input and to select moods.

Diary with Lock[13] is a product of WriteDiary.com updated to its latest version 4.90 on June 3, 2018 with a content rating of 3+. The application implements the features such as taking the text input, enhancing security with the app lock and the backup facility. However, the application does not implement voice to text conversion, addition of images, spell checker, mood selection and document preview.

Pointo[14] being a product of Salt and Pepper Labs with a last update on July 1, 2019 has a current version of 1.0.13 and a content rating of 3+. The application supports text input only, Furthermore, it supports addition of images with geo tags and the backup facility.

III. METHODOLOGY

The Agile methodology was used in developing “Voice Me” where sprints are provides and the phases can be conducted iteratively inside one sprint for each functionality. The development was carried out in a total of six sprints, every sprint was associated with a function implemented. A sprint contained three phases namely Design phase, Build Phase, and the Testing phase. In the Design phase the design of the

interfaces and the design of the database was addressed. In the building phase the algorithms and the functions were coded. In the Testing phase the test case for each function was created and the function was tested as a unit. In all the other sprints except for the first sprint the integrated testing was conducted. Planning, Analysis, Design, Implementation and Testing phases were followed through the methodology.

A. Planning

Planning phase is the most challenging phase in the SDLC where a project plan is prepared indicating the task needed to be completed in the due time. The triple constraint is addressed here in preparing the project plan and the WBS. The following plans were being made in the planning phase,

- WBS
- Gantt Chart
- Resource Plan
- Budget
- Risk Plan

Furthermore, a feasibility analysis was conducted to appreciate the business value of “Voice Me”.

1) Identifying research component

The research component was identified as a development to the voice recognition where the voice recognition has only been limited to execute simple commands. The homonym detection was identified as branch of the voice recognition development; hence a thorough feasibility analysis was conducted. Furthermore, to identify the areas to implement the voice recognition a research was conducted and the current E-diary applications were highlighted in the research. To make the project interesting a document processing component was introduced to convert the diary entries to a PDF document. Justification, Research questions and Research objectives were built on the research component.

2) Developing Risk Plan

The research component was checked in the feasibility analysis and a risk plan was generated to assess the risk situations. Development of a risk plan, identified the risk probable areas in the project and the mitigation of the risk was proposed. Through assessing the risks, the technical feasibility, organizational feasibility and the economic feasibility was addressed.

Organizational feasibility

The WBS and the Gantt chart was prepared with the time constraints and the Resource plan was developed assigning group members to each major functionality.

Economic feasibility

The budget was prepared for the project assessed the benefits and the drawbacks of the system to evaluate the effectiveness of the system

3) *Preparing the Resource Plan*

To carry out the project each team member was assigned with functionalities in the Gantt chart based on their skill to gain efficient and effective output from the project team. The resource plan was embedded in the Gantt chart where the group members can track the modifications resulted in the functionalities of the system.

B. *Analysis*

The analysis phase focused on gathering requirements about the existing system and analyzing the weakness and strengths of those systems which lead to develop the concepts of the system

1) *Primary data gathering*

The data was gathered through a questionnaire and a couple of interviews. The questionnaire was selected to gather information from a large sample of people while the interviews were selected to obtain the opinion of a few selected people on broad topics that has to be thoroughly discussed.

Since the population is not in a very large scale, non-probability sampling methods were used. To select the respondents to the questionnaires and interviewees quota sampling and judgement sampling is used respectively where quotas of the population is selected to respond to the questionnaire, and interviewees were selected by the interviewers based on the subjective characteristics.

The sample size of the respondents of the questionnaire is 91 individuals and sample size of the interview is five individuals.

In conclusion the following requirements were highlighted in creating “Voice Me” Diary application.

- More than 50% of the selected population are using android mobile phones hence developing the diary application for the android platform.
- The main causes listed as to why the population is not using a diary indicated that,
 - ✓ Writing a diary is very time consuming.
 - ✓ Less security.
 - ✓ Cannot add images.
 - ✓ The diaries can be lost easily.
- Hence the following functionalities were proposed to be implemented.
 - ✓ Creating a diary entry providing the voice input.
 - ✓ Use of passwords.

- ✓ Facility to add images.
- ✓ Back up facility.
- More than 50% of the population tends to forget the location of the image taken. As a solution saving the image with the location functionality is introduced.
- More than 50% of the selected population tends to find spelling and grammar mistakes in their notes hence a grammar and a spelling checker is implemented.
- The selected population are using diaries to
 - ✓ Keep track of the daily activities
 - ✓ Keep track of emotions
 - ✓ Keep track of notes
 - ✓ Keep reminders
- Hence a mood tracker is implemented

2) *Secondary data gathering*

The literature review was conducted under four sub topics. The progressive elaboration of the Voice-to-Text technology, the algorithms, Voice-to-Text technology used in the software industry, Document processing and the business perspective of the similar systems were thoroughly analyzed in the literature review. Research papers, Patents, Similar system reviews were used in gathering the secondary data. The content discusses about the current technologies and systems available in the industry and the society.

C. *Design*

The design was done inside the sprints where each sprint was designed with a design phase. The UML diagrams were designed first in the design phase, followed by the designing of the database structure, designing of the interfaces and the designing of the algorithms for homonym detection.

3) *Architecture Design*

The architecture design elaborates the software architecture diagram describing the overview of the diagram. “Voice Me” which takes the user’s voice as the input and converts the voice to text to create a document. It has the ability to detect homonyms and suggest the words to the user where the user can select an appropriate word from the listings. In addition, the E-diary has the backup facility to an internal storage. Moreover, the application provides editing with font variations, secure authentication using a pin lock, capturing images with the location and the mood selection. The application also provides the ability to convert the diary entry to a PDF document. (Refer Figure 1)

D. *Implementation*

In each sprint the implementation phase was conducted. In the last sprint the integration was performed where the actual product was built by integrating all the functionalities of the system. The software and hardware requirements are as follows.

- Windows 10 OS
- Intel Core i7 Processor
- 8 GB DDR3 L Memory
- Android Studio 3.3.2 with SDK
- SQLite
- Firebase
- Router/Wi-Fi
- Android device
- Microphone/ headset
- Google voice search with v6.15.24.21 or higher

Furthermore, android platform was used to build the application and the languages used in building the application was Java.

Under the testing phase in each sprint the unit testing was conducted for each functionality. Through the unit tests the functionalities were thoroughly tested to meet the research objectives. Integration testing, system testing and the user acceptance testing are the testing methods intending to perform on “Voice Me” where the user acceptance testing are done by the end users after the product is launched to the market.

E. Testing

Under each sprint the unit tests were performed to check the functionality of the individual component by the respective group member who was responsible in developing the functionality. The unit tests performed under following functionalities.

- Implementing locking patterns
- Voice to text conversion
- Mood Selection
- Adding location
- Capturing images
- PDF converter
- Font variations
- Back Up
- Algorithms for Homonym detection

Integration testing was performed when integrating a functionality with the rest of the functionalities implemented. All the modules which passed the unit tests are integrated with the other tested functionalities and then is tested as integration testing to ensure the communication among the unit modules have no defects and errors. The flow of control and the data exchange among the modules are tested thoroughly in the integration testing.

This testing approach is used as the last stage of the integration testing where all the modules are integrated and need to be tested as a system. The integration testing is expanded to the non-functional requirements as well in the system testing. The system testing is to be performed under following sub non-functional requirements.

Functionality

- Whether the research objectives have been met
- Whether the expected output and the actual output matches
- Security PIN handling

Usability

- Whether the functions can be understood by the user
- Whether the user can easily learn the system
- Whether the user can operate the system without any help

Efficiency

- Response time
- RAM usage

IV. RESULTS

Voice Me was developed as an android mobile application including the functionalities, voice to text conversion, image capturing with geographical location, application security, backup facility, PDF converter and Homonym detection.

The following sections explains the system results.

A. Implementing Locking patterns

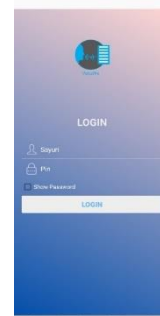


Figure 16 - Login Interface

A PIN is requested at the initial launch of the application where the PIN is stored under login details of the user. A count is taken where if the count is not equal to one the user is directed to the login screen. The user can enter the previously registered PIN to log in to the application.

B. Voice to Text conversion

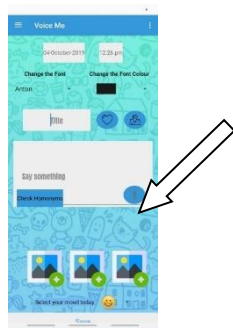


Figure 17 - New Node Interface - Voice to Text Conversion

The user can tap the mic button to speak to the application. The application takes in the speech input convert it to text and displays on the application.

C. Mood Selection



Figure 18 - New Node Interface - Mood Selection

The user can select any mood ranging from Happy, Sad, Angry, Afraid, Sick, Exhausted and Depressed in making a diary entry. The default mood is selected as Happy in case if the user is not interested to pick any mood.

D. Adding Location

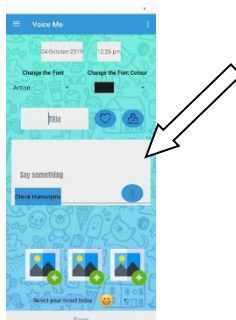


Figure 20 - New Node Interface - Location

The user can save the current location of where the diary entry has been made. This functionality is optional where the user can save the diary entry even without saving the current location.

E. Capturing Images



Figure 21 - New Node Interface - Capturing Images

The user can capture up to maximum of three images where the user has the functionality to remove the captured images or replace them. The user can save the diary entry even without capturing any images. If the images are not captured only the text will be shown to the user in viewing the diary entry.



F. PDF Converter

The user can open the diary entry and give the command as save

Figure 19 - Save As PDF

the diary entry to the PDF format where the diary entry will be saved to the SD card if the user's android phone is consisting of a SD card or to the internal storage if the user's android phone does not have a SD card by creating a folder "Voice Me".

G. Font Variations



Figure 22 - New Node Interface - Font Variations

The user can select a favoured font style and a font colour to write the diary entry. The font colour and the font style is saved to the diary entry hence viewing the diary entry to the user it can be displayed with the same font variations. In case the user does not pay attention to the change of font variations the default font style is Anton Regular and the default font colour is black.

H. Back Up

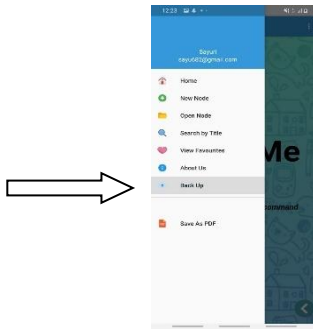


Figure 23 - Back Up

The user can back up the whole diary to a specified location where all the information regarding the diary is backed up. The user can later on restore the backed up diary.

I. Algorithms for Homonym Detection

The following algorithms were developed to detect the homonyms when converting voice to text in the New Node interface.

The following flow diagrams illustrates the algorithm developed.

Figure 10 describes the how the word is identified and highlighted as a homonym in the application. Once the sentence is given it is broken down to words and each word is checked with a predefined set of homonyms that are in the system. If the word matches create a clickable span and highlight the word.

Figure 11 describes the procedure how the homonyms are displayed for an identified homonym. The user is given the opportunity to click on one of the highlighted words and the

application extracts the homonyms for the particular word from the system and displays to the user.

The homonyms are hard coded to the system as linked lists implemented as queues.

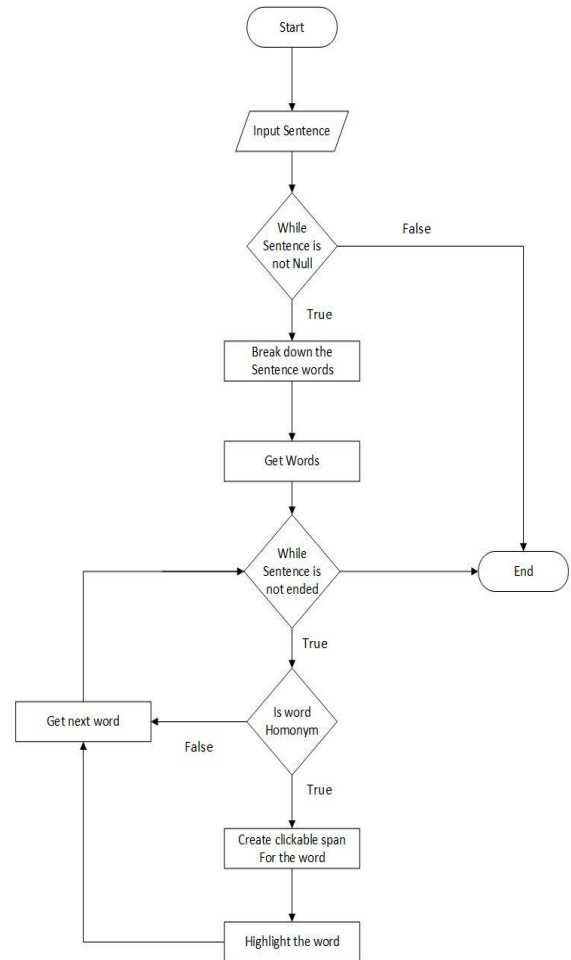


Figure 24 - Algorithm Design for Homonym Detection I

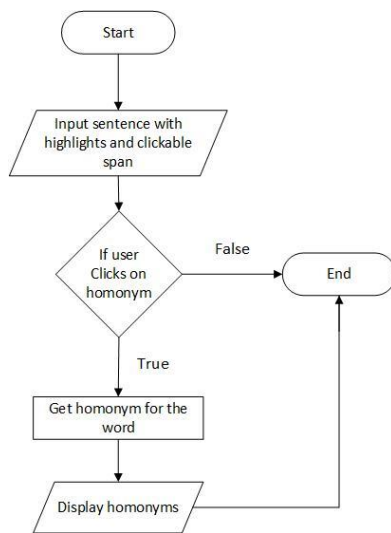


Figure 25 - Algorithm Design for Homonym Detection II

V. CONCLUSION

The main task of this project is to save your personal memos interesting, efficient and reliable. The “Voice Me” mobile application will be so helpful when it comes to journalists who can create their memos while travelling using voice input.

If the user wants to save any memo, it is important to provide security option since it is personal. And also many of the diaries which are in the commercial market are not customized with the voice input feature. Through voice input the user need not to type the entire paragraph instead the user can use voice input which is easy to maintain. The other important features are capturing images and adding the location in order to keep remembering the moment for future reference. To refer the entries later the application should have a consistent backup method. The internal backup function allows the user backup and restore all the entries related in any data loss. The pdf function will make the user to print any memo. Through the search function the user can search any diary entry in case the home page is filled with many entries

A. Quality Characteristics

1) Functionality

The suitability of the system is approximately 90% where all the implemented functionalities are related to the e-diary applications in the market. “Voice Me” covers the basic idea of almost every e-diary application in the market hence suitability wise it is at its peak.

Accuracy rate is approximately 60% where the expected output matches with the actual results in the functionality testing.

2) Reliability

Reliability of the application is calculated under three aspects its maturity level, fault tolerance and the recoverability. This is the first release of the application hence the maturity level is the lowest and the fault tolerance is not at a higher level where recoverability is implemented as a manual function where the back up function comes in to action. Hence by considering all these factors the reliability scores approximately 30%.

3) Usability

The usability is tested with an actual user about his understandability, learnability and the operability of the application. Understanding the features and exploring the features were up to a standard as the standard icons were used in indicating the functionalities. Hence the usability scored approximately 40%.

4) Efficiency

The time behavior in corresponding to the operations were measured and the result was satisfactory indicating the speed of the application was at a good level. The resources such as the RAM usage, Space was not significant as the application does not use any graphical content. Hence overall the efficiency of the application is good.

5) Maintainability

The application was developed function by function by different programmers. To ease the process of integration the coding was done according to a format that every programmer followed in coding the functionality. This enables the facility to be tested easily and easily understand the function of each and every code in the application. Hence if a programmer in the future needs to make any modifications the programmer can easily refer the documentations to code.

B. Limitations

Deployment of “Voice Me” application carries limitation constraints, which should be taken into consideration. The limitations are as follows,

- Backup is saved in the internal storage only
- PDF document created with default font variations
- Voice is not detected in noisy environment
- Limited number of images are added to a diary entry
- The diary entries can be searched through only title

C. Recommendations

The user is recommended to follow the following recommendations in using this android application.

- To make sure that the mobile device has the internet connection when using the application.
- The user should own an android mobile device in order to use the application.
- All the outcomes of the application depend on user's input. So, the users are recommended to provide accurate information.

D. Future works

This application can be further modified with other new extra features addressing few limitations. Research team has identified few areas which might attract potential researches in near future.

- Implement cloud backup storage
- Include font variations to the PDF document
- Build a customize voice recognition
- Implement various modules to search the diary entry

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Minecraft – Autonomous Land Mine Detection System

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Abstract— Landmines are major nemesis for the soldiers in the front of the battle field. Landmines have been so productively used in battle fields to defeat the enemy. Determining the precise location of minefields and modern landmines can be toughest tasks faced by national authorities and operators. The research team create an automated landmine detection system with machine learning techniques in aid of humanitarian demining. A robot and a controlling software was implemented separately. However, Additional time and resources were needed to get to know the system properly. Combination of machine learning with land coverage, avoiding obstacles and land mine detection can make the process more efficient and secure.

Keywords— Machine Learning, Landmine Detection, Bluetooth, WI-FI, Tracking, Arduino Bot, Android

I. INTRODUCTION

The people who are involved with mind clearance put their lives in danger unwillingly. The process of detection, removal and neutralization must be readopting. A mine is a munition designed to be placed under, on or near the ground or other surface area and to be exploded by the presence, proximity or contact of a person and that will incapacitate, injure or kill one or more persons [1].

There was a time in Sri Lanka when the people in the east and north are getting killed in terrorist attack. After the war ended the government plan to civilize the people who got affected by war in places where it was once a warzone. When civilizing these people, government had another issue that is to remove the landmine in that warzones to make a protected environment.

Landmines contains three components; the case which may be metal, wood, plastic or mixed, the explosive material which may be TNT, RDX, mixed RDX/TNT, Teteryl, or other high explosives, and an initiator which may include a pressure sensor, an electronic sensor or any other sensor. Military and humanitarian demining are two types of demining methods. The purpose of military demining is to find and remove a sufficient number of Landmines to create a safe environment for troops and/or vehicles to move through. The purpose of humanitarian demining is to free the entire land area from landmines. Landmines can be classified according to their design or their targets. They are numerous detection methods which can be categorized into biological, electromagnetic, optical, nuclear, acoustic, mechanical detections [2].

The system should be able to detect mines regardless of the type of explosives used, since mines are made of a variety of

explosive materials Mines come in a variety of shapes and in various types of casings, and therefore a detection system should be either insensitive to the geometrical shape of the mine and the type of casing material, or preferably provide imaging information. Detection should also be performed at a reasonable operational speed. The ideal system must be accurate, not too slow and not too expensive. The challenge of landmine detection is not only to develop techniques that can meet this demanding problem, but to tailor such techniques to local conditions. It is difficult to apply any one technique unless the nature of the mine is well known, and it is inconceivable that a single detection technology will be able to meet all needs. A fusion of systems is needed as a solution to the landmine detection problem. Currently, four common yet primitive mine detection techniques are widely used are simple visual inspection, hand-held metal detectors, classical mine prodders and biological sniffers [3].

Several countries suffer from the existence of millions of buried landmines in their territories. These landmines have a long life, and may still cause dreadful personal wounds for decades after a war finished. Therefore, there is an increasing demand by these countries for reliable landmine inspection system. ‘Minecraft’ project will help to make a protected environment and it will be able to fulfil these objectives as well.

- To identify the nature of the mine
- To develop robotic platform to automate the landmine detection.
- To develop a sensor based simple land coverage system.
- To develop an identification logic in order to distinguish landmines from false targets.
- To develop an algorithm to detect and avoid obstacles.
- To made a sleek design to the robot in order to move through rough terrains.

The paper explains background to research components, methodology, results, discussion and the conclusion of the landmine detection system

II. LITERATURE REVIEW

A. Algorithms and data analysis

Machine learning [6], by its definition, is belongs to computer science that evolved from studying pattern recognition and computational learning theory in artificial intelligence. It is the learning and building of algorithms that can learn from and make predictions on data sets. These procedures operate by construction of a model from example inputs in order to make data-driven predictions or choices rather than following firm static program instructions. Traffic forms at a busy node (task T).

Natural language instructions [7] are used to teach humans. They are rarely used to teach machine-learning systems. The research we focus on building an intelligent personal agent such as Siri, Google Now, Cortana, Echo, Google Assistant, Nina, Viv, Jibo, Hey Athena, Mycroft, Braina Virtual Assistant, Siri, SILVIA, Amazon Echo, Bixby, Lucida, Cubic, Dragon Go, Hound, Aido, Ubi Kit, BlackBerry Assistant, Maluuba, Vlingo have demonstrated great potential for assisting users with basic daily tasks.

Web-wide search engines [8] are difficult and time consuming to maintain. As the amount of information on the World Wide Web grows, it becomes increasingly difficult to find just what the user wants. Domain-specific search engines are becoming increasingly popular because they offer increased accuracy and extra features not possible with general, Web-wide search engines.

The limitations of Coverage algorithm [9] are absolute localization (i.e. use of GPS outdoors), not taking robot kinematics into account or requiring extensive manual training for various environments. The research described a set of global path planning algorithms, when used together; prove suitable for outdoor coverage tasks. The Spiral Inward path planner Creates paths around the perimeter of the mowing area. Obstacles are often dealt with by subdividing the area into smaller sub-areas. The advantages of this movement is that it avoids sharp turns, can be implemented on all vehicles, goes to the edge, and covers the entire area with limited overlapping coverage.

B. Sence and control objects

The Android controlled Arduino bot is a robot armed with a brain to recognize and track objects persuasively. The research team [10] has indicated that robot model on wheeled platform is designed for object recognition and tracking. Challenges in tracking evolves when the target objects change their

appearance and shading conditions. The solution for the above issue is to build an Arduino-based bot integrating with Android device that would be responsible for detection and recognition of an object that is being learned. Purpose of the research is to provide simpler robots' hardware architecture but with powerful computational platforms so that robots' designer can focus on their research and tests according to commands received from android the robot motion can be controlled. AT89S52, HC Serial Bluetooth, DC Motor were used for architecture[11].

C. Remote Control Systems

Arvin and Khairulmizam [12] have presented a short-range communication technique suitable for mobile robots' application. It is used in many applications, such as military, thermal efficiency, remote temperature sensing and short-range wireless communication. Issues with Infrared can be illustrated as distance estimation and location approximation problems. Swarm Mobile Robot structure includes IR Components, Robot Controller, Communication, Sensory Module Design, Communication Module Design.

Most popular short- range wireless standards, Bluetooth, UWB, ZigBee and Wi-Fi, in this paper has presented the developed ZigBee platforms [13]. ZigBee communication is specially built for control and sensor networks on IEEE 802.15.4 standard for wireless personal area networks (WPANs), and it is the product from ZigBee alliance.

The Bluetooth car [14] should be able to go through a maze lane, while transferring instructions and data with an android mobile phone. The toy car is programmed for a maze walking. The application has two-side communication features, send control instruction to the car and receive status data sensed by the IR sensors. When walking in the maze, sensors will detect the wall information and coordinator value then send back to the mobile and displayed it.

Handheld device [15] is a computerized, electronic machine that is designed to be held in one hand (calculators, organizers, pagers, mobile phones and Personal Digital Assistants (PDA)). These devices are programmable, and it is relatively easy to add other applications that can be downloaded from the internet. Smartphones has PalmOS or Windows CE operating systems and UI. Processors in mobile phones are also getting faster. Other devices run operating systems specially design for mobile phones (Symbian). Latest devices include cameras, voice recognition, touch screens, and other technologies. Current display colors of all PDAs increasingly use back-lit color screens, it is easier to read and it has higher battery capacity.

III. METHODOLOGY

The project team divided the scope into parts in order to save time and to deliver the project within the given period of time. Each part is assigned to a team member which was his responsibility to finish the part and deliver it with in the given time. When planning the project and estimating the cost the team has thought of various solutions to reduce the overall cost. The research team has searched in the internet for different kinds of hardware modules and prices. Have looked for various hardware shops for suitable hardware part with lower prices. Which helped the research team to buy all the hardware with minimum overall cost.

Research team met highest ranked army officers who are experts on land mine detection for an interview to ask questions regarding their role in demining. Because of the expertise knowledge in demining, forces are mostly used in humanitarian demining in emergency situations. They typically have good experience with landmine detection and clearance.

(Figure 1)User/operator can use a smartphone to control the device via Wi-Fi. All the data is stored in the firebase database. A receiver is placed in the robot to receive the signals from the mobile phone. Arduino Uno has used to create the bridge between the phone and the robot. Metal sensor has been used to detect landmines in the field. The readings of the sensor is then sent to the algorithm and algorithm will detect is there a mine or not. If it detect a mine robot will send an alert (Notification) to the user and the path to reach the mine.

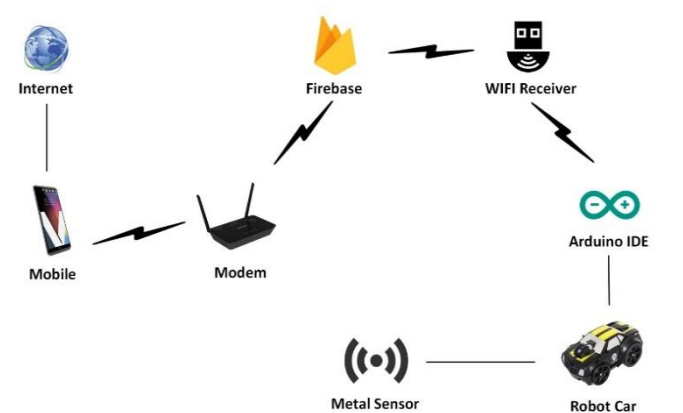


Figure 1 : Software Architecture Diagram

Following section explains the hardware components used when developing the system.

Arduino Microcontroller: Arduino Uno is a microcontroller board based and it has 14 digital input/output pins. This component is used to connect ultrasonic sensors of the Minecraft

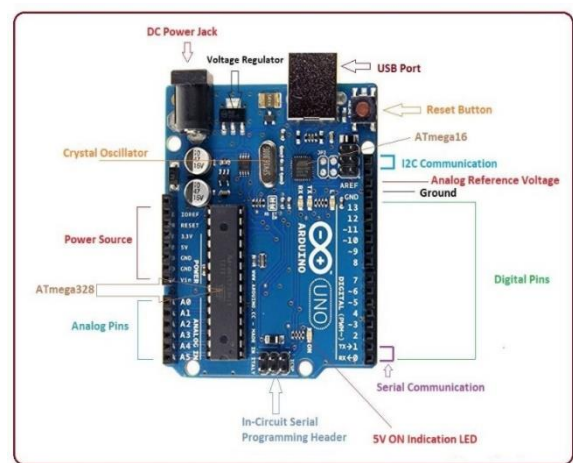
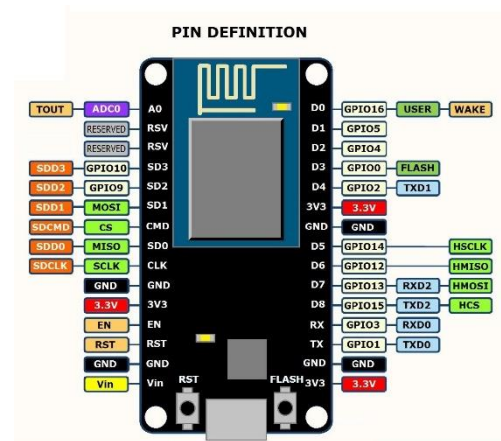


Figure 2 : Arduino uno

NodeMCU ESP-12E Module: The development board equips the ESP-12E module containing ESP8266 chip. This component is used to connect dc motors of the mine craft



GPS sensor: Suspected metal location can be triggered into the Minecraft app. This component is used to get latitude longitude navigations when it detects a metal.



Figure 5 : GPS Sensor

Buzzer: The PS series are high-performance buzzers are designed for easy incorporation into various circuits. It is used for the project to generate buzzer sound when it detects a metal.



Figure 6 : Buzzer

DC Motor: In this project DC motor is used to control the speed, motors' direction which movements of the car with the help of Arduino coding.



Figure 7 : DC Motor

Robot car get its current location right after it starts (Figure 8). Then it sends GPS navigations to the firebase. Then it checks the possibility to move. If there is an obstacle ahead, robot changes its direction to other location. When it detects a metal it sends its location to the database. Then it stops and provide the safest path to the operator to neutralize the mine. A compass has been used to figure out the faced position(X, Y, and Z) of the robot.

According to the above diagram (Figure 9) it demonstrate how the GPS module, metal sensor and obstacle avoiding sensors

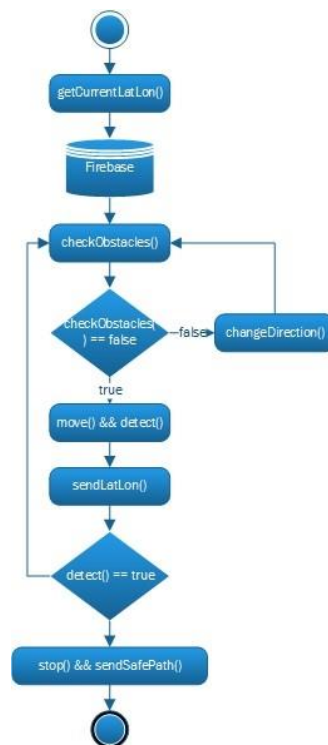


Figure 8 : Algorithm Design

were connected to the Arduino Uno. Node MCU is connected to the motor controller and the motor controller is connected to DC Motors.

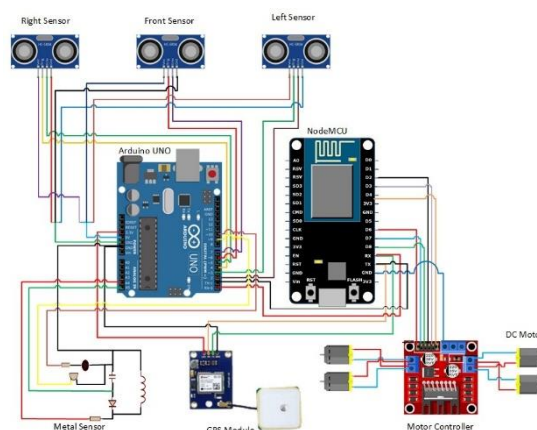


Figure 9 : Circuit Diagram

IV. RESULTS AND DISCUSSION

After the Research team implemented the project. The team has tested the project components to see if all the components are working perfectly. So when the research team is running the autonomous mode to see if it avoids obstacles by detecting the

obstacles with the help of Ultrasonic sensors it was a success. The team also moved the vehicle manually with the manual mode which is implemented in the android app. When supplying the power to the coil it generates an electromagnetic field. When the robot is in autonomous mode it finds the possibility of detecting landmines if the capacitor increases its voltage. A capacitor is used to power up the coil and to detect the voltage of the magnetic field. There was a slight change in the electromagnetic field therefore there is a presence of metal and it can be a possibility of a landmine.

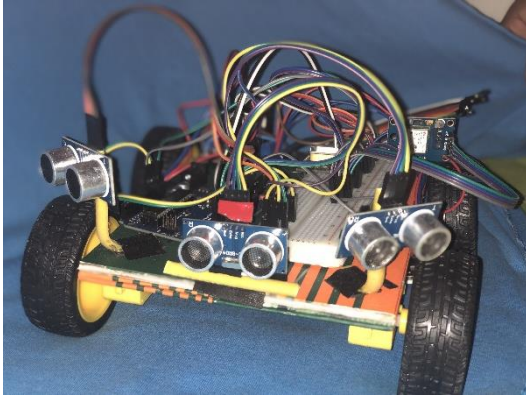


Figure 10 : Minecraft Robot

The robot is built with Arduino UNO and NodeMCU and it capable of sensing metals. The system can detect metallic objects without any human appearance and informs user and sends GPS navigations when a metal is detected. The accuracy of moving the robot is more than 95%. GPS coordinates 80% and detecting metal is 60%. Overall accuracy of the system can be described as 60%. There were few failed test cases when detecting metals and the team got rather different coordinates for the GPS navigations and sometimes it takes much time to send data.

Buzzer and led keep alerting when any metal is detected, there should be a way to distinguished from a false target. Robotic device got unusable when it's raining and advised to not to use it when it comes to bad weather conditions. There were few loose connections between jumper wires and pins and soldering iron is used to get rid of the issue.

V. LIMITATIONS AND RECOMMENDATIONS

GPS taking much time to get latitude and longitude if it's inside a covered area such as building, so that there will be a delay of operations and the coordinated are not always 100% accurate. The performance of the android application is mostly relying on the performance of the mobile device. Whole system would be unusable, if the mobile device is not performing well enough. Communication between the robot and the application can be affected by harmful programs. Inconveniences and troubles can be occurred when the operator is not well trained with the Mine-Craft application. Robot car cannot be operated in a safety manner when it comes to heavy rain flood etc. The Mobile phone must have enough performance in order to have an accurately working mobile applications. If the phone does not

have enough resources available for the application the application does not work as expected. Operators are advised to use the robot car in a clear sky to get better GPS coordinates and to not use in bad weather conditions. Users of the system are strongly advised to train well about the software application and its operations and to use the robot with safety guards, clothes and equipment in the contaminated area.

VI. CONCLUSION

Demining can be taken as the process of removing landmines from a contaminated land. In the process of demining; mine detection plays a significant role. Mines are sensitive explosives which would be triggered by pressure, movement, sound and vibration etc. So that it would be really unsafe to be presence in a danger zone with undiscovered landmines. The goal of the project is to help with detection to remove all the landmines to make the land clear for rehabilitation. The research idea improves existing technologies about mine detection and increase the probability of detection

Requirements that are discussed have been implemented as the first version of the application. Project team is expecting to release the second version of the system in future with the help of government. There will be improvements for the application to navigate by using satellite technology. In future model can be powered by a knowledge based system. From that metals can be accurately determined. The concept of the research can be applicable for security systems and for automated cars

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Ravana: The Unrevealed Legend

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Abstract— Ravana is described as the greatest emperor lived nearly five thousand years ago in Sri Lanka. According to the Hindu cultural resources Ravana is a demon king and in present time worshipers burn the statue of the Ravana as a festival called “Dussehra” However according to historical document king Ravana This paper explains the 3d animated movie about king Ravana’s technology considering the fact that king Ravana was a great inventor who invented mysteries even the prevailing science cannot prove

Keywords— 3D, Animated Movie, User Interacted, Ravana

I. INTRODUCTION

To start with a glance, we can turn into the history of Sri Lanka, Ravana; a character, a lore that has been avoided by the hands of archeology and history of the major culture. The information found in different countries like Sri Lanka, India, and China have different viewpoints of the story of King Ravana, which is contradicting. In the ancient Ceylon, most people think Ravana was a mythical character in folks. But according to Valmiki’s Ramayana and Sri Lankan historical resources, Ravana was not a myth, but also a King who ruled Sri Lanka nearly 5000 years ago. He also known as the ten headed king which is not a practical thing that we would find in an ordinary man but it idolizes the fact of his expertise in ten areas of knowledge, ten regions of this kingdom and the power and strength of ten men. During Ravana’s time, the kingdom “Lanka” was divided between three clans Yakka, Naga and Deva [1]. So many have taken steps to do research regarding this. Yet the real challenge is to merging the animation technology with this matter. As elaborated above; King Ravana’s legend has been manipulated by indian culture as they celebrate Dussehra festival while burning the statue of Raksha king so this means it simply cannot change a folk’s legend; aiding this into challenge a new research had to be done by the team to prove the greatest technology which prevailed in Sri Lanka. The team would visit the real locations which related to the project in order to gather information, map and illustrate the models, equipment and etc. Also, through this project the team would take steps to interact with the audience or the user while showing the unseen sites of ancient Ceylon and comprehensive knowledge as for the implementation of user interacted animation movie to signify the tremendous ancient technology which used in early Sri Lanka.

Objectives

In this research project I consider to peg the main characters in Ravana story, distinguish the existing 3D modeling techniques. To model King Ravana, Queen Seetha, Warriors and Guard characters using appropriate texturing. To model Sigiriya Rock and the surrounding landscape using appropriate texturing, to develop an interactive movie using the characters and the

environment using Unreal Engine. To develop a functionality to explore the environment in third person view.

The rest of the paper is structured as follows. Second section consists of a small overview about the related works that we could find.

II. LITERATURE REVIEW

Since this animated movie is based on an unrevealed story and the legend of king Ravana, this section shows the related work on interactive animation as well as existing works about king Ravana. Comparing Ravana: Unrevealed Legend; user interaction movie there are very few and limited number of existing similar research projects are available. Although these existing research projects covered some of the features that we can find in Ravana : Unrevealed Legend, there are still some features that cannot be found. The short 3d animated movie, Ravana: Unrevealed legend is a cluster of features gathered in order to give out and outstanding output.

A. Early Sri Lanka, believes and technology

Sri Lanka was an isle under India and on ancient times the land was fully devoted to mythological Gods, creatures and legends. Roman and Greeks told it is Taproban, as sometimes later it was known as Serendib. It’s a pearl shaped island as the half size of England. We should know that “Singlar” or the Sinhalese are the aborigines of Sri Lanka. Sinhalese occupying the country are said to have immigrated in 600b.c. There were three major clans in Sri Lanka at that time as yakka, naga, deva. Yaksha or the offsprings of Rakshas were the natives of the country. And deva or Sura to be the natives of India as we all know it’s there popular belief that rakshas are malignant beings demons of cruel heart, while such believes were there they also mentions that these people were worshipers of matter and force, which depicts the real development of science and technology that prevailed in Sri Lanka[1]. So our research team would take steps to find the technological history that prevailed and show them the real world using an Interactive medium.

B. User Experience in Interactive Movie

The effects of distribution are not that clear and they are hinge on the presentation devices and the content modality. It is discussed in terms of the measurement instruments and experimental design also suggestions are made for further research[2].

As they mention the Deep-sea Adventure is a prototype of an interactive movie developed “de pixie” and Philips Research where the user can find three modes as automated mood, game mode, and discovery mode. Automated mode is also becoming the default mode where they play a scenery of submarine sailing underwater where user can see fishes, seaweeds, shipwrecks and landscapes for about thirty seconds. In the game mode, the user can move the submarine into directions left and right to avoid obstacles likes reefs, and mines and user can score for avoiding those while if the ship get hit by a mine; the ship explodes and this mode also lasts for thirty seconds. Discover mode was built in order to give the user more freedom in navigating the submarine, here the speed and directions can be manipulated according to the user’s desire and when they go near a fish the researchers created an option to catch a fish and a detailed info. About the fish appears. All together the researcher’s objective was to give a 3d virtual experience to the user while using 3D animation features also, they used MPEG-4 to create the 3D space with multimedia objects [2].

C. Interactive playback of digital movies

A system and method for synchronized playback and control of a movie (also referred to as time-based digital media). The movie includes one or more data structures, called "tracks", containing time-based data that is intended to be played together in a synchronized manner at a given rate of speed. The system and method allows two or more participants that are operating on different playback systems at different locations to simultaneously view and control the playing of the movie. The image on each participants display is kept synchronized with the others, providing a virtual co-location. Figure: 1 and 2 illustrates the synchronized playback Menu [3]. Below diagram shows the playback interface of the system Ravana and its character menu interface.



Figure 1. UI of Ravana the Animated movie



Figure 2. Character Menu

D. History and production management of 3d animation

This section includes the revolutionary idea of this research as well as inspiration. 3D animation is simply challenging than a 2d animation as we know black and white movie is less costly than a colored movie. Animation is a bit harder than a normal movie and costly production, yet it grabs the attention of the user or the audience. The 1950s 3D technology was reusing the multi-camera technologies developed for early color and panoramic formats [4].

Animations permit people to apprise a story with your 2D and 3D content, such as exhibiting a critical region or by flying through a 3D view of the area and turning on analysis results. Anyone can then export animation to a common video format. Animations are created by establishing a small set of key frames, or waypoints within the view and configuring how the software incorporate the transitions between them. A key frame consists the viewpoint, layer visibility, time, and range properties of the map, which can be manipulated in combination depending on certain needs.

Examples of animations include the following:

- Previewing a procession route (camera animation in 3D)

- Communicating impacts on critical habitats (layer animation in two dimension)
- Visualizing early population changes (time animation in two dimension)
- Viewing discrete floors for a building (range animation in 3D) [5].

Making a 3D model is not simple task, so creating a human character, giving expressions is simply challenging. So we could aid the software like Autodesk Maya, Mudbox, 3d max etc. As these are very powerful 3d modeling and animating software. These systems dramatically ease the development of three-dimensional facial models. Improvements in surface scanner technology, such as optical laser scanners [Cyberwar Laboratory Inc. 90], and motion capture systems have been a great use in animation industry [6]. And the below figure 3 shows how facial animation framework works.

E. Animation in computer based instructions [7]

This research is about computer based animations. The research shows how animation is frequently used as part of practice strategies, ranging on a continuum from highly structured to discovery approaches. In the most structured practice activities, such as question and answer, animation is used as feedback to student responses. For example, a student who correctly answers that four quarts equal one gallon is given an animated demonstration [7].

III. METHODOLOGY

According to the research project components research team came up with a decision to use the “Iterative Waterfall Software Methodology”. When selecting the software methodology research team concerned about the time frame, doing few tasks at the same time is very easy to produce the final output on time and it shows in the below figure.

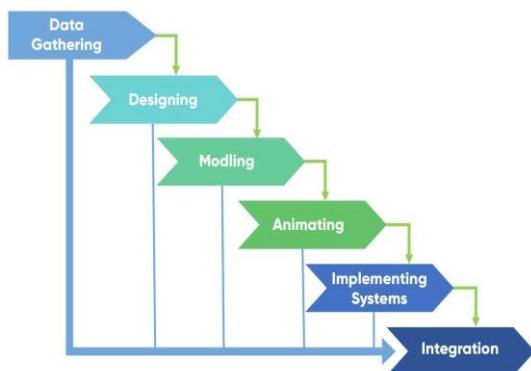


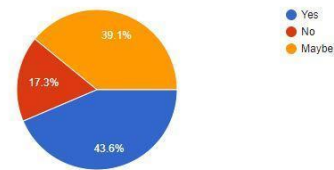
Figure3 . Iterative waterfall methodology

Data gathering

The research team took steps to create a question pool and gathered results for aiding the project following are some of the important data that aided in creating the system.

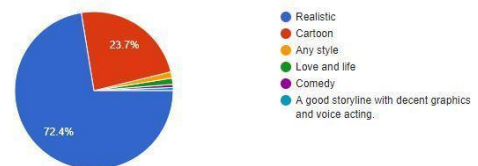
Do you prefer an interact with the movie?

156 responses



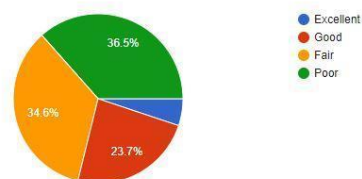
What kind of features are you expecting ?

156 responses



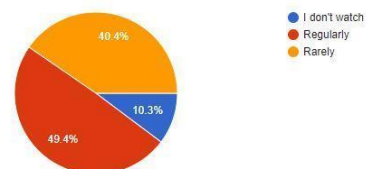
What is your opinion on Sri Lankan 3D animated movies ?

156 responses



How often do you watch 3D animated movies

156 responses



The Ravana Unrevealed legend is a three-dimensional animated movie with a user interaction that will help the audience to interact with the movie. The research was

successfully completed by an eye-catching interface and a character explore mood. The movie won't be a lengthy lethargic animated movie but a short interactive exquisite movie and the system assure that the audience will definitely have an interaction.

From the start and till the development of the project the research team had to face several challenges regarding the gist of the project due to several reasons, mainly technical reasons.

- Developing a storyline matching for the main character.
- Maintaining the components of the team members as the team members and their Pc's did not have enough performance.
- Size of the final project file was too large.
- Designing the main four characters with different characteristics and animations.
- Had to use visual coding system which was a new challenging experience for the team members.

As to prevail over the challenges the team had to learn and obtain knowledge about Unreal engine, Unity seeking online tutorials and forums and also aiding the help of some personals who are professionally engaged in this area.

In order to share the component workload, the team has to come up with a plan as every member did not possess enough skill set, technical and hardware access. So, to ensure the reliability of the project the team used following techniques.

- Using Unreal game engine to minimize the rendering time that would take than using software like Maya as unreal has a real time rendering platform, to consume time taken for coding and reducing the complexity happened due to the logics.
- Unity application was used to develop the project as it has a higher efficiency.
- When giving out the final product, tackling the people who watch animated movies were important so a survey had to be done and the team made following certainties.
- User must have an interest towards movies, and 3d animations.

IV. .RESULTS

“Ravana: The unrevealed legend “ 3d movie is a production made using the unreal engine, from the first camera view to the end of the movie the user can see the changing of viewpoints and how smoothly the movie flows. Also the user can see the realistic nature and the exquisite site of Sigiriya Rock, the gardens and the fortress.

The following few shots are taken from the animated movie.

- These characters were modeled by using Mixamo



Fuse Application and these are the simple characters of dancers.

- A portrait of king Ravana sitting on his throne, at Sigiriya Fortress created by using Unreal Engine 4



- This shot shows Sigiriya rock which was modeled using Zbrush and exported to the Unreal Engine 4 in order to merge with the movie.



By granting a thrilling experience to the user from the movie the team added an exploration mode for the characters so the user can get more interact with the movie. In the process of creating this scenario the team used the unreal engine 4 and using its visual coding system, it was able to create a logical scenario of exploring.

The below segment exhibit two samples of code, how the inputs were given to the characters to perform the tasks

- A jump event
- Mouse view input

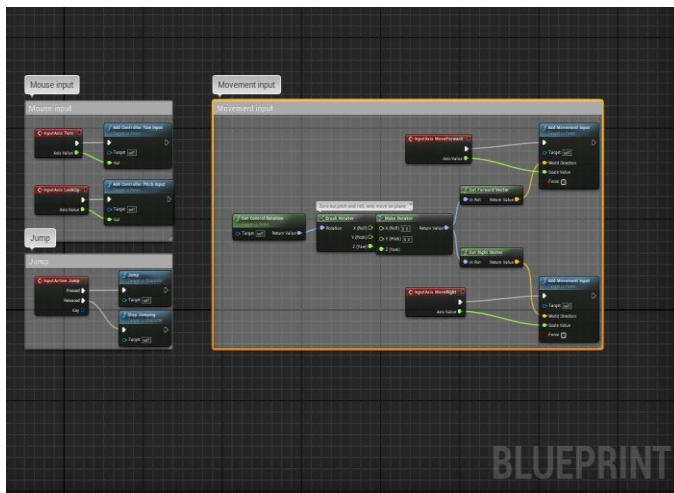


Figure 4- Blueprint 01

As the above diagram shows the basic blueprint of the character class in order to the character to explore the map the team had to create an animation blueprint as well,

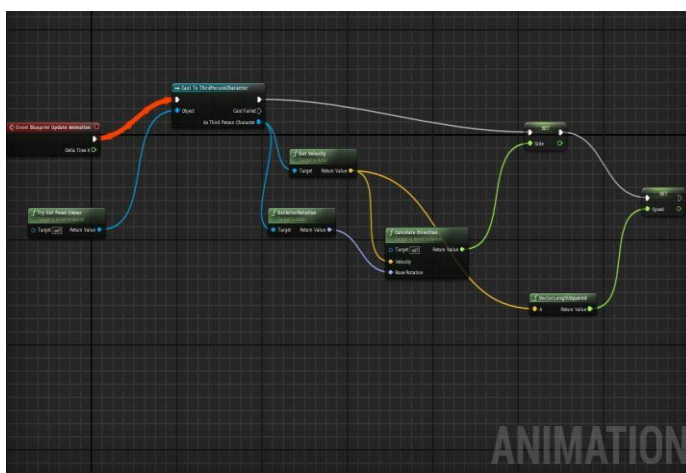


Figure 5- Blueprint 02

After assigning the character to a third person skeleton rigged the above action had to be performed in order for the character to move, run, stop, turn and to stay idle when the user is not giving any commands.

V. CONCLUSION

In this part of the paper, the overall conclusion of the project “The Ravana the unrevealed legend” had been discussed with the importance of the outcome, confrontation of the objectives, limitations, Recommendations, and future works.

After completing the user interacted 3D animated movie “Ravana- The unrevealed Legend”, the research team could give out a much pleasing and interactive movie to the users followed by realistic environments, user friendly interface, and interactive exploring mood with thrilling new experience.

VI. LIMITATIONS

Limiting the character models due to the lack of time and limitations faced when integrating the system. Not being able to create a project file without higher file space. Problems were faced due to not having well performing devices when creating, and when testing the system. Example - Graphic card, RAM.

VII. FUTURE WORKS

After finalizing the project we thought of creating a VR application for our research and also the team would create a first person game. And hoping to create a whole new storyline with improved graphical user interface. Also we can suggest to create a mobile version for this application.

VIII. ACKNOWLEDGMENT

The research team would like to take this opportunity to thank and appreciate all individuals and groups who have given aid in creating this project. First and foremost we would like to thank our project supervisor Dr. Yasas Jayaweera, the Academic Head of SLIIT Academy, and Ms. Gayana Fernando, Senior lecturer and lecturer in-charge of the module for giving us the opportunity and the support to conduct this creative project and research

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Section C : Poster Abstracts
Information Technology

"Sinhawalokanaya": Exploring 8 Sacred Places

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Abstract — The difference between the real world and the virtual one is connected from the past. Past thought it was reality and the dream world, but 21 centuries answered its Virtual Reality. Virtual reality gives some real-time experience to the user about an environment that currently differ from the current user environment. It is a popular fact that technology has invaded the modern world with many sources to gain knowledge and with this user-friendly digital world, people temp to accomplish a particular task smartly without dwelling through a hard path. A user is always likely to go for a media which aid in visualization and auditory than reading. Moulding is the act of building a model. It can be a physical model or a conceptual model. A simulation is a way of studying behaviours and performance or a particular system in a modelled environment. The proposed system is based on historically, archaeologically and artistically valuable location (8 sacred places, Sri Lanka) which can grant to enhance knowledge through a realistic experience. VR (Virtual Reality) tours have been created focusing on different locations in the real world and it has been a unique approach to learn about locations. Even though there are different methods like articles, photographs, and documentaries to gather knowledge about the Anuradhapura Temples, it's hardly a way to gain knowledge through a dynamic and interactive virtual environment. As a solution for that, the research team will be coming up with a Virtual Reality application. This Virtual Reality application will take the user a virtual tour inside, out and all over the Anuradhapura, which provides students with a learning environment, a realistic environment for the people willing to but not able to visit the location. Also, the tourist willing to visit the location, this will help to identify the location and to get a brief idea about the place. This application will make a positive impact on the industry of tourism to know the historical values of the country.

Voice Me – A Diary built on your voice command

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Abstract— The current population has tremendously become busy with the competition of living where people are not comfortable in spending time to maintain a day to day diary. As a solution, this project proposes a voice diary where individuals can continue keeping logs in the diary while engaging in other activities through voice. There are similar applications in the market, however, the majority of the applications have failed to provide facilities such as the application security, voice to text translation, image capturing with geographical location and mood selection. The research was conducted to investigate the reasons for individuals for not maintaining a diary, where the main issue stated was the time consumption in maintaining a diary. Other problems were also noticed stating inability to capture images, less security, reliability issues, and document creation issues. In this system, all the stated problems are addressed where the user of the diary application can use voice to maintain the diary, use PINs and Passwords to create security, capture images with the geographical location, backup facility, and the PDF converter to convert the diary entries into the documents. The main outcome of the proposed system is to provide reliable and efficient feedback in the diary operations with the implementation of detection of homonyms and the generation of the PDF document. By introducing the background to the research, this paper provides insight into the methodology, results, and discussion. Furthermore, it impacts the ways of handling diaries and the ways of the voice recognition-based systems and it provides the guidelines for the future development of Voice Me E diary.

Keywords— Voice Diary, Voice to Text translation, Image capturing with geographical location, Application Security, Backup facility, PDF Converter, Homonym Detection.

Automated Orchid Plant Nursery via Internet of Things

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Abstract — Rapid population growth, climate change and the dynamic business environment demands farmers to improve the efficiency of their agricultural processes. Technological innovations such as drones, satellites and sensor technology are reshaping the agricultural industry in a remarkable way. The Internet of Things (IoT) is reshaping the agricultural industry through precision agriculture, a concept that uses sensors, data, and network communication to tailor the agricultural system to the specific conditions of the field. The result is a more efficient (optimize) system that promotes sustainable growth while reducing costs. Orchid plantation is a popular Floriculture in Sri Lanka that brings substantial foreign exchange and generate employment directly as well as indirectly. Orchid plantation requires controlled sun light, watering and fertilization. This paper presents a system which uses sensors and IOT technology to automate an Orchid Plant Nursery. The sensors detect the sun light level, rain level and the soil moisture level. The sensors are connected to the Arduino Board and Node MCU which are connected to the Firebase Database (Realtime Database) via a Wi-Fi router and this Realtime Database are connected to Android application. According to the sensor reading, roof of plant nursery would be automatically opened or closed to control the sun light. Similarly, according the sensor reading of soil moisture, Plant Nursery would be automatically watered. The user can also manually control the Servo motors of smart roof and water pipes of Plant Nursery to control the Sun light and water supply. This Automatic Plant Nursery system enhance the user experience while reducing labour costs. The owner of plant nursery could even remotely control sun light and water supply through the Android phone. Android mobile phones being versatile today and the cost of sensors and hardware are bearable, this system helps to improve the efficiency of Orchid plantations remarkably.

Keywords — Internet of Things (IoT), Android, Mobile Applications, Sensors, Arduino Technology, Node MCU, Servo Motors, Relay Modules

SmartVoice - Conversational Interface

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Abstract— Talking to smart devices have come a long way from just voice to text conversations to actually being able to talk to an AI device. Compared to traditional chatbots, development of conversational User Interfaces have been remarkable. Conversational UIs consists of natural language processing, artificial intelligence, human-computer interaction and usability. SmartVoice is a technology that serves a different purpose compared to the traditional voice assistants. For an example traditional interfaces require touch assistance and UI navigation but with SmartVoice users can access their electronic devices through voice, using NLP technology common human phrases would be matched with the closest matching command. A simple voice command would go a long way if coupled correctly not to mention the advantage this brings to differently abled people. Once this technology makes its way onto consumer electronics it would completely change how people use their smart devices.

Keywords— Voice recognition, Conversational interfaces, Artificial Intelligence, Natural Language processing (NLP), Voice control, AI Assistant, Raspberry Pi

Minecraft – Autonomous Land Mine Detection System

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Abstract— Landmines are major nemesis for the soldiers in the front of the battle field. Landmines have been so productively used in battle fields to defeat the enemy. Determining the precise location of minefields and modern landmines can be toughest tasks faced by national authorities and operators. The research team create an automated landmine detection system with machine learning techniques in aid of humanitarian demining. A robot and a controlling software was implemented separately. However, Additional time and resources were needed to get to know the system properly. Combination of machine learning with land coverage, avoiding obstacles and land mine detection can make the process more efficient and secure.

Keywords— Machine Learning, Landmine Detection, Bluetooth, WI-FI, Tracking, Arduino Bot, Android

EasyList – Shopping Assistant Mobile Application

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Abstract— In Sri Lanka, there are several major supermarket chains that have emerged, especially for food and grocery items, and the provision to entice more customers by establishing shopping websites and mobile applications. The field of mobile shopping is developing rapidly and changing the way to customers for gather information from multiple sources, check for availability and compare prices with sufficiency of understanding to use shopping applications. EasyList is an android based shopping assistant mobile application, which is to ensure that any person will be able to use it solitary with the assistance of unique features excluding to existing shopping applications and technologies to pledge with easiness to the buyers and sellers of groceries. The application comprises with voice recognition technology to create list of items by user's voice in Sinhala, GPS technology to record the closest location of the grocery which is able to fulfil the buyer's list of items, data mining techniques to determine the patterns of purchasing items of the buyer to exhibit the suggestions of most selling items. The key benefit of this android shopping assistant mobile application is to preserve a plain selling relationship between the buyer and the grocer. Furthermore, this paper explains the development and deployment of EasyList which is consist of various functions, benefits and, to dispense the guidelines for future development of shopping applications.

Keywords— shopping assistant mobile application, voice recognition, data mining, suggestions about recent selling items, Global Positioning System (GPS), speech-enabled platforms, m-commerce.

I Portal: An Advanced Messaging platform for the University

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Abstract— In the current world, with the increase of access to higher education, the number of students enrolling in universities have rapid growth. Hence communicating with the students has become a process with utmost effort and problematic. The I Portal Advanced Messaging web-app paves the way for a hassle-free and secure communication platform for the students & lecturers to interact instantly. This messaging portal has been designed with fast, state of the art services and optimized backend for an enhanced communication experience that has the specialty of broadcasting or multicasting a message within the university. The integration of the user management system to the I Portal platform overcomes the manual user handling process. Hence the paper elaborates on the systematic development and methodologies of the I Portal Messaging web app.

Keywords— Instant Messaging, Message Broadcasting, Message threads, user management, Web app

Cross Ads: A service to extract advertisements based on different sources

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Abstract— “The key factors for the success of the World Wide Web are its larger size and the lack of centralized control over its contents”. But because of these factors, there are some serious disadvantages and constraints for the users, the lack of authenticity of the information found online and the information that the user seeks may be spread in multiple sources are some of them. In this research, we address the second problem of the above mentioned. E-commerce is a rapidly developing area on the internet. The first step for the process of E-commerce is it find the desired product, item or service. For that purpose, we have developed a system (Cross Ads) that can fetch advertisements that are posted on popular classified ad publishes in Sri Lanka. The system Cross Ads uses web scraping technology to collect the advertisements. After collecting advertisements from different sources, the system checks for duplicates, the perfectly matching duplicates will be automatically removed and the partial matches are sent to be reviewed by an employee. The users are provided with a free to download mobile app. This mobile application can be used to view the advertisements and navigate to the advertisement publisher’s classified web site. Here, we are not viewing the advertisement’s details in our application, instead, we just direct the user for the particular web URL. According to this method, the users of the system can search for a certain product or service without navigating to different classified advertisement publishers for comparison. Instead, they can get instant search results of advertisements and compare, sort the results according to their preferences. All in all, by using our system, the users can save lots of time and cost with a little effort.

SkelatalGUI : Experience the Next Level GUI Validation Techniques

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Abstract— The highly increased rate of the developments of the software industry, playing a major role in electronic medium and the increased intelligence-based components comes to play. These software's have brought huge challenge to identify bugs, defects, UI/ UX quality and standards which are unique to their own industry recognized internal standards. Considering the standards SkeletalGUI supports for the international code and UI/UX standards in order to maintain quality of the software product and verify whether software's are built in best quality by reducing the effort and cost for the organizations to test build tools.

Keywords— Graphical user interface (GUI), User interface (UI), User Experience (UX)

YAMAN An Android Application with Geo Tagging to Guide Hikers in Sri Lanka

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Abstract— “Yaman” is an android application on explore the uses of geo-tagging technique and crowd sourcing developed for hikers. Nowadays many people are interested in going hikes. There are many android applications developed as travel guide that can be used in hiking. All these applications provide the same functions like search for locations, booking vehicles, chatting, etc. Yaman system includes location-based algorithm using geo-tagging and an algorithm for select camping tools base on weather. The application includes a rating facility, where users can rate and comment on different locations. The system will calculate the health fitness using sensor. Hiking will be interesting because this application has these enormous features. The users will feel more familiar and relax. Hikers can decide where or what place is good for hiking. User can refer to the map given as a photo of the selected place via map reading. It will clearly define the directions of the location, so when they are offline, they will be able to see the directions using this app via GPS. The system is base on Google maps Application Program Interface (API) to get the users locations to the exact point and weather API to get relevant backpack details according to weather. The paper presents a system which uses sensors to detect the heart rate of a human. The sensors are connected to the Arduino Board and Bluetooth connector which are connected to the mobile through Bluetooth. According to the sensor readings hiker can analyze whether they are in a good condition to go on a hike. The Yaman system enhances the user experience while reducing their time because hikers can view the saved locations and packing backpack details. Android mobile phones being versatile today and the cost of sensors and hardware are bearable, this system helps to improve the efficiency of hikers remarkably.

Keywords— Geo-tagging, crowd sourcing , live locations , Hikers, step count, calories burned, camping tools, location based algorithm, GPS

Mindfulness - Stress Detection and Releasing Mobile Application

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Abstract— Contemporary new employees in the IT department of a particular institution are challenged by adapting to the new working environment because of the difficulty and coping work-related mental stress. As a result, some new employees leave their jobs. Currently, there are numerous methods and technological approaches addressing related situations like Elevate, Lumosity, Sanvello, HeadSpace, personalZen, etc. applications. But lack of solutions towards especially targeting the employee stress detection and prevention. The proposed system designed to cover all matters identified above by one integrated system. Stress detection and stress prevention include the whole system. Stress detection is done by employees' mobile phone (This should be a smartphone) utilizing its built-in API to detect the stress level of the employee through the image input. While stress prevention or managing achieved by recommending selected activities that are following "neuroplasticity" findings. The combined system assures a relaxed working environment with improved working efficiency. Because of the experiment, nature, and the possibility of undiscovered requirements, the system needs to be developed using prototype methodology. Proposed systems outcomes improve working efficiency and aid employee for quick adaptation to the working environment with a relaxed mind.

Keywords— image-classification, stress-detection, stress-managing, neuroplasticity, adapting

"Sinhawalokanaya": Exploring 8 Sacred Places

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Abstract— The difference between the real world and the virtual one is connected from the past. Past thought it was reality and the dream world, but 21 centuries answered its Virtual Reality. Virtual reality gives some real-time experience to the user about an environment that currently differ from the current user environment. It is a popular fact that technology has invaded the modern world with many sources to gain knowledge and with this user-friendly digital world, people temp to accomplish a particular task smartly without dwelling through a hard path. A user is always likely to go for a media which aid in visualization and auditory than reading. Moulding is the act of building a model. It can be a physical model or a conceptual model. A simulation is a way of studying behaviours and performance or a particular system in a modelled environment. The proposed system is based on historically, archaeologically and artistically valuable location (8 sacred places, Sri Lanka) which can grant to enhance knowledge through a realistic experience. VR (Virtual Reality) tours have been created focusing on different locations in the real world and it has been a unique approach to learn about locations. Even though there are different methods like articles, photographs, and documentaries to gather knowledge about the Anuradhapura Temples, it's hardly a way to gain knowledge through a dynamic and interactive virtual environment. As a solution for that, the research team will be coming up with a Virtual Reality application. This Virtual Reality application will take the user a virtual tour inside, out and all over the Anuradhapura, which provides students with a learning environment, a realistic environment for the people willing to but not able to visit the location. Also, the tourist willing to visit the location, this will help to identify the location and to get a brief idea about the place. This application will make a positive impact on the industry of tourism to know the historical values of the country.

Smart Food Suggestion System: (Eat Food According to Your Mood)

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Abstract— Emotion can be communicated from various points such as outward appearance, signals, discourse and by composed content. Emotions are engaged with everything individuals do; every activity, choice and judgment. Everybody encounters and relates their sentiments and emotions in everyday life. Emotions hold important information about connections, conduct and each part of the human life around us. This exploration fabricated a theoretical model to show how food can be suggested according to the facial display of emotion. So some brain science models were proposed to investigate the correlation between clients' discernment and emotions (joy and excitement) and between clients' enthusiastic states and conduct aims. An environment in the restaurant or any place where people enjoy meals and food was proposed. This proposal discusses a Smart Food Suggestion System (SFSS) to find the customer's emotion using the video/audio/question form. Then suggests the matching meal for the emotion which is deduced and then checks whether they are satisfied or not using a feedback method which is our main goal. We are going to deliver this using two methods. One is a standalone system. The second is an online website. The website has a benefit where the more time consumption is reduced; the customer can order his/her meal through the website. So the meal will be prepared fresh when customer arrives to the location. Thus, the customer can enjoy the meal without waiting for the meal to be prepared.

Keywords— Emotion detection; affective computing; psychology; algorithms; web-based application

HelloYou: A Mobile Serious Game Application

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Abstract— Mental disorders are a familiar and ubiquitous issue that plague an increasingly worrying percentage of people globally regardless of gender, age or circumstances. It is an invisible threat, unknowable to anyone besides those afflicted and in a worst-case scenario can lead to suicidal thoughts and without treatment, death. It is especially dangerous in largely traditional societies which look down on mental disorders and this stigma prevents potential victims from seeking help. Therefore, the research team set out to build an easily accessible android mobile game application that can help cope with anxieties and depression in a proven healthy manner. Activities within the application were designed with express purpose of helping those afflicted effectively and combine to form a serious gaming experience built to curb the crippling symptoms of depression and anxiety allowing users to continue functioning in society and improve their mental wellbeing.

Keywords – Mobile Game Application, Android, Health and Wellbeing, Mental Health, Mental Disorders, Depression, Anxiety

SLWEA Sri Lankan Women Empowering Application

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Abstract— SLWEA is the next level of skill and job mapping application to the unemployed women. This Application is easy to use and based on Android Mobile Application with the Web Application. This product estimation tool will be able to utilize the Unemployment of the Sri Lankan women with the most accuracy job respect to the skill pool and the most accuracy seasons, with the use of job recommendation and job analyzing tools. The research team was able to identify the niche market values and gather the requirements to fulfill the space using the available skill selection or the newly created skill pool. Unemployed women can register with Android mobile applications. As the next step they have to fill the required information from which contains user's basic information and skill management interface which contain some examples with the available skill selection. Skill was divided into two parts as a primary skill selection and secondary skill selection. The primary skill selection was used as the best option for the forecasted result and secondary skill selection was used as the alternative skill selection. In the Web Application research team provided the Interface to employers of government organizations, private sector companies, service providing centers and individual value added services. Based on those entities, control party of the entities could register their organization with SLWEA and fill the required information forms. Based on the information, prediction model predicts the seasonal jobs and alert them to the registered users with SLWEA. With the indication skill mapping module identified the result and redirected those results to users of both skills mentioned above. When the given result was not accepted by the user end result automatically redirected to the next most eligible user. With the SLWEA research team was able to help increase Sri Lankan economy and secure poor families with additional income. By this Application unemployment rate of Sri Lankan women can decrease to 2.5 %. Another benefit of this Application is seasonal job and the production flow can increase without any delays.

Keywords— Women, Job recommendation, skill mapping, Android Application, Web Application.

A practical implementation of dynamic GPS based appointment scheduling for health and fitness

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Abstract— The modern man is caught in a conundrum of interloping appointments, business meetings and engagements that often clash with one another. Not only do we spend more and more time moving between previously scheduled appointments, we also spend a lot of time hunched in front of screens in activities that are not only unhealthy, but mundane and unappealing. This problem persists even when an individual wishes to engage in a lot physical activities. Because they often lack the management skills to make necessary appointments. The solution to this issue is not to introduce drastic social reforms, but rather; innovation. Innovation through optimization. This work looks at a practical implementation of optimizing the daily schedules of individuals, and dynamically allocating appointments based on GPS coordinates, time of day, weather conditions and traffic. All concepts discussed herein will be implemented and evaluated by a comprehensive software prototype in different application scenarios.

Mobile Laboratory (Blood report analyzer)

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Abstract— Medicine and Technology are rapidly developing and advancing fields in the modern-day. Even the younger generation has access to the internet at their fingertips, yet when a person needs to get a diagnosis or a simple reading of their blood reports they still have to consult a doctor. This research is focused on an Android-based mobile app that reads a blood report by an uploaded or captured image via the camera and provided a diagnose report. Then there is a process to identify characters of the image by using Optical character recognition. The extracted data goes through the matching algorithm to divide into separate key-value pairs. And that pairs are fed to the supervised machine learning model which is trained by actual patients' data of Complete Blood Count report to get a diagnosis of the patient current health state, according to the report. Even though there are large systems with lots of sensors and equipment to determine a patient's health, they are limited among specific groups of people or places such as hospitals, medical centers, laboratories and sometimes they are too expensive. Also, some of them are created so complicatedly as they can only be operated by field-related experts. This app provides a simple diagnosis with just the application installed inside a mobile phone. As key benefits; the user is provided with easy to use, user-friendly mobile application, which saves money and time to visit a doctor for a blood report analysis. Furthermore, this system developed to analyze complete blood reports only, as it can be developed to analyze other medical reports as well in the future.

Keywords – Medical and Technology, Blood Report, Support Vector Machine (SVM), Supervised Learning, Optical Character Recognition, Expert systems.

Automatic Feedback System

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Abstract— The common issue in each company is getting customer feedback. Will it be a real comment, would be a concern among the existing input methods of the company. The development team can be able to create a unique system by using both speech and facial recognition. Automatic feedback system has the ability to record the customer's face and speech emotions when the customer first interacts with the camera. Customer is not have to bother to answer a questioner. The feedback automatically record and sent to the database as the feedback report. The facial emotions were be hidden from the tablet camera in facial recognition. For the feedback extract, generation four emotions were from the image sequences. From the tablet, record camera four emotions were as sadness, anger, happiness, and neutral state. In facial recognition, the speech was recoded from the tablet mic. For the feedback generation, pitch and frequency are detected of the speech of the customer. Agile methodology is used to implement this feedback system. Currently most of the banks are using various feedback systems but the most common way is to collect the customer feedback from an emoji related way. It is contain whether the service is very good, good, bad and very bad. Some banks include the feedback service as a questioner. It contains some questions about the service. Some may answer it but some may not. This project introduces an automatic feedback system to a banking feedback system. It include face emotion recognition, speech recognition and generates a feedback of the customer satisfaction. From a tablet's camera and the mic facial emotions and speech is captured. It generates a result and it saves as a report in the Database. An organization can successfully gather customer feedbacks and have a final report per month, can save the customers' time because the process is happen when the customer first interacts with the bank employee and the organization can improved by referring to the monthly feedback report.**Keywords** – Medical and Technology, Blood Report, Support Vector Machine (SVM), Supervised Learning, Optical Character Recognition, Expert systems.

Keywords – Face recognition, Emotion recognition, Speech recognition, Real-Time image processing, Feedback report, Audio

Section D: Poster Abstracts
Electronic & Electrical Engineering

Gas Leak Detector

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BEng in Electronic & Electrical Engineering

Abstract— Home fires take place frequently and as a result the threat to human life and property is well known. Liquid Petroleum Gas (LPG) is highly inflammable and most households use LPG for domestic cooking. This gas can burn even at some distance from the source of leakage. Most fire accidents are also caused due to poor-quality rubber tubing. It can also be a situation where the regulator is not turned off when the LPG is not in use. Therefore, a product is developed using the MQ-5 Gas Sensor and the PIC16F84A microcontroller to detect a gas leakage at home and warn any possible damage to life and property. This is a simple PIC based alarm system that triggers an audio alarm and a red led flash light when a gas leak is detected in the vicinity that can have a potential lack of oxygen or presence of a toxic gas.

CD-ROM CNC Plotter

Perera N and De Mel G

BEng in Electronic & Electrical Engineering

Abstract— “CD-ROM CNC Plotter” is an embedded system that works on the principle of Computer Numerical Control (CNC). An image to be plotted is imported to Inkscape and converted to a G-code file format using a library called Unicorn present in the Inkscape editor. Another software named Processing is used for communication between the G-code and the Arduino code. ‘Processing’ basically gives the appropriate coordinates of the pen taken from the G-code and fed to the Arduino Board once the board is connected through the communication port. Finally the image is printed using the pen with currently running coordinated on the processing command window. The printer includes two CD-drive stepper motors for Z and Y axis and one CD-drive for X axis with a servo motor, wherein the CNC PLOTTER plots the input given from the computer from the drawing board using an open-source physical computing platform Arduino Uno.

Home Automation System

Rehan A.A.S and Samini C

BEng in Electronic & Electrical Engineering

Abstract— The objective of this work was to develop a ‘Home Automation System’ using an Arduino board with Wifi and a remotely controlled Android OS smart phone. As technology is advancing so houses are also getting smarter. Conventional wall switches located in different parts of the house makes it difficult for the user to go near them to operate. It becomes more difficult for the elderly or physically handicapped people to do so. Remote controlled home automation system provides a modern solution with smart phones. In order to achieve this, a Wifi module is interfaced to the Arduino board at the receiver end while on the transmitter end a GUI application on the cell phone sends ON/OFF commands to the receiver where different loads are connected. By touching the specific location on the GUI, different loads can be turned ON/OFF remotely through the smart phone. The loads are operated by Arduino board through opto-isolators and thyristors using triacs. The loads in our work are the lights inside the house and lights outside the house in case of entry of an unauthorized person.

Presentation Timer

S D Ampemohotti D, Sulochana M.S , Udukumbura H and Wijesinghe N

BEng in Electronic & Electrical Engineering

Abstract— ‘Time Management’ is vital in every task we undertake to do. In a public event with several speakers the organisers are expected to make sure that each speaker observes and respects the time allocated each one. The ‘Presentation Timer’ is a product that is developed to maintain the timing of a presentation so that the presenter and the audience are both aware of the time and an event can proceed according to schedule. Time selections of 5 minutes, 10 minutes, 15 minutes and 20 minutes are made available in this product with 4 selector switches for different timings of presentations. Having selected the allocated time for the presentation, at the start of the presentation an indicator button is pressed and a GREEN LED comes ‘ON’ to indicate the start of the presentation. Then the speaker starts his/her presentation. After 30 seconds the GREEN LED goes off to prevent any distraction due to the LED which is ‘ON’. Two minutes before the end of the allowed time, an AMBER LED comes ‘ON’ giving a signal that the speaker has only 2 minutes left to finish his presentation. After a few seconds the AMBER LED goes off and a RED LED comes ‘ON’ at the end of the allocated time. The product therefore has three LED indicators to show the different phases of a presentation namely the ‘start’ ‘get ready to stop’ and ‘stop’. A buzzer also gives a low intensity sound to indicate the end of presentation. A reset button is available to start a new presentation. Its accuracy can be increased without compromising resource usage significantly by introducing a better algorithm and programming methods without much difficulty..

