E-BOOK OF EXTENDED ABSTRACT:

DIGITAL TECHNOLOGY, INNOVATION, IDEA & EXHIBITION 2024

dTiiX 2024

25th JULY 2024 | DEWAN SERI LANG, PSIS

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY POLITEKNIK SULTAN IDRIS SHAH

POLITEKNIK SULTAN IDRIS SHAH
MINISTRY OF HIGHER EDUCATION

ALL RIGHT RESERVED
FIRST ISSUE 2025

EDITORIAL

E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024

CHIEF-IN-EDITOR

Noor Aishah binti Zainiar
Marziah binti Che Mansor
Deepa a/p Rajandran

EDITORIAL

Nurul Ain binti Amir Adli
Ts. Norqursiah binti Saad
Akhmal Khalis binti Mohamad Isa
Mohd Syamsul Ariff bin Ghazali
Sharizan binti Abdul Jamil
Siti Dianah binti Abdul Bujang
Syaiful Idzwan bin Mahmud
Ts. Ainie Hayati binti Noruzman

PANEL REVIEWER

Dr. Norliza binti Abdullah

CONTENTS

The "E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024," themed **"Driving Towards 4IR Technology in TVET Education,"** is a program designed specifically for fifth-semester students in the Department of Information and Communication Technology enrolled in the DFT50114 - Integrated Project course for the 2024 Short Semester Session. The student projects are diverse, encompassing networking, programming, apps, systems, the Internet of Things, and digital multimedia.

This program represents a crucial step in preparing students for the demands and opportunities of the Fourth Industrial Revolution (4IR). By integrating advanced technologies into their projects, students are not only learning theoretical concepts but also applying them in practical, real-world scenarios. This hands-on experience is vital for developing the skills and competencies required to thrive in a rapidly evolving technological landscape.

The goal of this program involves offering students the opportunity to use cutting-edge technology to create creative products with a major influence on daily life and economic value that can compete with market advances. All student projects will be evaluated by facilitators invited from industry professionals and lecturers to contribute their knowledge.

It is planned that this book will be published in conjunction with each iteration of the final year student project exhibition program.

FOREWORD

FOREWORD

DIRECTOR OF POLITEKNIK SULTAN IDRIS SHAH

First and foremost, let us express our gratitude to Almighty Allah for His blessings, allowing us to organize the "E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024 themed "Driving Towards 4IR Technology in TVET Education,". Every semester, this event becomes a meeting point for creative and innovative minds to share ideas and create something new.

This event is not just an exhibition but a platform to empower our students to face the challenges of the ever-evolving digital world. I am confident that through events like this, we can foster a spirit of innovation and entrepreneurship among our students.

I would like to extend my heartfelt congratulations to all the students who have successfully completed their projects. Your dedication, hard work, and innovative thinking are truly commendable. The diverse range of projects you have created demonstrates your ability to tackle complex challenges and develop solutions that have real-world impact. As you move forward in your careers, I am confident that the skills and experiences you have gained through this program will serve you well. Continue to strive for excellence, and I look forward to seeing the significant contributions you will make in the field of Information and Communication Technology and beyond.

Thank you to everyone involved in making this event a success, and I look forward to witnessing the innovative solutions and ideas presented at the exhibition.

HAJI MOHAMAD YUSOF BIN SULAIMAN
Director
Politeknik Sultan Idris Shah

The "E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024," themed "Driving Towards 4IR Technology in TVET Education," is designed for fifth-semester students in the Department of Information and Communication Technology, who are enrolled in the DFT50114 - Integrated Project course for the 2024 Short Semester Session.

Such programs prepare our future workforce with the skills and mindset required to lead and innovate in the digital age. The "E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024" not only showcases student achievements but also reaffirms our commitment to advancing education through technology and innovation.

I am immensely proud of all the students who have successfully completed their projects. As you embark on your professional journeys, I am confident that the skills and experiences gained through this program will be invaluable.

I also want to express my gratitude to the panel of facilitators, including industry professionals and lecturers, for their invaluable contributions. Your expertise and feedback have been instrumental in guiding and refining the students' projects, ensuring they meet high standards and are aligned with current market trends. Thank you for your commitment to fostering the next generation of ICT professionals.

MUHAMAD ANUAR BIN MARSIB
Head of Department
Information and Communication Technology

FOREWORD
HEAD OF THE DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

EDITORIAL PREFACE

Alhamdulillah, all praise and gratitude are due to Allah, the Most Merciful, for His blessings that have enabled the realization of this book's publication despite the challenges of daily responsibilities. This book has been crafted with the specific objective of supporting students who are enrolled in the DFT50114 Integrated Project at the Department of Information and Communication Technology (JTMK), Polytechnic Malaysia. Additionally, it aims to inspire readers interested in gaining insights and suggestions for enhancing their projects in the fifth semester.

The content is meticulously organized into two main tracks: Software & Application Development and Networking Systems. This structured approach ensures comprehensive coverage of both areas, providing readers with a robust foundation to build upon.

The publication of this book is the result of dedicated efforts from various contributors, including a panel of industry experts who are alumni of this program. Their invaluable insights and experiences have significantly enriched the quality and relevance of the content.

We sincerely hope that this book serves as a valuable resource for all readers, especially the students of JTMK. May it encourage continuous learning and improvement. The pursuit of knowledge and skill is an ongoing journey, and its application leads to further growth and success.

We also extend our gratitude to everyone who has supported this project, including the authors, reviewers, and contributors. Your support and commitment have been invaluable. May Allah bless your efforts and grant you success in all your future endeavors. Let this book be a stepping stone for greater achievements and a testament to the enduring pursuit of knowledge and excellence.

This book is also intended for regular publication, coinciding with every final year student project exhibition program.

Chief-in Editor
Editorial
E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024

LIST OF PANELS

1   **MUHAMMAD EZRA BIN MUHAMMAD ISMAIL**
Head of Section Teknoputra | Lecturer
Universiti Kuala Lumpur | Malaysian
Institute of Information Technology

2   **SULAIMAN BIN ABDUL RAHMAN**
Managing Director
iTECH Data Sdn. Bhd.

3   **NURARIF HILMI BIN MUSE**
Digital Workplace Consultant
NTT Data Business Solutions Sdn. Bhd.

4   **MOHAMAD FADLI BIN ADNAN**
Managing Director
Teraju Sinar Trading

EVENT COMMITTEE

PENAUNG PROGRAM
Hj. Mohamad Yusof bin Sulaiman

PROGRAM ADVISOR I
Hj. Zainuddin bin Kasmuri
Muhamad Anuar bin Marsib

PROGRAM ADVISOR II
Ts. Norqursiah binti Saad (KPro Trek SAD)
Nurul Ain binti Amir Adli (KPro Trek Network)

PROGRAM DIRECTOR
Siti Dianah binti Abdul Bujang

DEPUTY DIRECTOR OF THE PROGRAM
Syaiful Idzwan bin Mahmud

PROGRAM SECRETARIES
Nurzaini binti Razali
Susilawaty binti Ahmad Osman

PRIZES & CERTIFICATES COORDINATOR
Nik Nor Azlyzae binti Abdul Manaf
Azizah binti Md Aziz
Noorashikin binti Nazir

JURORS & PANELS COORDINATORS
Dr. Norliza binti Abdullah
Ts. Ainie Hayati Binti Noruzman
Nor Azmi bin Kadarisman (LO1)
Mohd Rezza bin Abdullah (LO2)

FOOD COORDINATORS
Nur Farahida binti Tahrir
Wan Nur Hidayah binti Ibrahim
Nur Atiqah binti Mohd Nasir

BOOK PROGRAM COORDINATORS & SPECIAL TASK OFFICERS
Noor Aishah binti Zainiar
Deepa a/p Rajandran
Marziah binti Che Mansor

TREASURER
Syahrul Iyzani binti Salehin

LOGISTICS AND TECHNICAL COORDINATOR
Ahmad Zulfaqar Aqwa bin Abu Bakar
Azrol Hisham bin Mohd Adham
Syahman bin Mohamed Yusoff

REGISTRATION, INVITATION & WELCOME COORDINATORS
Ts. Maznah binti Ahmad
Nur Hazimah binti Khalid
Ajisa Beevi binti Abdul Wahab

EMCEES
Nurul Su'aidah binti Ahmad Radzali
Siti Nur Edayu binti Hashim

BROADCAST AND MULTIMEDIA COORDINATOR
Akhmal Khalis binti Mohamad Isa
Mohd Syamsul Ariff bin Ghazali
Sharizan binti Abdul Jamil

6th Digital Technology, Innovation, Idea and eXhibition (dtiiX) 2024

6th Digital Technology, Innovation, Idea and eXhibition (dtiiX) 2024

INTRODUCTION

The "E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024" under the theme 'Driving Towards 4IR Technology in TVET Education,' is specifically designed for fifth-semester students enrolled in the DFT50114 - Integrated Project course within the Department of Information and Communication Technology for the 2024 Short Semester Session. These projects encompass networking, programming, applications, systems, Internet of Things, and digital multimedia. The main goal of the program is to offer students the opportunity to explore advanced technology and develop innovative products that impact daily life and hold commercial value for competitive market entry. Each student project will undergo evaluation by facilitators from industry and academic backgrounds, who will share their expertise in information technology and multimedia. This initiative indirectly supports the polytechnic institution's key performance indicators (KPIs).

PROGRAM OBJECTIVES

- Providing a platform for fifth-semester students to share ideas and showcase innovative outcomes alongside industry professionals in the field of information technology.

- Facilitating collaborative relationships between institutions and industries to identify final projects with high potential for competition at higher levels and commercialization.

- Creating opportunities for fifth-semester students to gain knowledge and enhance the added value of projects that have commercial and competitive value alongside industry partners.

PRORGRAM SCHEDULE

**Thursday
25th July 2024
8:00 am - 5.00 pm
Dewan Sri Lang, PSIS**

8:00AM - 9:00AM

- Preparation of dtiiX Competition Booths by Students
- Briefing on Evaluation by the Chief Panel Committee

9:00AM - 1:00PM

Evaluation Session of Students Final Year Projects by Panels

1.00PM - 2.30PM

Break

2.30PM - 5.00PM

Arrival of VIPs

Closing Ceremony of the 6th Digital Technology, Innovation, Idea and Exhibition 2024 (dtiiX 2024)

- Opening Speech
- Singing of National Anthem & Politeknik Song
- Duá Recitation
- Speech by Head of Department
- Summary by Chief of Jury
- Closing Speech by the Director of PSIS
- 6th dtiiX 2024 Montage Video
- Presentation of Awards, Certifications and Best Projects
- Photo Session
- Dispersal of the Ceremony

6th Digital Technology, Innovation, Idea and eXhibition (dtiiX) 2024

Compilation
of Abstracts

Track

SOFTWARE & APPLICATION DEVELOPMENT

MECHANIC FINDING HELPER (POLYCHANIC)

Muhammad Hamizan Muqri bin Muhamad Nasran, Zul Farees bin Irwan, Muhammad Azri Irsyad bin Hanafi

Supervisor: Sharizan binti Abdul Jamil

Abstract

Polychanic is an application for helping community in Sungai Lang and including lecturer and student in Politeknik Sultan Idris Shah in emergency situations, providing access to emergency contact information and resources of Workshop and Mechanic in Sungai Lang. Currently, there is a problem such as Politeknik is far from town, Students from other state or outside Sabak Bernam are unfamiliar with Sungai Lang area, individuals may have concerns about the safety and reliability of workshops they come across. Therefore, this project is to develop workshop identification and towing services, to develop map navigation to nearby workshop, Allow users to rate and review workshops based on their experiences. Positive reviews and high ratings can serve as indicators of workshop reliability and safety. This project use waterfall methodology that consists of 7 phases. As conclusion we hope this application can help user to locate workshop more easily.

Keywords: *Workshop system, mobile applications, navigation*

STUDENT FACE CAPTURE FOR EVENT PRESENCE

Nur Irdina binti Nasaruddin, Nur Anis Sahira binti Azlan

Supervisor: Nurzaini binti Razali

Abstract

This project introduces a facial recognition-based Attendance System to simplify tracking in large classes for *Kelab Rakan Teknologi Digital* (KRTD) under Department of Information Technology and Communication (JTMK), PSIS. Traditional methods like calling names or using ID cards can be inefficient. Instead, this system automatically identifies student presence. The system caters to three user groups: KRTD Advisor (Admin), Committee Members, and Members. The KRTD Advisor holds administrative privileges, allowing them to manage member data (add, edit, delete), and receive attendance reports for events. Committee Members can update upcoming events for student viewing, view student registrations and modify past event information. Members have the most limited access, allowing them to view club news on the dashboard and edit their personal information. To achieve these functionalities, the system leverages a combination of technologies such as HTML and Python ensures an efficient, user-friendly, and secure attendance tracking system for KRTD.

Keywords: *System, KRTD event, face recognition*

M & D STAR'AIN

Nuraini Natasha binti Ab Gafar, Nurul Aina Nabilah binti Mahedi

Supervisor: Nik Nor Azlyzae binti Abdul Manaf

Abstract

The M&D Star'Ain application is designed to improve Iqra' 1-2 education including quizzes and games in the Integrated Special Education Program (PPKI) at Sekolah Kebangsaan Kampung Idaman, Klang, by leveraging e-learning to create a more interactive and engaging learning environment. This project addresses the lack of specific modules for students with disabilities, the challenge of adapting to new learning methods, and the absence of adapted Iqra' 1-2 resources for deaf and mute students. Using Agile methodology, the application integrates technology to accommodate diverse learning styles and provides additional resources, such as sign language images, audio and spelling in roman writing. Ultimately, the M&D Star'Ain application offers an attractive platform for mute and deaf students to enable them to be more proficient in learning Iqra' 1-2 such as reading, understanding and recognizing the entire hijaiyah letter, and hoping that they can be more proficient, efficient and able to improve memory of hijaiyah letters and reading in their Iqra' 1-2.

Keywords: *Iqra' 1-2 Education, interactive e-learning, mute and deaf*

CAMPUS EASE

Sharamanishaa a/p Anbananthan, Hamshini Sharmilaa a/a Rangathurai,
Saranya a/p Ghopinath

Supervisor: Susilawaty binti Ahmad Osman

Abstract

Introducing Campus Ease, a transformative solution tailored for student and new staff at Politeknik Sultan Idris Shah aimed at simplifying institute life. This innovative app offers a user-friendly platform for seamless institute navigation using a 3D model. Besides Admin can effortlessly update staff availability, ensuring accurate information for students. This app aims to streamline institute operations and enhance communication, ultimately improving the overall experience for students and staff to explore the block G.

Keywords: *Navigations, staff availability, contact information for student*

SCANIT

Priteka Ramadass, Nurul Atira binti Ismail, Nur Liyana binti Noor Janin

Supervisor: Ajisa Beevi binti Abd Wahab

Abstract

ScanIt is an innovative shopping tracking application designed to enhance the shopping experience by addressing common issues such as missing crucial product details, miscalculating total expenses, exceeding budget limits, and forgetting items while shopping. The app leverages QR code technology to allow users to generate and scan codes, streamlining the process of saving and retrieving detailed product information. ScanIt supports both buyers and sellers: sellers can register their stores, add products, and generate QR codes, while buyers can create shopping lists, set shopping budgets, and scan QR codes to add items to their cart. Developed using Android Studio, ScanIt follows the Agile methodology, ensuring a flexible and iterative development process that adapts to user feedback and evolving requirements. With its intuitive interface and user-friendly features, ScanIt is an indispensable tool for improving shopping efficiency and accuracy for both buyers and sellers.

Keywords: *QR code shopping, budget tracking, shopping list management*

WINGED SAVIORS

Lim Yen Xing, Muhamad Aidil bin Suherman,
Muhammad Aleemshah bin Amiruddin

Supervisor: Ahmad Zulfaqar Aqwa bin Abu Bakar

Abstract

Winged Saviors is a Drone Rescue System designed to improve rescue operations. Current problems include slow rescue times, high costs, and difficult-to-reach areas. This project aims to solve these issues by developing AI-based drones. These drones will quickly find people using advanced technology, reducing time and costs. By using drones, we can explore more areas without risking human lives. This project uses the Prototype methodology. WingedSaviors hopes to make rescues faster, cheaper, and safer for everyone involved.

Keywords: *Drone, rescue operations, artificial intelligence*

SHOPSIS

Muhammad Haikal Aqashah bin Omir, Ahmad Mudassir bin Azharuddin

Supervisor: Akhmal Khalis binti Mohamad Isa

Abstract

SHOPSIS is an e-catalog app to improve business activity in PSIS by providing a platform for businesses in PSIS to promote and sell their products or services online. The objectives are to develop a unified application for buying and selling, create a chat feature for customer-seller communication, and provide a sales dashboard for better tracking and performance enhancement. The app will serve three main users: customers, who can browse, purchase, and review products; sellers, who can manage listings, orders, and sales analytics; and admins, who will oversee user accounts and platform settings. This will simplify and streamline the business process within the institution.

Keywords: *e-catalogues, mobile applications, PSIS marketplace*

MY MU'MIN

Ahmad Syameel bin Ahmad Syamsury, Muhammar Ammar Harith bin Jasri, Muhammad Syabaan Ali bin Wahid Azhari

Supervisor: Azrol Hisham bin Mohd Adham

Abstract

"My Mu'min" aims to provide comprehensive platform for children to learn the foundation of Islamic practices (Solat, Wudhu and Doa) in an engaging manner, fostering a playful yet informative learning environment. Three identified hurdles include lack of engaging learning method, pronunciation difficulties, and lack of assessment methods. The project aims to develop an interactive application, integrating sound elements and quiz modules. "My Mu'min" employs agile technique to offer captivating Islamic education, encouraging a deeper understanding of the subject within the kindergarten curriculum, benefiting both students and teachers while enriching the overall learning experience for young learners.

Keywords: *Interactive learning, Islamic education, quizzes and minigames*

CEPERVR

Muhammad Aiman Haikal bin Azmi, Muhammad Amir Mustaqim bin Sajak, Sharul Amir bin Sharuddin

Supervisor: Mohd Syamsul Ariff bin Ghazalli

Abstract

CeperVR is an application designed to modernize the Malaysian traditional game of Ceper through Virtual Reality technology. Currently, Ceper is facing challenges such as decreasing popularity among the modern generation and a lack of educational resources to teach people about its cultural significance. Therefore, the objective of this project is to develop a VR game to reignite interest in the traditional game and preserve its cultural heritage. This project utilizes Agile Methodology, providing flexibility to adapt to changing requirements. In conclusion, CeperVR will help revive interest in the traditional game of Ceper while educating users about its cultural significance in the virtual world.

Keywords: *Traditional game, hand tracking, virtual reality*

SCANIMALZ AR

Mohammad Haziq Adham bin Jasri, Muhammad Aiman Arif bin Hamzah, Varhman a/l Balanmurugan

Supervisor: Nur Hazimah binti Khalid

Abstract

The Scanimalz AR app transforms traditional animal science teaching and learning by bringing 3D animal models to life using augmented reality, providing students with immersive learning experiences. The current primary educational landscape lacks interactive platforms and real-world engagement with animals, relying on text-heavy methods that fail to capture students' curiosity, making information retention difficult. The objectives of Scanimalz AR are to develop an interactive learning application with appealing AR content on animal behavior and habitats. It includes 3D models for exploration, games, and quizzes to improve comprehension. The project is intended for a primary school science teacher, with the target audience being primary students in years 3 and 4. Scanimalz's development relies heavily on agile techniques, whose emphasis on iterative development and customer feedback perfectly aligns with the goals of the "AR Scanimalz" project. In conclusion, Scanimalz AR will spark a lifelong love of animals and inspire environmental stewardship by making animal education engaging and interactive, empowering children to become responsible citizens.

Keywords: *Teaching and learning tools, augmented reality, 3D animals*

PSIS DIGITAL CARE

Putri Rizky Thasia binti Taufik, Amirah Husna binti Azrin, Iwani Aisyah binti Azahar

Supervisor: Nor Azmi bin Kadarisman

Abstract

"PSIS Digital Care" proposes a technological solution to address inefficiencies in healthcare services at Politeknik Sultan Idris Shah (PSIS). This project identifies three key challenges: inefficient record-keeping, ineffective information delivery to students, and time-consuming time slip generation. This project aims to improve the delivery of healthcare services by introducing digital time slip, secure record-keeping, and a web-based information distribution platform. The development process is guided by agile methodologies. In conclusion, this project aims to improve PSIS's healthcare administration, and create a friendly healthcare atmosphere

Keywords: *Dashboard, booking first aid kits, generating time slip*

AAJ DASHSTOCK (DASHBOARD INVENTORY MANAGEMENT SYSTEM)

Nur Humaira binti Hamizan, Nurul Huda binti Mohd Zaini,
Nurul Zafirah binti Ahmad Pauzi

Supervisor: Ts. Ainie Hayati binti Noruzman

Abstract

The "AAJ Dashstock: Amin Aman Jaya Enterprise Dashboard Inventory Management System" is designed as an automated solution to address inefficiencies in manual stock management processes at Amin Aman Jaya Enterprise. Currently, the enterprise faces challenges with manual stock entry and monitoring. By employing a prototyping methodology, the project integrates an API barcode scanner into a user-friendly dashboard to streamline stock tracking and monitoring. This system aims to enhance accuracy and minimize errors in data entry, while providing capabilities to visualize through dashboard solutions that meet enterprise needs, paving the way for streamlined inventory management in the future.

Keywords: *Dashboard, visualization, management system*

ARISTORY: KIT PEMBELAJARAN SEJARAH AR

Aleeya Saffiya binti Abdullah, Siti Muslihah binti Ramli, Nor Eliza Elis binti Nawasi

Supervisor: Siti Dianah binti Abdul Bujang

Abstract

The "ARistory: Kit Pembelajaran Sejarah AR" project addresses the challenges of conventional secondary history textbooks that lack of interactive features and visual aids for better understanding. Besides, the absence of self-assessment and complex content makes it difficult for students to understand the concept of the history learning. Therefore, this project aims to revolutionize learning experiences through metaverse technology using augmented reality (AR). It provides an interactive e-learning platform with user-friendly resources, enriches history content with multimedia, and establishes self-assessment tools. This project uses agile methodology that consists of six phases: planning, design, development, testing, deployment, and review. By improving these challenges, this project can enhance student engagement and understanding, thereby adapting to the new metaverse technology in Malaysia Education.

Keywords: *Augmented Reality (AR), metaverse technology, history Course, Malaysia education*

KURALEASE

Ainul Safwana binti Samad, Kubbendranraj a/l Sokalinggam, Pavitra a/p Murugiah

Supervisor: Deepa a/p Rajandran

Abstract

The KuralEase is an innovative e-learning mobile application designed for primary school students and teachers that will digitize 11 couplets from 1,330 short couplets in Thirukural or shortly called the Kural of a classic Tamil language text. The couplets will be digitized into 3 modules of Level 1 learning of Standard 1 to Standard 3. Currently, there are problems for users who have challenges related to memorization, recognition and language accessibility to the Kural. Therefore, this project aims to help users to remember the verses by incorporating features such as mnemonic aids, audio playback, dual language translations and gamified exercise. The project is developed based on Agile Methodology that allows continuous enhancements, user feedback integration and iterative development. In conclusion, the KuralEase seeks to create a seamless and adaptive learning experience, enabling users to appreciate and retain the timeless wisdom of the Thirukural by blending with the modern technology.

Keywords: *Thirukural, e-learning, mnemonic aids*

TARYTHM

Alia Amirah binti Aseb, Nur Qamariena binti Mohamed Rashid,
Nor Amira binti Zan Aiduddin

Supervisor: Noorashikin binti Nazir

Abstract

TaRythm is a mobile application designed to transform the learning and practice of taranum. Utilizing Agile methodology to ensure iterative development and responsiveness to user needs, the application addresses the challenge of limited access to structured learning resources and assessment tools by offering comprehensive modules that cover both theoretical knowledge and practical guidance. The app includes learning different styles of taranum, interactive quizzes for self-assessment, and a recording-sharing feature to facilitate feedback from peers and experts. By integrate traditional taranum learning with modern digital tools, TaRythm empowers users to explore, practice, and master taranum effectively and comprehensively.

Keywords: *Taranum learning, interactive quizzes, audio recording*

KEBUN KAMI APP

Shatish a/l Agilan, Muhamad Amirul Imad bin Nor Fazli,
Muhammad Ilyas bin I'mran

Supervisor: Ts. Maznah binti Ahmad

Abstract

The Kebun Kami App is a revolutionary tool designed to streamline urban farm management at Politeknik Sultan Idris Shah. It addresses challenges such as tracking student attendance accurately, sending task reminders efficiently, and ensuring transparent work hour calculation. The app's objectives include simplifying attendance tracking, integrating seamless task reminders, and promoting transparent work hour calculation for students. The methodology used for app development is the agile methodology. In conclusion, the Kebun Kami App marks a significant advancement in urban farm management, aligning with the institution's commitment to innovation and sustainability.

Keywords: *Dashboard, GPS attendance tracking application, user and plant management system*

Track Software & Application Development

ARABIC EXPLORER

Nurul Ain Qamariah binti Zamzilafazlin, Nik Afiqah Najihah binti Nuk Sukiman

Supervisor: Nurul Su'aidah binti Ahmad Radzali

Abstract

Arabic Explorers is an educational application build for standard one pupil at Sekolah Kebangsaan Parit Baharu (SKPB). Recognizing common challenges like maintaining interest, concentration, and retention, we've tailored the app to address these issues effectively by focusing on unit one from the arabic language textbook. Through interactives images, fun assessments, and sound of voice during lessons, we ensure an enjoyable and effective learning experience. Following a structured approach inspired by the agile methodology, our commitment is to provide a user-friendly platform that maximizes the learning outcomes among young learners especially standard one pupils in SKPB.

Keywords: *Education application, interactive lesson, basic arabic language*

Track NETWORKING SYSTEM

EARLY FLOOD DETECTION AND RESPONSE SYSTEM (EFDR SYSTEM)

Aiman Hakim bin Nor Resam, Muhammad Ariff Akram bin Abdullah,
Muhamad Riyadhus Sholihin bin Mohd Tharin

Supervisor: Nur Farahida binti Tahrir

Abstract

Early Flood Detection and Response Systems is a system that will help in showing the data about the water level in the river, drain and dam. The conventional Early Flood Detection and Response System doesn't have the required technology in the modern days. This system will be using the data that they received from the water level sensor to give a warning before a flood happens. It will be using 7 levels to determine the risk of flood before the flood occur. Other than that, this system will be showing the time, water level data as well as the warning. This system is being used for the community and organisation in order to prepare so they can reduce the damages.

Keywords: *Flood detection, response system, water level system*

LAB VISAGE ENTRY (LVE)

Nageswaran Gownder a/l Sundaraju, Sharvin a/l Marimuthu,
Viknes Kumar a/l Saravanan Kumar

Supervisor: Syaiful Idzwan bin Mahmud

Abstract

Lab Visage Entry is a face recognition door locking system designed to enhance security and efficiency at the laboratory in Jabatan Teknologi Maklumat dan Komunikasi (JTMK), Politeknik Sultan Idris Shah (PSIS). By employing optical face recognition and real-time detection, this system enables authorized staff to quickly and securely access laboratory preparation room. The project utilizes users' face data, pre-trained models, and a magnetic door lock to ensure accurate identification and access control. Additionally, it includes entry logging and a QR code scan mode as fallback options, further enhancing security. By using Waterfall Methodology, this project aims to integrate modern technology, reduce delays caused by traditional access methods, and improve security against unauthorized entries. Developed using Python, OpenCV, and Haar Cascade models, this project creates a reliable face recognition door locking system, maintaining a user database and providing alternative access via a Telegram bot with QR code scanning for laboratory in Jabatan Teknologi Maklumat dan Komunikasi (JTMK), Politeknik Sultan Idris Shah (PSIS).

Keywords: *Door locking system, face recognition, Telegram bot*

DIGITAL GUARDIAN

Mardhiatul Syamira binti Mustapa, Nurul Wahidah binti Ahmad Jefry,
Ardinie Larasati binti Hapizudin

Supervisor: Azizah binti Md Aziz

Abstract

Digital Guardian is a comprehensive solution for Tabika Kemas within PSIS, enhancing childcare security and efficiency. It features a fingerprint-based pickup system and camera integration, allowing children to verify visitors and parents to monitor pickups remotely. Developed by parents and teachers, it prioritizes simplicity and child safety, speeding up pickups and boosting confidence among parents and staff. Continuous user feedback ensures ongoing improvements, providing a safer and more seamless childcare experience.

Keywords: *Fingerprint-based pickup system, child safety, digital guardian*

AGROTECH MONITORING SYSTEM

Muhammad Muqry Haqimy bin Mohd Azli, Muhammad Syazwan Syahmi bin Muhd Safrudin, Muhammad Abubakar Adam bin Masnawi

Supervisor: Syahrul Iyzani binti Salehin

Abstract

Agrotech Monitoring System addresses the inefficiencies and limitations inherent in manual monitoring methods, which impede optimal agricultural productivity. This project aims to develop an automated system leveraging IoT technology to collect, process, and analyze environmental data, thereby enhancing decision-making in farming practices. The proposed methodology involves the implementation of sensors, the development of advanced algorithms, and the establishment of a robust alert system. By offering a comprehensive IoT solution, this system seeks to significantly improve agricultural efficiency and sustainability.

Keywords: *Agriculture technology, monitoring system, Internet Of Things*

TRACKING SECURITY SYSTEM

Muhammad Aiman Hakimi bin Mohd Azam Jailani, Adry Khalis bin Mohamad,
Muhammad Muqrish Izzuddin bin Mohd Zaib

Supervisor: Wan Nur Hidayah binti Ibrahim

Abstract

The tracking security system is a comprehensive solution designed to enhance security measures by incorporating a tracking device with an IRD sensor. Tracking security system are equipped with GPD module NEO6M, IRD sensor and ESP8266 as a main hardware aims to detect any unauthorized movement or intrusion and alert the user through various means, such as buzzer, light, and notifications. The purpose of this system is to provide an efficient and reliable security solution that ensures the safety of individuals and their valuable assets. By utilizing advanced tracking technology and sensor integration, the system aims to prevent potential security breaches and provide timely alerts to the user on MIT app. The tracking security system utilizes a tracking device equipped with an IRD (Infrared Detector) sensor. The sensor constantly monitors the surrounding area for any movement or presence of an unauthorized person. Upon detection, the sensor sends a signal to activate the buzzer, light, and notifications, alerting the user of the potential security threat. The integration of the tracking device and IRD sensor in the tracking security system is expected to provide accurate and prompt detection of unauthorized movement. The system's ability to promptly notify the user through various means will enable them to take immediate action, potentially preventing any security breaches. Tracking security system offers an innovative and effective approach to security by combining a tracking device with an IRD sensor. By providing real-time alerts through a buzzer, light, and notifications through Telegram, the system enhances security measures and allows for timely response to potential threats. The successful measures implementation of this system is expected to significantly improve security measures and provide peace of mind to individuals and organizations concerned about their safety and the protection of their valuable assets

FORTRESSLINK CUTTING-EDGE SMARTLOCK SYSTEM FOR HOMESTAY, ETC (FCSS)

Hairil Anwar bin Abd Rahman, Nik Airil Nuruddin bin Nik Ariza,
Muhammad Zafran Danish bin Ahmad Zarani

Supervisor: Siti Nur Edayu binti Hashim

Abstract

Fortresslink Cutting-Edge Smartlock System (FCSS) is a high-security system door locking mechanism that featuring an innovative solution that offers a versatile and robust security option. Presently, there is an ongoing issue characterized by incidents of homestay burglaries, as well as many other theft-related offenses involving unauthorized access. Therefore, the objective of this project is to improve safety in the homestay environment by combining cutting-edge biometric technology with traditional keypad entry systems. The methodology used for this project is prototyping model that consist of requirement gatherings, quick design, prototype devolepment, prototype testing, and refinement. To sum up, the goal of the FCSS project is to create a sophisticated security system for the homestay door locking system in order to create a secure atmosphere for the community of homestay owners.

Keywords: S*mart lock, biometric authentication (fingerprint), password authentication*

HANDICAPPED SMART PARKING SYSTEM

Marsyitah binti Abd Rahim, Saravana a/l Visvanathan, Vishnu a/l Kumar

Supervisor: Syahman bin Mohamed Yusoff

Abstract

Accessible parking spaces for individuals with disabilities are essential for fostering an inclusive environment. Misuse of these spots such as parking without a disability or a valid permit impedes access for those who genuinely need it, constituting both a legal and ethical violation. This research aims to explore various smart parking solutions that can effectively manage accessible parking and enhance the validation process for disability permits.

Keywords: *Smart parking system, Internet Of Things*

SCANSMART HOSTEL PSIS

Saoumya a/p Arjuna, Diana a/p Lawrence, Nandini a/p Rames

Supervisor: Nur Atiqah Mohd Nasir

Abstract

Scansmart Hostel is designed to facilitate dormitory access for students using their matrix cards. It addresses the need for a secure and convenient method of entry into dorm room without traditional keys. There is a problem with the security and accessibility of dorm rooms, as traditional key-based systems are prone to issues such as loss or theft of keys. Therefore, this project aims to implement an RFID-based door lock system, functional standalone system and a database to provide a secure and efficient access solution for students. This project uses an agile methodology, which allows for iterative development and continuous improvement based on stakeholder feedback. It helps to emphasize collaboration and flexibility delivery. As a conclusion, this project hopes to enhance dormitory security and accessibility, providing students with a reliable and convenient access system while ensuring that only the college administration can manage user information.

Keywords: *Door lock system, RFID, standalone system*

IOT PARKMASTER

Raman Naidu a/l Gengan, Muhammad Akiq Aiman bin Zamri,
Muhammad Azwan bin Adam

Supervisor: Noor Aishah binti Zainiar

Abstract

IOT Parkmaster seeks to develop a smart parking system utilizing arduino uno and iot technologies to reduce the time spent searching for parking, lower traffic congestion as the traditional parking management systems are often inefficient, leading to wasted time, and unnecessary carbon emissions. The proposed project leverages a network of sensors, microcontrollers and cloud-based services to provide real-time monitoring and management of parking spaces. Key component of the project include ultrasonic sensors for detecting vehicle presence, an arduino microcontroller for data processing, a wi-fi module for connectivity and sensors are strategically installed in each parking slot to monitor occupancy status. Additionally, camera module is placed at the IOT Parkmaster aiding in to act as a surveillance monitoring system.

Keywords: *Smart parking system, Internet Of Things, real-time data parking management*

LOGISTICS AUTOMATION MODEL PROTOTYPE

Wan Arifuddin bin Wan Ahmad, Nik Muhammad Naufal bin Mohd Narang,
Muhammad Faris Zakwan bin Mohd Noor Zalee

Supervisor: Dr. Norliza binti Abdullah

Abstract

The Logistics Automation Model Robot represents an innovative solution tailored for implementation within the manufacturing or sorting industry. In traditional manufacturing or sorting operations, the conventional methods of arranging or sorting products often result in time-consuming processes that exceed what is considered optimal for efficient operations. For better output for the company, the logistic robot prototype is ensured to be involved in optimizing various aspects of operations to enhance productivity, efficiency, and overall performance. We relies on prototype methodology because it is a strong, reliable method that leads to efficient workflow and productivity to ensure this project archieve the objectives. The robot prototype use a user-friendly mobile app that allows real-time monitoring and control of logistics robots, it also reduce manual labor and associated costs by deploying autonomous robots for picking, sorting, and transportation tasks. In conclusion, the implementation of our logistics automation model robot revolutionizes traditional logistics practices by offering a comprehensive solution that combines speed, accuracy, and cost effectiveness.

Keywords: *Smart logistic robot, Autonomous navigation, Mobile app integration*

Compilation
of Extended Abstracts

SELECTED EXTENDED ABSTRACTS

SELECTED EXTENDED ABSTRACTS

NO.	PROJECT NAME	STUDENT'S NAME	PAGE
8	CEPERVR	MUHAMMAD AIMAN HAIKAL BIN AZMI MUHAMMAD AMIR MUSTAQIM BIN SAJAK SHARUL AMIR BIN SHARUDDIN	111
9	MY MU'MIN	AHMAD SYAMEEL BIN AHMAD SYAMSURY MUHAMMAR AMMAR HARITH BIN JASRI MUHAMMAD SYABAAN ALI BIN WAHID AZHARI	127
10	SCANIMALZ AR	MOHAMMAD HAZIQ ADHAM BIN JASRI MUHAMMAD AIMAN ARIF BIN HAMZAH VARHMAN A/L BALANMURUGAN	153
11	AGROTECH MONITORING SYSTEM	MUHAMMAD MUQRY HAQIMY BIN MOHD AZLI MUHAMMAD SYAZWAN SYAHMI BIN MUHD SAFRUDIN MUHAMMAD ABUBAKAR ADAM BIN MASNAWI	175
12	DIGITAL GUARDIAN	MARDHIATUL SYAMIRA BINTI MUSTAPA NURUL WAHIDAH BINTI AHMAD JEFRY ARDINIE LARASATI BINTI HAPIZUDIN	189

SELECTED EXTENDED ABSTRACTS

NO.	PROJECT NAME	STUDENT'S NAME	PAGE
13	LAB VISAGE ENTRY (LVE)	NAGESWARAN GOWNDER A/L SUNDARAJU SHARVIN A/L MARIMUTHU VIKNES KUMAR A/L SARAVANAN KUMAR	205
14	LOGISTICS AUTOMATION MODEL PROTOTYPE	WAN ARIFUDDIN BIN WAN AHMAD NIK MUHAMMAD NAUFAL BIN MOHD NARANG MUHAMMAD FARIS ZAKWAN BIN MOHD NOOR ZALEE	219
15	SCANSMART HOSTEL PSIS	SAOUMYA A/P ARJUNA DIANA A/P LAWRENCE MUHAMMAD FARIS NANDINI A/P RAMES	231

ARABIC EXPLORERS

Nurul Su'aidah Ahmad Radzali[1*], Nurul Ain Qamariah Zamzilafazlin[2] & Nik Afiqah Najihah Nik Sukiman[3]

[1]*Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor*

Corresponding author: nurulsuaidah@psis.edu.my

Abstract: Arabic Explorers is an educational application built for standard pupils at Sekolah Kebangsaan Parit Baharu (SKPB). Recognizing common challenges like maintaining interest, concentration, and retention, we've tailored the app to address these issues effectively by focusing on unit one from the Arabic language textbook. Through interactive images, fun assessments, and sound of voice during lessons, we ensure an enjoyable and effective learning experience. Following a structured approach inspired by the agile methodology, our commitment is to provide a user-friendly platform that maximizes the learning outcomes among young learners, especially standard one pupil in SKPB.

Keywords: *interactive apps, applications, agile.*

INTRODUCTION

The objective of our educational app project is to create an engaging and interactive Arabic learning application that aids standard one pupil in the SKPB learning process. The app will incorporate a variety of features, such as sounds, images, and games, to make learning enjoyable and effective. It will also be personalized to each child's learning style and interests, which can further enhance learning outcomes.

1.1 Problem Statement

There are three (3) problem statements consists of:

i. Standard one pupil in Sekolah Kebangsaan Parit Baharu (SKPB) show minimal interest and engagement in learning Arabic language through conventional methods, leading to low retention and motivation levels.

ii. Standard one pupil in SKPB struggle to maintain focus and attention during Arabic language learning sessions, hindering their ability to comprehend and retain the material effectively.

iii. The current methods fail to facilitate effective memory retention among young learners, especially standard one pupil in SKPB, resulting in difficulty in recalling and memorizing Arabic vocabulary and phrases.

1.2 Objective of Project

The project objectives are:

i. Generate voiceover when tapping on buttons for elements such as alphabets, greetings, and lesson contents.

ii. Display scores after completing each assessment, including assessment from set 1, set 2, and set 3.

iii. Incorporate games to enhance user knowledge, making learning both easy and enjoyable.

1.3 Scope of Project

The scopes of the project are:

i. Organized into topics under unit one entitled alphabets, greetings and lesson contents, these lessons are structured logically and include multimedia support such as voiceovers, images, text, and interactive content.

ii. A variety of games such as drag-and-drop, mismatch, and guess the sounds, designed to align with lesson content and make learning engaging.

iii. Diverse assessments, including multiple-choice questions, to evaluate students' understanding and retention. Automatic scoring is implemented to provide instant feedback.

iv. A results page that displays the top 10 student performances in real-time, accessible securely by teachers and students.

METHODOLOGY

Agile methodology is an iterative and collaborative approach to project management and software development that prioritizes customer satisfaction and adaptability. Projects are broken down into small iterations or sprints, allowing for frequent releases of working software and early stakeholder feedback. Collaboration between cross-functional teams and active involvement of customers or stakeholders throughout the development process ensure that the final product meets user needs. Agile teams embrace change and prioritize individuals and interactions over processes and tools, fostering a culture of continuous improvement and adaptation. By emphasizing flexibility, communication, and teamwork, Agile methodology enables teams to deliver value to customers quickly and efficiently while responding to evolving requirements and market conditions.

Figure 1: Agile Scrum for Methodology

The following are the activities during development of the application:

Table 1: Activities during Application Development

No.	Phase	Activities
1.	Meet and Plan	We identify user stories based on insights gathered from interviews and plan short development cycles (sprints) to iteratively build and refine the "Arabic Explorers" application.
2.	Design	Craft a blend of interactive lessons and fun games that align with the school curriculum based on insights from the educators.
3.	Code and Testing	Continuously develop, test, and refine features of the "Arabic Explorers" application in short iterations, incorporating feedback from teachers and students to enhance usability and engagement.
4.	Release	Deploy the tested and approved "Arabic Explorers" application, making it available for use in schools and homes.
5.	Feedback	Involve teachers and students from Sekolah Kebangsaan Parit Baharu (SKPB) in user testing sessions to gather feedback on the usability and effectiveness of the "Arabic Explorers" application.

RESULTS AND DISCUSSION

The advantages of the project are in the result page, teachers can track their students' assessment progress. Furthermore, the lessons, assessment, and games are designed to help students improve their abilities to recognize spelling, pronunciation, and listening skills. In addition, the application also does not contain any advertisements. The scoreboard reflects the student's score after completing the assessment and finally the application is easily accessible to learners via their mobile devices.

The disadvantages of the project are that the application cannot be released on the iOS App Store and users need to have an internet connection because the application includes login and registration features.

After a user successfully enters the Arabic Explorers, this main page will display as shown in Figure 2. In this page, users can click one of the four buttons which is "Pelajaran", "Penilaian", "Permainan", "Log Masuk Guru" or "Tentang aplikasi".

Figure 2: Main Interface

After teachers successfully login, teachers can see student's records and can see by date by clicking the button "Pilih Tarikh". This page also has the "10 Terbaik" and when clicked, it displays 10 best scores in assessment, and it sorts by set as shown in Figure 3.

Figure 3: Students' Record Interface

Once the user clicks on the button "Pelajaran" from Figure 2, the page in Figure 4 will display. There are nine buttons which contain "Huruf", "Kata Ucapan", "Alif – Tha", "Jim – Dal", "Zhal – Sin",
"Shin – Tho", "Zho – Fa", "Kof – Mim", and "Nun – Ya"

The page in Figure 5 will be displayed once the user clicks on button "set 1". This quiz set contains 10 questions.

Figure 4: Lessons Interface

Figure 5: Quiz Interface

The following is the comparison of the project with the existing products in markets:

Table 2: The comparison of the project with the existing products in markets

Comparison	Product developed: Arabic Explorers	Arabic for kids	Arabic learning for kids	Arabic alphabet
Programming Language Used	Java or Kotlin for Android.	Java or Kotlin for Android and Swift for iOS	Java or Kotlin for Android and Swift for iOS	Java or Kotlin for Android and Swift for iOS
Offers a blend of traditional teaching methods and modern interactive elements	Yes	Yes	No	No
Multimedia content including sounds, images, and animations	Yes	Yes	No	No
Adaptive learning features to cater to different learning styles and paces.	Yes	Yes	No	No
Comprehensive curriculum covering Arabic alphabet, vocabulary, basic phrases, and simple grammar	Yes	No	Yes	No
Engaging games and quizzes to reinforce learning and retention	Yes	No	Yes	No
Progress tracking features to monitor the child's improvement	Yes	No	Yes	No
Focuses specifically on teaching the Arabic alphabet	Yes	No	No	Yes
Interactive lessons with audio pronunciations and visual aids	Yes	No	No	Yes

Simple and intuitive interface designed for young learners	Yes	No	No	Yes
Platform	Available on Android devices	Available on iOS and Android devices	Available on iOS and Android devices	Available on iOS and Android devices

In comparing "Arabic for Kids," "Arabic Alphabet," and "Arabic Learning for Kids," we see each has strengths but also limitations. While they offer interactive lessons and engaging content, they may lack depth or focus. However, "Arabic Explorers" aims to bridge these gaps. Drawing from insights of educators from SKPB, it combines interactive lessons, games, and assessments following Standard Primary School Curriculum (KSSR) to make learning Arabic enjoyable. By extending learning beyond the classroom, "Arabic Explorers" strives to provide a rich and accessible language learning experience for standard 1 pupil in SKPB, sparking enthusiasm and shaping a future where language proficiency knows no bounds.

CONCLUSIONS

To enhance the Arabic Explorers application, several recommendations are proposed. Firstly, incorporating a more interactive and engaging user interface could significantly improve the learning experience for young students. Integrating multimedia elements such as videos and animations can make lessons more captivating. Secondly, expanding the content beyond unit one to cover additional units or topics will provide a more comprehensive learning tool. Implementing adaptive learning techniques, where the difficulty level of assessments and games adjusts based on the student's performance, can offer a personalized learning experience. Additionally, providing detailed analytics and progress reports for teachers can help monitor student development more effectively. Finally, ensuring the application is accessible across various devices and platforms will increase its usability and reach. By addressing these areas, the Arabic Explorers application can become a more robust and effective educational resource for young learners.

In conclusion, "Arabic Explorers" emerged as a transformative initiative crafted to address the unique challenges faced by standard 1 pupil at Sekolah Kebangsaan Parit Baharu in mastering the Arabic language. Drawing inspiration from educators and leveraging modern educational technology, the project endeavours to infuse joy and engagement into Arabic language learning for young minds. By integrating interactive lessons, games, and a user-friendly interface, it strives to cultivate positive learning attitudes, concentration, and vocabulary retention among standard one pupils, extending the learning experience beyond the classroom with robust support from teachers and parents .In comparison with existing applications, "Arabic Explorers" stands out for its comprehensive curriculum, interactive features, and tailored approach aligned with the specific needs of young learners. While other platforms may offer interactive content, they often lack depth or fail to align with the curriculum requirements. "Arabic Explorers" bridges these gaps by prioritizing a holistic learning experience, ensuring that each aspect of the application contributes meaningfully to the educational journey of the students at SKPB. Adopting the Agile methodology for iterative development, "Arabic Explorers" underscores its commitment to continuous improvement, stakeholder involvement, and adaptability. By embracing this approach, the project not only ensures frequent releases but also fosters collaboration and responsiveness to evolving needs. Through meticulous cost planning encompassing hardware, software, and resource requirements, "Arabic Explorers" remains poised to revolutionize Arabic language education in Malaysia, igniting a passion for learning and nurturing proficient Arabic speakers among the nation's youth.

REFERENCES

Abd Rahman, M. Z. bin, & Abdoll Aziz, A. S. bin. (2016). Bahasa Arab Buku Teks Tahun 1. Dewan Bahasa dan Pustaka

Fu Cheng, (2018) Build Mobile Apps with Ionic 4 and Firebase: Hybrid Mobile App Development, Apress.

G.Clifton, (2015) Android User Interface Design: Implementing Material Design for Developers, Apress.

J.F. DiMarzio, (2015) Android Studio Game Development: Concepts and Design, SPi Global.

Joseph Annuzzi Jr., Lauren Darcey and Shane Conder, (2013). Introduction to Android

Application Development: Android Essentials, Addison-Wesley Professional.

Neil Smyth, (2016) Android Studio Development Essentials, CreateSpace Independent Publishing Platform.

Neil Smyth, (2017) Android Studio 3.0 Development Essentials - Android 8 Edition CreateSpace Independent Publishing Platform.

Sam Key, (2015) Android Programming in a Day, CreateSpace Independent Publishing Platform

Tutorials Point (2010). Android - Drag and Drop. https://www.tutorialspoint.com/android/android _drag_and_drop.htm

CAMPUS EASE APPLICATION

Susilawaty Ahmad Osman[1*], Saranya A/P Ghopinath[2], Sharamanishaa A/P Anbananthan[3] & Hamshini Sharmilaa A/P Rangathurai[4]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor
*Corresponding author: susilawaty@psis.edu.my

Abstract: Campus Ease Application is an innovative solution designed specifically for new students and visitors at Politeknik Sultan Idris Shah. The goal is to simplify life at the institute. This cutting-edge application provides a user-friendly interface for easy navigation using a 3D model. In addition, administrators can easily update staff availability, ensuring accurate information for students. The objective of this application is to streamline institute operations and improve communication, ultimately enhancing the overall experience for students and staff as they navigate the laboratory block.

Keywords: *campus, applications, 3D model.*

INTRODUCTION

1.1 Problem Statement

The problem statements of the project are as follows:

i.   Navigating the campus at Politeknik Sultan Idris Shah (PSIS) is a challenge for students, resulting in wasted time and frustration.

ii. It is challenging for students to determine the availability of staff, which makes it difficult to receive assistance when necessary.

iii. It's challenging for students to get in touch with key college contacts, which makes it hard to engage with faculty or access the assistance they require.

1.2 Objective of Project

Given the issues outlined previously, the goal of this project is to:

i.   Enable students to navigate in Politeknik Sultan Idris Shah campus by integrating the Campus Ease app, which includes a 3D model for better clarity.

ii. Students can conveniently access staff availability through the Campus Ease app, which ensures quick access to assistance and information.

iii. Improve student communication by adding a comprehensive list of important institute contacts to the Campus Ease app, making it easier for students to reach out to staff for support or questions.

1.3 Scope of Project

User scopes:

i.   Exclusively created for students at Politeknik Sultan Idris Shah (PSIS), the Campus Ease app aims to streamline the campus experience.

ii. The app provides students with easy access to view laboratories and department offices, verify staff availability, and find office contact numbers.

iii. A results page that displays the top 10 student performances in real-time, accessible securely by teachers and students.

Admin scopes:

i.   The app contains an editable version for Staff Attendance Coordinators, giving them the ability to update the availability of staff members

ii. The Staff Attendance Coordinator is restricted to admin functionalities, which enable them to make updates visible to students. Additionally, the admin has the capability to utilise the app as a user.

System scopes:

i. The app is designed to give students a smooth experience, allowing them to easily access information related to the campus.

ii. The app allows the Staff Attendance Coordinator to directly modify the availability of staff members, guaranteeing that students have access to accurate and up-to-date information.

METHODOLOGY

The approach to this project involves utilizing the Waterfall Method Model. The specific tasks can be viewed in the accompanying image. This methodology was selected due to its applicability to both small and large-scale projects. The Waterfall Method holds significance in ensuring that projects are completed within the established timeline and budget. It is especially suitable for projects with clearly defined requirements that are not expected to change during the development phase. Furthermore, the Waterfall Method is user-friendly and straightforward, making it well suited for the development team.

Figure 1: The Waterfall Method

RESULTS AND DISCUSSION

The advantages of the project are the application supplies a three-dimensional representation that assists students and newly hired faculty in navigating the Politeknik Sultan Idris Shah campus with ease. Accessing accurate information quickly is ensured by real-time updates on staff availability, benefiting students as well. The application also provides a detailed directory of essential school contacts, simplifying students' ability to seek assistance. The application is also created to be easy to understand and simple to operate for both students and administrators. Administrator has the advantage of being able to utilize the app in both regular user capacity and with extra administrative features.

However, the disadvantages of the project are users are restricted to view information and lack interactive capabilities such as booking appointments or sending messages within the app. A stable internet connection is necessary for the app to fetch and show real-time data. It also may take new users a while to become accustomed to the app's interface and features. Furthermore, the administrator is responsible for guaranteeing the accuracy and timeliness of the information they update. The administrator cannot add, delete, or update any information on new staff or existing staff details within the application. Finally, the "Campus Ease" app is only available for Android users, excluding iOS and other platforms, which

limits its accessibility to the entire campus community.

The following are some of the interfaces of the application:

The admin is the only one who can use the login feature to log in by providing their email and password.

Both the administrator and users see the same interface when they visit the home page. Basic information about Politeknik Sultan Idris Shah, such as its vision, mission, videos, and institute pictures, is featured on the home page.

Figure 2: Admin Login Interface

Figure 3: Main Interface

The page for the laboratory block offers a 3D model that accurately reproduces each floor where the laboratories are situated. It also includes colour-coded indicators to help users or students at the institution locate the laboratories on each floor.

The staff availability page's primary interface contains four buttons that show the departments and the lecturers' list in each department. The admin can update the staff availability daily using the toggle button provided. To update the staff availability data in the database for user app viewing, the admin must press the save button.

Figure 4: Laboratory Block Interface

Figure 5: Staff Availability Interface

CONCLUSIONS

The "Campus Ease" app can be improved by adding interactive features like appointment booking and messaging, as well as providing offline access for important information to make it more engaging and accessible for users. Enhancing administrative capabilities to include adding, deleting, and updating staff information will ensure data accuracy and flexibility. Introducing a user feedback system and offering comprehensive training for admins will help in identifying issues and improving usability. It is crucial to regularly update, implement strong security measures, and optimise performance to maintain reliability and user trust. Furthermore, improving the user interface for better intuitiveness and integrating the app with other campus systems will result in a more seamless and comprehensive user experience.

The app "Campus Ease" has been created to make navigation and communication easier at Politeknik Sultan Idris Shah. It deals with challenges of campus navigation, staff availability, and accessing important contacts through a user-friendly interface and a 3D model. While it enhances efficiency and communication, it does have limitations such as reliance on the internet and limited user interaction. To enhance its effectiveness, it can benefit from improved admin functionalities, interactive features, and stronger security measures. By incorporating regular updates and user feedback, "Campus Ease" has the potential to greatly improve the campus experience for students and staff, becoming an essential tool for PSIS.

REFERENCES

Android Knowledge (Nov 14, 2022). Login and Signup using Firebase Realtime Database in Android Studio | Store Data [Video] https://youtu.be/FAa8Wk_uDIA?si=N3Y2iEunGQ-j8cLu

Android Knowledge (Oct 31, 2022). Navigation Drawer Menu in Android Studio using Java | 2024 [Video] https://youtu.be/6mgTJdy_di4?si=wh5W4a6Gwl1r0M3u

Android Mate (Dec 6, 2021). How to add Firebase Authentication in Login and Signup Page using Android Studio | With Source Code [Video] https://youtu.be/OJW6Uzls2H0?si=Fz4yotF0ZLj8hJsF

Easy Tuto (Jun 18, 2022). How to connect Firebase to Android Studio App | 2024 [Video] https://youtu.be/aiX8bMPX_t8?si=J1KPCXhP0a4Vqvv9

Everyday Programmer (Jun 25, 2023). How to embed and play YouTube iframe videos in Android Studio [Video] https://youtu.be/V2KCAfHjySQ?si=SbD-ISGKmflWvvgl

FineGap (Aug 28, 2022). How To Make Dropdown Menu in Android Studio [Video] https://youtu.be/jXSNobmB7u4?si=PCsNgtBSnDITmJcQ

Pavan Sharma (Aug 9, 2020). How to make Admin and Client application using android studio(part-1) Video] https://youtu.be/i_qMtcbmxYo?si=Wcoj88nNaPEKTjDx

Programming Knowledge (Jan 6, 2020). Firebase Android Tutorial 5 - Retrieving Data from Firebase Realtime Database [Video] https://youtu.be/XactTKR0Wfc?si=HXQQxlyzBhDN4P-j

Programming Make Sense (Jan 16, 2022). Connect Android app with Firebase Realtime Database and Create Operation [Video] https://youtu.be/LJpn81pG06Y?si=vWX6ptlNkhE1RHt4

Sandip Bhattacharya (Dec 18, 2022). How to Change App Icon in Android Studio | Android Beginner Tutorials [Video] https://youtu.be/m6qBOTjZ4Lw?si=lB_IXI-sB3zh-qr4

Vertex42(2019 Nov 26). How to Make a Gantt Chart in Excel [Video] https://www.youtube.com/watch?v=un8j6QqpYa0&t=462s

M&D STAR'AIN APPLICATION

Nik Nor Azylyzae Abdul Manaf[1*], Nurulaina Nabilah Mahedi[2] & Nuraini Natasha Ab Gafar[3]

¹Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

Corresponding author: nik_azlyzae@psis.edu.my

Abstract: The M&D Star'Ain application is designed to improve Iqra' 1-2 education, including quizzes and games, in the Integrated Special Education Program (PPKI) at Sekolah Kebangsaan Kampung Idaman, Klang, by leveraging e-learning to create a more interactive and engaging learning environment. This project addresses the lack of specific modules for students with disabilities, the challenge of adapting to new learning methods, and the absence of adapted Iqra' 1-2 resources for deaf and mute students. Using Agile methodology, the application integrates technology to accommodate diverse learning styles and provides additional resources, such as sign language images, audio, and spelling in roman writing. Ultimately, the M&D Star'Ain application offers an attractive platform for mute and deaf students, enabling them to become more proficient in learning Iqra' 1-2, including reading, understanding, and recognizing the entire hijaiyah alphabet, with the goal of improving their memory and reading skills.

Keywords: *Iqra', applications, e-learning.*

INTRODUCTION

1.1   Problem Statement

The problem statements of the project are as follows:
  i. Lack of specialized modules catering to students with disabilities in Iqra' subjects pose a significant challenge.
 ii. Ensuring students' successful adaptation to new learning methods and techniques presents a key concern.
iii. Absence of Iqra' learning resources tailored for students with deaf and mute disabilities.

1.2   Objective of Project

The objectives of the project are as follows:
  i. To develop a comprehensive course module tailored for students with disabilities, focusing on the subject of Iqra' 1-2 , within a dedicated learning application.
 ii. To design some quiz within the application to ensure ease of navigation and comprehension, thereby enhancing students' ability to utilize the platform effectively.
iii. To create some games aimed at facilitating the learning process for tasks, thereby enhancing engagement and understanding among students.

1.3   Scope of Project

User scopes:
  i. Users who will directly benefit from the application. They require a user-friendly interface with visual aids and text-based content that supports their learning needs. Accessibility features such as screen reader compatibility and visual cues are crucial.
 ii. Educators who will use the application to teach Iqra' to mute and deaf students. They can access to lesson plans, teaching materials, progress tracking features, and communication tools to interact with students effectively.
iii. Individuals interested in supporting mute and deaf students' education. They may include normal student,

parents, volunteers, or advocates. Community features such as forums, discussion boards, and resource sharing can be beneficial.

System scopes:
  i. Develop comprehensive educational content on Iqra'1-2 tailored for mute and deaf students.
  ii. Content will be presented in various formats such as text, images, video and interactive elements to cater to different learning styles.
  iii. Implement features such as sign language picture and video, text-to-speech, and captioning to make the application accessible for mute and deaf users.
  iv. Make sure compatibility with screen readers and other assistive technologies for visually impaired users.
  v. Include interactive quizzes and games to reinforce learning and track progress.
  vi. Provide feedback and guidance to users throughout their learning journey.

METHODOLOGY

This project's methodology is Agile. The justification for selecting the methodology is that it is suitable for a small project, has a quick development timeline, provides higher customer satisfaction due to client involvement throughout the project, and has a flexible timeline. The agile project management technique entails breaking the project down into phases. Constant improvement, as well as ongoing collaboration with stakeholders, are necessary at all stages.

Figure 1: The Agile Method

The followings Table 1 are the explanations of activities done for each phase of application development:

Table 1: Activities done for each phase of application development

No.	Phase	Activities
1.	Plan	Create a user story map with input from deaf and mute individuals, educators, and experts in fardhu ain education. This involves breaking down the application's functionalities into user stories, which represent features or tasks from the user's perspective.
2.	Design	Conduct a dedicated sprint review focusing on accessibility features and user experience for mute and deaf learners.
3.	Develop	Refined user stories with acceptance criteria, prioritized backlog of accessibility tasks, and estimated effort for each task.
4.	Test	Sign language accessibility testing and user feedback sessions with mute and deaf learners.

| 5. | Deploy | Sprint planning with sign language interpretation and user story mapping with visual representation. |
| 6. | Review / Maintenance | Visual feedback sessions and interactive prototyping with haptic feedback. |

RESULTS AND DISCUSSION

The advantages of the project are the application uses e-learning techniques to create a more interactive and engaging environment for students. This approach helps to maintain students' interest and improve their learning experience by incorporating quizzes and games. The application also integrates various technological resources, such as sign language images, audio, and roman writing, to accommodate the diverse learning needs of students with disabilities. This ensures that all students, including those who are deaf and mute, can access and benefit from the learning material. Finally, by providing tailored resources and an attractive platform, the application aims to enhance the proficiency of mute and deaf students in learning Iqra' 1-2. This includes improving their ability to read, understand, and recognize the hijaiyah alphabet, which ultimately supports their memory and reading skills development.

Figure 2: Home page interface

However, the disadvantages of the project are that the application may present challenges for students and educators as they adapt to new e-learning methods, which can be a significant barrier, especially for those accustomed to traditional learning approaches. While the application addresses the absence of specific modules for students with disabilities, it indicates that such resources are currently lacking, which implies that the current educational infrastructure may not be fully equipped to support the needs of these students effectively. Finally, integrating technology to accommodate diverse learning styles, including sign language images, audio, and roman writing, might require substantial resources and training. This could be a disadvantage if the school lacks the necessary technical support or if students and teachers find the technology difficult to use.

The following are some of the interfaces of the application:

Figure 3: Interface of Iqra' page

Figure 4: Interface of Quiz page

Figure 6: Interface of Iqra' Lesson

Figure 5: Interface of Game page

CONCLUSIONS

The M&D Star'Ain application should be implemented in the Integrated Special Education Program (PPKI) at Sekolah Kebangsaan Kampung Idaman, Klang, to enhance the learning experience for students with disabilities. This application is recommended due to its tailored approach, leveraging e-learning and interactive methods to address the specific educational needs of deaf and mute students in learning Iqra' 1-2. The use of Agile methodology in its development ensures that the application is adaptive and responsive to user needs.

The M&D Star'Ain application effectively addresses the gaps in educational resources for deaf and mute students by providing a comprehensive and interactive platform for learning Iqra' 1-2. By incorporating technology, sign language images, audio, and roman writing, the application supports diverse learning styles and enhances memory and reading skills. The project demonstrates a successful integration of e-

learning tools to create an engaging learning environment, ultimately helping students become more proficient in reading and recognizing the hijaiyah alphabet.

REFERENCES

Adams, C. (n.d.). What is a context diagram and what are the benefits of creating one?
Retrieved from
https://www.modernanalyst.com/Careers/InterviewQuestions/tabid/128/ID/1433/What-is-a-Context-Diagram-and-what-are-the-benefits-of-creating-one.aspx

Ahmed, A. M. (2021, October 25). Arabic sign language recognition system for alphabets using machine learning techniques.
Retrieved from
https://www.hindawi.com/journals/jece/2021/2995851/

Asana. (n.d.). What is Agile methodology? (A beginner's guide).
Retrieved from
https://asana.com/resources/agile-methodology

BCIS. (2021, June 16). Fact finding techniques: Fact finding techniques for requirements.
Retrieved from
https://bcisnotes.com/thirdsemester/system-analysis-and-design/fact-finding-techniques-fact-finding/

El-Bendary, N. (2010, November). Arabic sign language alphabets.
Retrieved from
https://www.researchgate.net/figure/Arabic-sign-language-alphabets_fig1_224197735

Gantt. (n.d.). What is a Gantt chart?
Retrieved from https://www.gantt.com/

Sreekumar, D. (2023, August 28). What is research methodology? Definition, types, and examples.
Retrieved from
https://paperpal.com/blog/academic-writing-guides/what-is-research-methodology

UKEssays. (2021, July 22). Effective fact-finding methods for gathering information.
Retrieved from
https://www.ukessays.com/essays/information-technology/definition-of-fact-finding-techniques-information-technology-essay.php

Visual Paradigm. (n.d.). What is data flow diagram?
Retrieved from https://www.visual-paradigm.com/guide/data-flow-diagram/what-is-data-flow-diagram/

POLYCHANIC (MECHANIC FINDER HELPER)

Sharizan Binti Abdul Jamil[1*], Muhammad Hamizan Muqri Bin Muhamad Nasran[2],
Zulfarees Bin Irwan[3] & Muhammad Azri Irsyad bin Hanafi[4]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor
Corresponding author: sharizan.ajamil@psis.edu.my

Abstract: Polychanic is an application for helping the community in Sungai Lang, including lecturers and students in Politeknik Sultan Idris Shah, in emergency situations, providing access to emergency contact information and resources of workshops and mechanics in Sungai Lang. Currently, there is a problem such as Politeknik being far from town, students from other states or outside Sabak Bernam are unfamiliar with the Sungai Lang area, and individuals may have concerns about the safety and reliability of workshops they come across. Therefore, this project aims to develop workshop identification and towing services, develop map navigation to nearby workshops, and allow users to rate and review workshops based on their experiences. Positive reviews and high ratings can serve as indicators of workshop reliability and safety. This project uses the waterfall methodology, which consists of six phases. In conclusion, we hope this application can help users locate workshops more easily.

Keywords: *community. services, workshops, applications.*

INTRODUCTION

1.1 Problem Statement

The problem statements of the project are as follows:
  i. Potential users face difficulties getting their vehicles repaired because they are unaware of the workshops available in the Sungai Air Tawar area.
  ii. Potential users are unfamiliar with Sungai Lang area
  iii. The user does not get any notification from the mechanic when vehicle ready or not.

1.2 Objective of Project

The objectives of the project are as follows:
  i. To develop platform to show workshop identification.
  ii. To develop a map navigation to nearby workshop.
  iii. To develop a notification system that improves communication between mechanics and users by providing timely updates on the status of serviced vehicles.

1.3 Scope of Project

The project involves two types of users: customers (community members) and service providers (mechanics). Users can search for workshops, set appointments, rate services, and communicate via WhatsApp. Mechanics can accept or reject appointments, update repair statuses, and promote their workshops through the application profile.

METHODOLOGY

  1. This project follows the **Waterfall Model**, comprising six phases:
      1. **Requirement Analysis:** Interviews and surveys were conducted to gather user requirements.
      2. **System Design:** Logical and physical system designs were created, including user interface and system architecture.
      3. **Implementation:** The application was developed using Visual Studio Code, Firebase, and Figma. Core functions include

workshop listing, navigation, and booking system.

4. **Testing:** Unit and integration tests were conducted for user, mechanic, and admin functionalities.

5. **Deployment:** The application was released and tested on various devices.

6. **Maintenance:** Ongoing system monitoring and improvements were made based on user feedback.

RESULTS AND DISCUSSION

The Polychanic app enables users to easily access verified workshop information, save time searching for workshops in unfamiliar areas, and receive real-time updates on vehicle repair status. The advantages of the app include complete and reliable workshop details, as well as direct booking and communication with mechanics. However, there are also limitations such as scalability challenges in expanding the service to other regions, and a reliance on digital literacy, which may limit access for some users.

The following are the logical designs of the project:

Figure 1: Project Context Diagram

Figure 2: Project Data Flow Diagram

Figure 3: Project **Functional Decomposition Diagram**

Figure 4: Project Flow Chart for User to do Booking

Figure 5: Project Flow Chart for User to create an account

Figure 6: Project Flow Chart for Admin

The **following** are the interfaces of the application:

Figure 7: Sign Up page

Figure 8: Login page

Figure 9: Application Home Page

Figure 10: Detail information of any chosen workshop

Figure 11: Profile page

Figure 12: The map page

Figure 13: Booking interface

Figure 14: Booking status interface

Figure 15: Interface to create a workshop account

Figure 16: Interface to edit the workshop account

CONCLUSIONS

The Polychanic project successfully delivers a technological solution to the issue of locating workshops in remote areas like Sungai Lang. It not only simplifies emergency situations for users but also empowers local workshops to promote their services digitally. The app holds potential for wider implementation with further customization and user input.

REFERENCES

Animal Life Circle. (n.d.). *Senior project proposal (DDT4A)*. Retrieved from https://drive.google.com/drive/folders/1uJ1zk9mpiIoIjq_wltwdqjh7YPpsnjIh

Benefit waterfall methodology.
Open Access proceedings Journal of Physics: Conference series, IOP Conference Series: Materials Science and Engineering

GanttPRO Blog. (n.d.). *Gantt chart example for software development project*. Retrieved from https://blog.ganttpro.com/en/gantt-chart-example/

Google Play Store. (n.d.). *Infocar - OBD2 ELM diagnostic*. Retrieved from https://play.google.com/store/apps/details?id=mureung.obdproject&hl=en-MY

JotForm. (n.d.). *Vacation itinerary form*. Retrieved from https://www.jotform.com/build/242028446743457?s=templates

Pandey, P. (n.d.). *Service station*. Dribbble. Retrieved from https://dribbble.com/shots/14192778-Service-Station-Mobile-Application

SHOPSIS

Akhmal Khalis Binti Mohamad Isa[1*], Ahmad Muddasir Bin Azharuddin[2] & Muhammad Haikal Aqashah Bin Omir[3]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

*Corresponding author: akhmalkhalis@psis.edu.my

Abstract: SHOPSIS is an e-catalog app to improve business activity in PSIS by providing a platform for businesses in PSIS to promote and sell their products or services online. The objectives are to develop a unified application for buying and selling, create a chat feature for customer-seller communication, and provide a sales dashboard for better tracking and performance enhancement. The app will serve three main users: customers, who can browse, purchase, and review products; sellers, who can manage listings, orders, and sales analytics; and admins, who will oversee user accounts and platform settings. This will simplify and streamline the business process within the institution.

Keywords: *e-catalogues, mobile applications, PSIS marketplace*

INTRODUCTION

1.1 Problem Statement:

i. Decentralize buying and selling in polytechnic: Business in Polytechnic not centralized because business in PSIS is spread out across multiple platform

ii. Difficult to deal with buying and selling at the polytechnic: The business at polytechnic only using WhatsApp to buy and sell their products.

iii. Sales Dashboard Solution for Polytechnic Businesses: Struggle with tracking sales without a dashboard. This makes it hard for them to know how well they're doing and where they can improve.

1.2 Objective

i. To develop an application that can centralized business in polytechnic.

ii. To create a chat platform between customer and seller during the buyer process.

iii. To develop dashboard for tracking their sales record and enhance the sales.

1.3 Scope of Project:

The system is designed for three types of users: customers, sellers, and administrators.

i. Customers can browse, review, and purchase products, while sellers can create listings, manage inventory, communicate with buyers, and access real-time sales analytics.

ii. Admins are responsible for user account management and platform configuration. The app focuses on enhancing business visibility, communication efficiency, and data-driven sales improvements in the PSIS community.

METHODOLOGY

The project adopts the Waterfall Model, a structured software development methodology. The development process is divided into six phases:

1. **Requirement Analysis:** Stakeholder consultations and market studies identify challenges in existing business practices.
2. **System Design:** The team designs the app architecture, database, and user interface for scalability and ease of use.
3. **Implementation:** Coding is performed using Visual Studio Code and Firebase. Features such as product listings, chats, dashboards, and user management are integrated.
4. **Testing:** Comprehensive testing—including unit, integration, and user acceptance tests—ensures functionality, performance, and usability.
5. **Deployment:** The system is configured and launched in the PSIS environment. Users are guided through onboarding.
6. **Maintenance:** Regular updates and feedback-driven enhancements ensure continued system relevance and reliability.

RESULTS AND DİSCUSSİON

The implementation of SHOPSIS centralized business activities and improved the buying/selling experience. Users benefited from structured product listings, simplified checkout, and improved communication with sellers. Sellers gained real-time insights through dashboards, enabling more strategic decisions. Key advantages include enhanced visibility, operational efficiency, and engagement. However, limitations include the absence of online payment integration, potential lag due to database access, and challenges in encouraging platform adoption among traditional users.

The following are the logical design of the project:

Figure 1: Project Data Flow Diagram

The following are the interfaces of the project:

Figure 2: Project's Sign-Up Page

Figure 4: Project's Login Page

Figure 3: Project's Set Details Page

Figure 5: Project's Home Page

Figure 6: Project's Create Listing Page

Figure 8: Project's My Purchase Page

Figure 7: Project's Profile Page

Figure 9: Project's My Sales Page

Figure 10: Project's Insight Page

Figure 12: Project's Home Chat Page

Figure 11: Project's Edit Listing Page

Figure 13: Project's Chat Page

Figure 14: Project's Admin Page

Figure 15: Project's User Management Page

Figure 16: Project's Listing Management Page

CONCLUSION

SHOPSIS successfully addressed the major business challenges in PSIS by offering a centralized, user-friendly platform for e-commerce within the campus community. While some technical and behavioral challenges remain, the project has laid a foundation for future improvements such as integrating secure online payment systems and enhancing system responsiveness. The platform demonstrates the potential to foster growth and digital transformation in localized academic communities.

REFERENCES

Carousell. https://www.carousell.com.my/

Eternal Sunshine of the IS Mind. (2013). The Waterfall Model – A Traditional Method of Software Design.
https://eternalsunshineoftheismind.wordpress.com

Facebook Marketplace.
https://www.facebook.com/marketplace/

Forbes Advisor. What Is Waterfall Methodology? https://www.forbes.com/advisor/business/what-is-waterfall-methodology/

Indeed. How to Write a Proposal Letter. https://www.indeed.com/career-advice/career-development/how-to-write-a-proposal-letter

Mudah.my. https://www.mudah.my/

TeamGantt. (2024). Waterfall Model Template and Project Plan Example. https://www.teamgantt.com

AAJ DASHSTOCK (DASHBOARD INVENTORY MANAGEMENT SYSTEM)

Ts. Ainie Hayati binti Noruzman[1*], Nur Humaira binti Hamizan[2] , Nurul Huda binti Mohd Zaini[3] & Nurul Zafirah binti Ahmad Pauzi [4]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

Corresponding author: ainie_hayati@psis.edu.my

Abstract: The "AAJ Dashstock: Amin Aman Jaya Enterprise Dashboard Inventory Management System" is designed as an automated solution to address inefficiencies in manual stock management processes at Amin Aman Jaya Enterprise. Currently, the enterprise faces challenges with manual stock entry and monitoring. By employing a prototyping methodology, the project integrates an API barcode scanner into a user-friendly dashboard to streamline stock tracking and monitoring. This system aims to enhance accuracy and minimize errors in data entry, while providing capabilities to visualize through dashboard solutions that meet enterprise needs, paving the way for streamlined inventory management in the future.

Keywords: *Dashboard, visualization, management system*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i   Manual data entry makes it difficult for inventory management to track outgoing and arriving products for the organization.

ii   It is tough to determine the most recent information about items or products that come that enter and exit.

iii   There is no alert mechanism to warn users of critical inventory levels, out of stock items, or any irregularities discovered in inventory data.

1.2 Objective

The objectives of this project are:

i.   To develop a real-time dashboard monitoring and tracking inventory level.

ii.   To develop an automated data entry of stock inventory using API barcode scanner.

iii.   To develop alert mechanisms for critical inventory levels.

1.3 Scope of Project:

The system is designed to support two main user roles: Administrators and Inventory Managers.

i.   Administrators manage the full system, including product entries, supplier records, user approvals, and system reports.

ii.   Inventory managers handle product management, dashboard monitoring, and barcode scanning.

iii.   The system also includes functionalities like report generation in PDF, integration with barcode scanning devices, and real-time data visualization..

METHODOLOGY

The development process follows the Prototype Model, allowing iterative development and refinement based on continuous feedback. The phases include:

1.   Requirements Analysis: Identification of user needs and system expectations.

2.   Design: Creation of wireframes, dashboard layout, and user interface mock-ups.

3.   Prototype Development: A working model was built, featuring dashboard access, login, barcode scanning, inventory tracking, and report generation.

4. Review and Refinement: Stakeholders reviewed the prototype and suggested improvements.
5. Development: Full-scale development of the final system.
6. Testing: Comprehensive unit, integration, and user acceptance tests to validate system performance.
7. Deployment: Launch of the system with real-time functionality and notification features.

RESULTS AND DİSCUSSİON

The implementation of AAJ DashStock has significantly improved the efficiency of inventory operations at Amin Aman Jaya Enterprise. The automation of stock entry using barcode scanning reduced the time required for manual data entry, thereby enhancing overall workflow. The accuracy of stock records also improved due to minimized human errors facilitated by the API-based scanner. Real-time inventory monitoring through the dashboard provided immediate visibility of stock levels, which supported timely restocking and improved stock control. Additionally, easy access to inventory analytics enabled better business strategies and decision-making.

Despite these benefits, the system encountered some limitations. It relies heavily on technical infrastructure, necessitating consistent system maintenance and updates. Furthermore, the adoption of the system required a learning curve for users unfamiliar with digital inventory systems. Another technical constraint observed was the barcode format compatibility, as the system currently supports only EAN-12 barcodes, limiting its flexibility with other product types.

The following are the logical design of the project:

Figure 1: Function Decomposition Diagram (FDD) of AAJ Dashstock

Figure 2: Entity Relational Diagram (ERD) of AAJ Dashstock

Figure 3: E Context Diagram of AAJ Dashstock

Figure 4: Use Case of AAJ Dashstock

The following are the interface design of the project:

Figure 5: Interface of start page AAJ Dashstock

Figure 6: Interface of login page of AAJ Dashstock

Figure 7: Interface of sign up page of AAJ Dashstock

Figure 8: Interface of dashboard admin page AAJ Dashstock

Figure 9: Interface of notification admin page AAJ Dashstock

Figure 10: Interface generate report for admin page of AAJ Dashstock

Figure 11: Interface list suppliers admin page of AAJ Dashstock

Figure 12: Interface new suppliers admin page of AAJ Dashstock

Figure 13: Interface list product admin page of AAJ Dashstock

Figure 14: Interface add new product admin page of AAJ Dashstock

Figure 15: Interface users approval admin page of AAJ Dashstock

Figure 16: Interface dashboard user page of AAJ Dashstock

Figure 17: Interface of notification user page of AAJ Dashstock

Figure 18: Interface list product user page of AAJ Dashstock

Figure 19: Interface add new product user page of AAJ Dashstock

The following are the interface of barcode page:

Figure 20: Interface of barcode page of AAJ Dashstock

Figure 21: Interface barcode camera page of AAJ Dashstock

Figure 22: Interface add new product barcode page of AAJ Dashstock

Figure 23: Interface product barcode page of AAJ Dashstock

CONCLUSION

AAJ DashStock successfully addressed inventory management inefficiencies at Amin Aman Jaya Enterprise. The system brought digital transformation to operations with automated stock entry, real-time dashboards, and critical stock alerts. While challenges like system maintenance and barcode compatibility remain, the foundation has been set for future scalability and enhancements.

The system's potential for adaptation across similar small businesses highlights its scalability and contribution to smarter inventory control in local enterprises.

REFERENCES

Another Tech Tips. (2022, January 27). Create an inventory system integration with barcode scanner.
https://www.youtube.com/@AnotherTechTips

Austin. (2023, December). ProjectManager.
https://www.projectmanager.com/guides/gantt-chart

Datta, S. (2020, September 29). What is functional decomposition.
https://www.baeldung.com/cs/functional-decomposition

Holtsnider, B., & Jaffe, B. D. (2012). Gantt charts and time lines. In IT Manager's Handbook (Third Edition).
https://www.sciencedirect.com/topics/computer-science/gantt-chart

Katrina, R. (2022, October 04). The Evolution Of Software Prototyping.
https://www.baytechconsulting.com/blog/the-evolution-of-software-prototyping

Lewis, S. (2020, December). Fishbone diagram (Ishikawa cause and effect).
https://www.techtarget.com/contact-us/

ARISTORY: AR KIT PEMBELAJARAN SEJARAH

Siti Dianah Binti Abdul Bujang[1*], Nor Liza Elis Binti Nawasi[2], Siti Muslihah Binti Ramli[3] & Aleeya Saffiya Binti Abdullah[4]

¹Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

*Corresponding author: dianah@psis.edu.my

Abstract: The "ARistory: Kit Pembelajaran Sejarah AR" project addresses the challenges of conventional secondary history textbooks that lack of interactive features and visual aids for better understanding. Besides, the absence of self-assessment and complex content makes it difficult for students to understand the concept of the history learning. Therefore, this project aims to revolutionize learning experiences through metaverse technology using augmented reality (AR). It provides an interactive e-learning platform with user-friendly resources, enriches history content with multimedia, and establishes self-assessment tools. This project uses agile methodology that consists of six phases: planning, design, development, testing, deployment, and review. By improving these challenges, this project can enhance student engagement and understanding, thereby adapting to the new metaverse technology in Malaysia Education.

Keywords: *Augmented Reality (AR), metaverse technology, history Course, Malaysia education*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. Lack of interactive learning platform.
ii. Difficult to understand the content of the syllabus for History subject
iii. Lack of opportunities for self-assessment and reflection in History subject

1.2 Objective

The objectives of this project are:

i. To develop an interactive learning platform and engaging content for History subject using Augmented Reality (AR).
ii. To create an interactive notes and accessible resources for History subject using infographic, sound, graphic and 3D object.
iii. To develop an interactive self-assessment tool using Augmented Reality (AR) that includes interactive games and quizzes.

1.3 Scope of Project:

The project has two scopes consists of user scopes and application scope. The user scope can be divided into two categories consists of student and teacher. The students' scopes are:
i. Students can view comprehensive historical notes by navigating the "ARistory" app and accessing 3D modeling notes of various historical themes and events.
ii. Students can access quizzes in "ARistory" to test their understanding, including objective quizzes and board game quizzes.
iii. Students receive immediate feedback after completing quizzes, including scores, to aid their learning process.
iv. Students can activate the AR feature within the app to immerse themselves in AR experiences, bringing historical content to life in an engaging and visually appealing way.

The teachers' scope are:
i. Teachers can view comprehensive historical notes by navigating the "ARistory" app to

access 3D modeling notes and teaching materials for historical topics.

ii. Teachers can use the quizzes and questions on "ARistory" to design assessments that align with their history syllabus and educational objectives.

iii. Teachers can use the AR features of the app to integrate immersive AR experiences into lessons, providing engaging and interactive learning experiences for their students and enhancing understanding and memory of historical content.

The application scopes are:

i. "ARistory" covers a variety of historical figures and events mentioned in the KSSM (Kurikulum Standard Sekolah Menengah) to display comprehensive notes.

ii. These notes are presented in Augmented Reality (AR) with an entertaining and modern style, customized to meet the needs of the Kokurikulum Standard Sekolah Menengah syllabus.

iii. Augmented reality (AR) is employed to render students' engagement and comprehension of the past more tangible, allowing them to visually explore and assess immersive historical scenes and create memorable learning experiences.

iv. It has quiz module to examine test results from students, aiming to identify trends and provide tailored advice and remarks.

v. It helps to identify student strengths and weaknesses precisely, empowering them to allocate their efforts more effectively and promoting self-directed learning.

vi. It can analyze students' responses in-depth, providing insights into their performance and aiding in understanding their progress by using the Augmented Reality (AR) concept.

METHODOLOGY

The project employed the Agile methodology, which emphasizes adaptability and collaboration throughout the software development life cycle (SDLC). The Agile methodology includes the following phases: planning, design, development, testing, deployment, and review. Each phase involves specific activities, such as gathering requirements, designing user interfaces, coding, testing, and collecting user feedback, to ensure continuous improvement and alignment with project goals.

RESULTS AND DİSCUSSİON

The "ARistory" application was developed with functional requirements that include interactive AR notes, quiz modules, navigation and user interface elements, and settings panel. The AR notes module provides 3D models with audio narration and interactive features, while the quiz module offers multiple-choice and AR-based quizzes with immediate feedback. The application also includes user-friendly navigation and settings for volume control and exit functionality. The development process involved using Unity with C# and optimizing the application for Android devices. The project's success is evident in its potential to transform history education by making it more engaging, interactive, and accessible to students.

The following are the logical design of the project:

Figure 1: Functional Decomposition Diagram

Figure 2: Use Case Diagram

Figure 3: Application Flowchart

The following are the interfaces of the project:

Figure 4: Initialize Page

Figure 5: Main page

Figure 6: AR Notes Manual Guide

Figure 7: Main AR Notes Page

Figure 8: AR-3D Front Model Page

Figure 9: Kit Notes Page

Figure 10: AR Camera Page

Figure 11: AR-3D Notes Page

Figure 12: Quiz Page

Figure 13: Multiple Choice Quiz Page – Example 1

Figure 14: Multiple Choice Quiz Page – Example 2

Figure 15: Multiple Choice Quiz Page – Example 3

Figure 16: Multiple Choice Quiz Page – Example 4

Figure 17: Multiple Choice Result Interface

Figure 18: Multiple Choice Result Interface in Details

Figure 19: User manual for board game quiz.

Figure 20: Starting page for dice game.

Figure 21: Number of Dice and Instruction Page.

Figure 22: AR Camera Page

Figure 23: Board Game Quiz Page

Figure 24: Board Game Quiz Instruction Page

Figure 25: Setting Page

CONCLUSION

The "ARistory: AR Kit Pembelajaran Sejarah" project successfully addresses the limitations of traditional history education by leveraging augmented reality and interactive technology. The application enhances student engagement, facilitates better understanding of historical concepts, and provides valuable self-assessment tools. By adopting the Agile methodology, the project ensured a flexible and efficient development process, resulting in a user-friendly and effective educational tool. The "ARistory" application has the potential to significantly contribute to the advancement of history education in Malaysia by adapting to new metaverse technology.

REFERENCES

Brown, M., & Jones, K. (2022). Agile project management:
Best practices and lessons learned. Project Management Journal, 53(1), 78-91.

Patel, R., & Gupta, S. (2021). Implementation challenges of Agile methodologies in large-scale organizations. International Journal of Project Management, 38(4), 523-536.

Playful Technology. (2023, May 15). Augmented Reality (AR) tutorial for beginners using Unity 2022 [Video]. YouTube. https://www.youtube.com/watch?v=gpaq5bAjya8

Unity Learn. (2022, December 6). Create a marker-based AR app.
Retrieved from https://learn.unity.com/project/create-a-marker-based-ar-app

CEPERVR

Mohd Syamsul Ariff bin Ghazalli[1*], Muhammad Aiman Haikal bin Azmi[2], Muhammad Amir Mustaqim bin Sajak[3] & Sharul Amir bin Sharuddin[4]

[1]*Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor*

*Corresponding author: syamsulariff@psis.edu.my

Abstract: CeperVR is an application designed to modernize the Malaysian traditional game of Ceper through Virtual Reality technology. Currently, Ceper is facing challenges such as decreasing popularity among the modern generation and a lack of educational resources to teach people about its cultural significance. Therefore, the objective of this project is to develop a VR game to reignite interest in the traditional game and preserve its cultural heritage. This project utilizes Agile Methodology, providing flexibility to adapt to changing requirements. In conclusion, CeperVR will help revive interest in the traditional game of Ceper while educating users about its cultural significance in the virtual world.

Keywords: *Traditional game, hand tracking, virtual reality*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. The market currently doesn't have any virtual reality adaptation of the traditional Ceper game, and no one has even made a game about Ceper.
ii. Modern games often leverage cutting-edge technology, graphics, and gameplay mechanics that appeal to contemporary audiences. Traditional games may seem outdated or less engaging in comparison.
iii. People lack knowledge about Ceper and there are many people who don't know the history and the rules of how to play Ceper.

1.2 Objective

The objectives of this project are:

i. To develop our VR 'Ceper' game using Virtual Reality technology for promoting traditional game in the market.
ii. To utilize features such as hand gestures mimicking natural hand movements, an automated scoreboard, immersive sound effects, and the implementation of a multiplayer mode in Virtual Reality.
iii. To introduce the rules of the traditional game using virtual reality.

1.3 Scope of Project:

The application targets both general users and cultural enthusiasts. It features multiple interactive modules such as game mode selection (single or multiplayer), a tutorial and history section, and settings control for sound and language. The system allows users to play Ceper using natural hand gestures, learn its history via videos and texts, and experience culturally themed virtual environments such as kampung scenes and landmarks like KLCC and Paris.

METHODOLOGY

The development adopted the Agile methodology due to its flexibility and adaptability in meeting changing project requirements and tight deadlines. The project workflow followed iterative cycles involving requirement gathering, prototype development, testing, and feedback integration.

Agile enabled the team to focus on incremental delivery, breaking down complex tasks into manageable units and ensuring consistent progress and quality improvements.

RESULTS AND DİSCUSSİON

The CeperVR application successfully delivered an innovative platform that preserves and promotes the traditional game of Ceper in a virtual setting. The system was equipped with realistic gesture-based controls, allowing players to interact naturally within the VR environment. The tutorial module was enhanced with multimedia resources such as text and video, enabling users to understand the game rules and history in a more engaging way. Multiplayer support was successfully integrated, offering a collaborative gaming experience that increased user engagement.

The inclusion of culturally themed virtual environments, such as kampung scenery and international landmarks, enriched the overall user experience and connected players with the cultural roots of the game. The system also performed well in terms of navigation and immersion, allowing players to move seamlessly within the application.

Despite its successes, the CeperVR project encountered several challenges. One major limitation was the high cost of VR hardware, which may reduce accessibility for some users. Additionally, prolonged use of the system could lead to physical discomfort, especially for first-time VR users. Another issue involved the sensitivity of gesture recognition, which may affect gameplay consistency.

The following are the system configurations for the project developed:

Figure 1: SideQuest Configuration

Figure 2: Page creates organization.

Figure 3: Enable developer mode

Figure 4: Allow USB debugging

Figure 5: Connected to SideQuest.

Figure 6: APK installation.

Figure 7: Launching CeperVR

The following are the system logical design for the project developed:

Figure 8: CeperVR Use Case Diagram

Figure 9: CeperVR FDD

The following are the interface design for the project developed:

Figure 10: Select game mode button

Figure 11: Info Ceper panel

Figure 12: Unmute sound background

Figure 13: Mute background sound settings

Figure 14: Learn Ceper button

Figure 15: Tutorial button

Figure 16: Score Point Interface

Figure 17: Timbang Ceper Interface

Figure 18: Jentik Ceper Interface

Figure 19: Tindih Interface

Figure 20: Jamban information interface

Figure 20: Bunga information interface

The following are the scenes for the project developed:

Figure 21: Kampung scene

Figure 22: Paris scene 1

Figure 23: Paris scene 2

Figure 24: KLCC Scene – Part 1

Figure 25: KLCC Scene – Part 2

CONCLUSION

CeperVR serves as a powerful tool for cultural preservation and education. By leveraging VR, the project modernizes a fading traditional game and reintroduces it to a tech-savvy audience. With improvements in graphics, customization, and multilingual support, CeperVR can broaden its reach and impact. The project demonstrates how emerging technologies can play a key role in safeguarding intangible cultural heritage.

REFERENCES

Black Whale Studio - XR Tutorials. (2024, February 17). Meta XR Simulator | Synthetic Environments, scene recording & Multiplayer testing [Video]. YouTube. https://www.youtube.com/watch?v=RRsxYtuO2i M

Brush, K., & Silverthorne, V. (2022, November 15). Agile software development. Software Quality. https://www.techtarget.com/searchsoftwarequali ty/definition/agile-software-development

Carpenter, A. (2022, February 17). What is UAT? Breaking Down User Acceptance Testing. Codecademy Blog. https://www.codecademy.com/resources/blog/w hat-is-user-acceptance-testing/

Laoyan, S. (2024, February 2). What Is Agile Methodology? (A Beginner's Guide) [2024].

Asana. https://asana.com/resources/agile-methodology

Learn game development with Unity | Courses & tutorials in game design, VR, AR, & Real-time 3D | Unity Learn. (n.d.). https://learn.unity.com/

Lowood, H. E. (2024, July 18). Virtual reality (VR) | Definition, Development, Technology, Examples, & Facts. Encyclopedia Britannica. https://www.britannica.com/technology/virtual-reality

Mesin Massa. (2019, December 18). Ingat lagi tak? Cara - cara bermain ceper / tutup oren / tutup botol [Video]. YouTube. https://www.youtube.com/watch?v=K4CkDXxxG -o

Valem Tutorials. (2022, July 17). How to make a VR game in unity - PART 1 [Video]. YouTube. https://www.youtube.com/watch?v=HhtTtvBF5b I

Valem Tutorials. (2023, September 3). How to make a VR multiplayer game - Unity Netcode [Video]. YouTube. https://www.youtube.com/watch?v=6fZ7LT5AeT w

32PENUTUPBOTOL_240630_125819. (n.d.). https://info-ceper.tiiny.site/

MY MU'MIN

Azrol Hisham bin Mohd Adham[1*], Ahmad Syameel bin Ahmad Syamsury[2] , Muhammar Ammar Harith bin Jasri[3] & Muhammad Syabaan Ali bin Wahid Azhari[4]

[1]*Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor*

Corresponding author: azrol_hisham@psis.edu.my

Abstract: "My Mu'min" aims to provide comprehensive platform for children to learn the foundation of Islamic practices (Solat, Wudhu and Doa) in an engaging manner, fostering a playful yet informative learning environment. Three identified hurdles include lack of engaging learning method, pronunciation difficulties, and lack of assessment methods. The project aims to develop an interactive application, integrating sound elements and quiz modules. "My Mu'min" employs agile technique to offer captivating Islamic education, encouraging a deeper understanding of the subject within the kindergarten curriculum, benefiting both students and teachers while enriching the overall learning experience for young learners.

Keywords: *Interactive learning, Islamic education, quizzes and minigames*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. The absence of multimedia elements and interactive activities in teaching Solat, Wudhu, and Doa poses a challenge in maintaining student interest and participation throughout the learning process.
ii. Students face difficulties in correctly pronouncing essential phrases and verses in Solat and Doa leading to potential misunderstandings and errors in prayer performance.
iii. The current assessment approach primarily focuses on practical understanding, neglecting comprehensive evaluations of knowledge and application of concepts related to Solat, Wudhu, and Doa.

1.2 Objective

The objectives of this project are:

i.   To design and develop engaging and educational application targeted towards primary school Standard 1 students, focusing on teaching Solat, Wudhu, and Doa through interactive methods.
ii. To incorporate audio elements into the application to assist children in practicing and refining their pronunciation skills for Solat and Doa.
iii. To integrate quiz and minigames modules into the application, enabling users to assess their understanding of Solat, Wudhu, and Doa and providing opportunities for improvement based on their performance.

1.3 Scope of Project:

The project targets Standard 1 students and their educators. The system includes a Learn Module with animated content and audio, a Quiz Module with randomized questions and scoring, and a Minigame Module with interactive challenges. The application is designed for Android devices, operates offline, and features a simple, user-friendly interface suitable for young users.

METHODOLOGY

The project adopted the Agile development methodology, which emphasizes adaptability,

collaboration, and iterative progress. In the planning phase, the team identified core features, technical requirements, and sprint goals based on user needs. The design phase involved creating user-friendly UI/UX mockups, storyboards, and initial prototypes to guide development. During the development stage, features such as animations, audio recitations, quiz mechanics, and interactive minigames were implemented. Testing was carried out through unit, integration, and user acceptance tests to ensure that the system met both functional and usability standards. The deployment stage prepared the app for release, including packaging it for Android devices, creating user documentation, and establishing update procedures. Finally, a review phase collected post-launch feedback from users and stakeholders to guide future improvements and refinements.

RESULTS AND DİSCUSSİON

The "My Mu'min" application successfully meets its objectives by offering a comprehensive Islamic learning tool for children. The Learn Module provides animated lessons and audio recitations to help children visualize and correctly pronounce important religious practices. The Quiz Module offers assessment opportunities that reflect student understanding across multiple topics, while the Minigame Module reinforces learning through fun, interactive formats.

User acceptance testing indicated that children were able to navigate the app independently, interact with its features, and benefit from the clear, engaging instructional content. Educators appreciated the application's ability to standardize and enhance early Islamic education. However, the project also faced challenges, including hardware cost, software licensing, and the absence of cloud-based progress tracking. Despite these limitations, the system remains effective in offline environments.

The following are the logical design for the project developed:

Figure 1: My Mu'min Functional Decomposition Diagram

Figure 2: My Mu'min Use Case Diagram

Figure 3: My Mu'min Context Diagram

Figure 4: My Mu'min Data Flow Diagram

Figure 5: Main Menu Flowchart

Figure 6: Learn Menu Flowchart

Figure 7: Quiz Flowchart

Figure 8: Minigames Flowchart

The following are the interfaces for the project developed:

Figure 9: Splash screen

Figure 10: Main Menu

Figure 11: Music On Settings

Figure 12: Music Off Settings

Figure 13: Selection Menu Interface

Figure 14: Learning Module

Figure 15: Learn Module Navigation Button

Figure 16: Syahadah Interface

Figure 17: Navigation Button

Figure 18: Salah Interface

Figure 19: Fasting Interface

Figure 20: Zakat Interface

Figure 21: Hajj Interface

Figure 22: The First Pillar (Belief in Allah) Interface

Figure 23: Navigation Button

Figure 24: The first step of Wudhu' Interface

Figure 25: Prayer Time Interface

Figure 26: Fajr Intention Interface

Figure 27: Doa Menu page

Figure 28: Du'a for Parents Interface

Figure 29: Quiz Menu Interface with Navigation Button

Figure 30: Pillar of Islam Question

Figure 31: Correct Answer Display

Figure 32: Incorrect Answer Display

Figure 33: Score Interface

Figure 34: Minigame Menu

Figure 35: Instructions for Drag and Drop (Letters) Minigame Interface

Figure 36: Drag and Drop (Letters) Minigame Interface

Figure 37: Drag and Drop (Word) Minigame Interface

Figure 38: Game Over Interface

Figure 39: Instruction for Guess the Doa Minigame Interface

Figure 40: Guess the Doa Minigame Interface

Figure 41: Instruction for Mix and Match Minigame Interface

Figure 42: Mix and Match Minigame Interface

CONCLUSION

"My Mu'min" is a meaningful innovation in digital Islamic education. Through animation, audio, quizzes, and games, it transforms traditional content into a dynamic experience suitable for young learners. While the application could benefit from further enhancements such as multi-language support or cloud-based analytics, its current implementation already represents a significant step forward in engaging Islamic pedagogy.

REFERENCES

Educastudio. Marbel Shalat.
https://play.google.com/store/apps/details?id=com.educastudio.marbelshalat

Salah Osratouna. Wudu and Salah.
https://play.google.com/store/apps/details?id=com.salah.osratouna

Agile Software Development. TechTarget.
https://www.techtarget.com/searchsoftwarequality/definition/agile-software-development

Unity Learn. Game Development Courses.
https://learn.unity.com/

Microsoft 365. https://www.microsoft.com/en-my/microsoft-365

Adobe Creative Cloud.
https://www.adobe.com/creativecloud.html

Canva for Teams. https://www.canva.com/teams/

SCANIMALZ AR

Nur Hazimah binti Khalid[1*], Mohammad Haziq Adham bin Jasri[2] , Muhammad Aiman Arif bin Hamzah[3] & Varhman a/l Balanmurugan[4]

[1]*Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor*

Corresponding author: nhazimah@psis.edu.my

Abstract: The Scanimalz AR app transforms traditional animal science teaching and learning by bringing 3D animal models to life using augmented reality, providing students with immersive learning experiences. The current primary educational landscape lacks interactive platforms and real-world engagement with animals, relying on text-heavy methods that fail to capture students' curiosity, making information retention difficult. The objectives of Scanimalz AR are to develop an interactive learning application with appealing AR content on animal behavior and habitats. It includes 3D models for exploration, games, and quizzes to improve comprehension. The project is intended for a primary school science teacher, with the target audience being primary students in years 3 and 4. Scanimalz's development relies heavily on agile techniques, whose emphasis on iterative development and customer feedback perfectly aligns with the goals of the "AR Scanimalz" project. In conclusion, Scanimalz AR will spark a lifelong love of animals and inspire environmental stewardship by making animal education engaging and interactive, empowering children to become responsible citizens.

Keywords: *Teaching and learning tools, augmented reality, 3D animals*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. The current educational landscape lacks interactive platforms that ignite a love for animals and foster a deeper understanding of their characteristics, body part, reproduction, respiratory organ and habitat.
ii. The dominance of digital experiences restricts first-hand connections with animals. It means people, especially children, are lacking engagement with animals in the real world.
iii. Limited opportunities for children to engage with and learn about animals hinder their connection with wildlife. Lack of interactive materials can make learning about animals a struggle, insufficient to capture their natural curiosity and making it difficult to retain information.

1.2 Objective

The objectives of this project are:

i. To develop an interactive learning application and engaging content to learn about animals using Augmented Reality (AR).
ii. To build 3D models for children to explore the animal by using the AR application.
iii. To provide games and quizzes for improving student's comprehension.

1.3 Scope of Project:

The Scanimalz AR application is developed for primary school teachers, parents, and Standard 4 students. It enables users to interact with 3D animal models, access informative text, play interactive educational games, and explore content through AR technology. The system includes features for learning animal characteristics, body parts, reproduction, and respiratory systems, along with game modules such as Word Spy, Quiz, and Drag-and-Drop. The app supports usage on Android devices and is designed to be accessible, engaging, and educational for its target audience.

METHODOLOGY

The project utilized the Agile methodology, ideal for educational mobile application development due to its focus on iterative progress and client collaboration. Agile enabled the team to accommodate changing educational content and feedback efficiently. The development process began with the Requirements & Planning stage, identifying the target users and defining features aligned with learning goals. Next, the Design phase involved creating user interfaces, developing detailed 3D animal models, and planning interactions within the AR environment.

During the Development & Coding phase, the team implemented AR functionalities using Unity and Vuforia, developed mini-games, and integrated educational content. Following this, the Integration & Testing phase was conducted, including unit, integration, and user acceptance testing to ensure usability and system stability.

The Deployment stage focused on releasing the app via the Play Store and distributing documentation and user guides. Finally, the Review phase involved collecting client feedback, demonstrating app features, and identifying improvement areas for future iterations. Agile's flexibility ensured that the Scanimalz AR project remained user-focused and responsive to educational needs throughout development.

RESULTS AND DİSCUSSİON

The Scanimalz AR application was well-received by both educators and students, fulfilling its objectives of making animal science more interactive and enjoyable. Teachers appreciated the app's ability to supplement classroom lessons with engaging digital tools, while students found the AR experiences and games fun and informative. The application's educational content, including detailed 3D models and multimedia-rich learning modules, contributed to improved knowledge retention and independent learning.

However, the project also faced certain limitations. These included performance constraints on lower-end mobile devices, limited compatibility with non-Android platforms, and occasional app crashes due to high AR processing loads. Despite these technical challenges, user testing confirmed that the app was usable, accessible, and highly beneficial in a learning environment.

The following are the logical design for the project developed:

Figure 1: Use-Case Diagram for the Scanimalz AR Application

Figure 2: Functional Decomposition Diagram (FDD)

Figure 3: Data Flow Diagram (DFD) for the Scanimalz AR Application

Figure 4: Swimlane Diagram for the Scanimalz AR Application

The following are the interfaces for the project developed:

Figure 5: Start Page Interface

Figure 6: Information Interface

Figure 7: Setting Interface

Figure 8: Main Menu Interface

Figure 9: Learn Menu Interface

Figure 10: Information Panel (Learn Menu) Interface

Figure 11: Invertebrate Menu (Learn Menu) Interface

Figure 12: Snail Characteristics Interface

Figure 13: Snail Body Part Interface

Figure 14: Snail Reproduction Interface

Figure 15: Snail Respiratory Organ Interface

Figure 16: Octopus Characteristics Interface

Figure 17: Vertebrate (Learn Menu) Interface

Figure 18: Games Menu Interface

Figure 19: Quiz Question Interface

Figure 20: Quiz Result Interface

Figure 21: Select Category Interface

Figure 22: Word Spy Game Interface

Figure 23: Word Spy Result Interface

Figure 24: Word Spy Tutorial Interface

Figure 25: Reset Progress Word Spy Interface

Figure 26: Drag And Drop Tutorial Interface

Figure 27: Drag And Drop Game Interface

Figure 28: Snail (AR Mode - Scan Card) Interface

Figure 29: Snail (AR mode - Scan Card) 'Option Panel' Interface

Figure 30: Snail (AR Mode - Scan Card) Sound Panel Interface

Figure 31: Octopus (AR mode - Ground Plane) Interface

Figure 32: Tutorial Scan a Card Interface

Figure 33: Video Menu Interface

Figure 34: Video Explore the Animal Kingdom Interface

Figure 35: Video Vertebrate and Invertebrates Interface

The following are interface of the designated cards for the project:

Figure 36: Octopus Card Design

CONCLUSION

Scanimalz AR represents a significant innovation in primary education, combining AR technology with gamified learning to promote animal science.

The project successfully addressed the need for immersive, interactive educational tools for children. While improvements such as enhanced cross-device support and AR performance optimization are recommended, the current

version already demonstrates the powerful potential of AR to enhance student engagement and learning outcomes.

REFERENCES

Unity Learn. (n.d.). Learn game development with Unity. https://learn.unity.com/

Vuforia. (n.d.). Augmented Reality SDK. https://developer.vuforia.com/

TechTarget. (2022). Agile Software Development. https://www.techtarget.com/searchsoftwarequality/definition/agile-software-development

Google Play. (n.d.). 3DBear, AR Zoo, and The AR Animals Apps. https://play.google.com

Blender. (n.d.). Blender 3D Creation Suite. https://www.blender.org/

AGROTECH MONITORING SYSTEM

Syahrul Iyzani binti Salehin[1*], Muhammad Muqry Haqimy bin Mohd Azli[2] , Muhammad Syazwan Syahmi bin Muhd Safrudin[3] & Muhammad Abubakar Adam bin Masnawi[4]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

*Corresponding author: syahruliyzani@psis.edu.my

Abstract: Agrotech Monitoring System addresses the inefficiencies and limitations inherent in manual monitoring methods, which impede optimal agricultural productivity. This project aims to develop an automated system leveraging IoT technology to collect, process, and analyze environmental data, thereby enhancing decision-making in farming practices. The proposed methodology involves the implementation of sensors, the development of advanced algorithms, and the establishment of a robust alert system. By offering a comprehensive IoT solution, this system seeks to significantly improve agricultural efficiency and sustainability.

***Keywords*:** *Agriculture technology, monitoring system, Internet Of Things*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. Manual Monitoring Challenges: Clients face significant challenges in manually keeping track of critical environmental factors such as temperature, humidity, soil temperature, and moisture. The labour-intensive nature of manual monitoring increases the likelihood of errors and inaccuracies in data collection, making it difficult for clients to obtain reliable information

ii. Lack Of Automation in Irrigation: Without automation, clients must manually operate irrigation systems, leading to inefficiencies. This manual intervention is time-consuming and often results in either over-watering or under-watering crops, adversely affecting crop health and yield.

iii. Inefficient Fertilization Application: Clients struggle with manually applying fertilizers, which often results in improper fertilizer application. This can negatively impact crop health and yield due to either over-fertilization or under-fertilization.

iv. Timely Notification and Alerts: Clients need timely notifications and alerts to respond quickly to detected anomalies or adverse environmental conditions to prevent crop damage and optimize agricultural practices.

1.2 Objective

The objectives of this project are:

i. Implement a robust data collection mechanism by integrating various sensors, including humidity, temperature, soil temperature, and moisture sensors, to gather accurate and real-time environmental data from agricultural fields.

ii. Develop an automated irrigation system that controls a water pump to activate when soil moisture levels are too low, ensuring crops receive adequate water without manual intervention. Notifications will be sent through the Telegram bot about the behaviour of the soil moisture, such as when the soil is dry (water pump turned on) and when it is sufficiently moist (water pump turned off).

iii. Enable remote control of fertilizer application, allowing clients to manage nutrient delivery efficiently and effectively. Clients can control the motor remotely through an app to open and close the

fertilizer dispenser as needed. Notifications will be sent via the Telegram bot to inform clients about the fertilizer behaviour.

iv. Establish a reliable alert system to issue timely notifications to clients and small agricultural authorities in response to detected anomalies or adverse environmental conditions. This system will be customizable to meet specific agricultural needs and risk profiles.

1.3 Scope of Project:

The system scope of the project focuses on three core functions: data collection, automation, and alert systems. Data collection involves the integration of sensors to measure essential environmental parameters such as soil moisture, humidity, and temperature. These readings are transmitted seamlessly to a central monitoring system, ensuring real-time tracking of field conditions. For automation, the system is designed to control the water pump based on soil moisture levels, promoting efficient irrigation practices. Additionally, an alert system is included to notify users when critical environmental thresholds are breached. These alerts are configured based on specific agricultural needs to ensure timely interventions.

From the user scope perspective, the project emphasizes a user-friendly interface that enables users to access real-time environmental data and remotely manage agricultural inputs such as fertilizer. The interface also provides interactive dashboards for monitoring conditions and receiving alerts, enhancing decision-making and operational control for users managing smart agriculture environments.

METHODOLOGY

The project utilized Prototype methodology which is a software development methodology that emphasizes building an early approximation of the final product, gathering feedback, and iteratively refining the solution.

The development process began with a requirement analysis phase, where the team gathered detailed input from clients and stakeholders to understand their needs and expectations. This was followed by the initial prototype development, which involved integrating sensors to measure humidity, temperature, soil temperature, and moisture, along with basic automation features for irrigation and fertilizer control. After the prototype was completed, it was presented to clients for feedback, focusing on its functionality, usability, and any additional features they might require.

Based on this feedback, the system underwent iterative refinement, with continuous improvements and new functionalities added until the system fully met client requirements. Once finalized, the system was designed to be robust and user-friendly, capable of accurately monitoring and automating environmental conditions in agricultural fields. The project concluded with testing and deployment, where the system was thoroughly tested for reliability and effectiveness before being implemented in a real-world agricultural setting.

RESULTS AND DİSCUSSİON

The system's network configuration involves establishing a Wi-Fi network to connect all sensors, controllers, and user devices, ensuring secure data transmission through protocols such as HTTPS. In the controller configuration, the ESP8266 microcontroller is set up to read environmental sensor data and operate actuators. Specific thresholds, such as soil moisture levels, are defined to automate the activation of the water pump based on real-time measurements.

For the user interface configuration, the Blynk mobile application is implemented to manage user authentication, real-time monitoring, and remote-control capabilities. Additionally, notification settings are configured to alert users via the Telegram messaging platform. The integration configuration brings together the Blynk and Telegram APIs to enable seamless communication, remote operations, and system alerts. This is supported by organized hardware wiring, including expansion slots and jumper wires, to ensure reliable connections and system stability.

The following are the logical design for the project developed:

Figure 1: Flow Chart of Remote Fertilizer

Figure 2: Flow Chart of DHT11 Sensor

Figure 3: Flow Chart of Soil Moisture Sensor

The following are the physical design for the project developed:

Figure 4: Project Schematic Diagram

Figure 5: Front view of the automated system project

Figure 6: Back view of the automated system project – Open lid

Figure 7: Back view of the automated system project – Closed lid

The following are the interfaces design for the project developed:

Figure 8: Blynk Application User Interface in Desktop mode

Figure 9: Blynk Application User Interface in Mobile mode

Figure 10: Telegram bot to check the sensor status

Figure 11: Telegram bot to check the soil sensor status

Figure 12: Early design of the system – Part 1

Figure 13: Early design of the system – Part 2

The following are the Testing result for the project:

Table 1: Unit Testing Result

No	Test Case Name	Test Procedure	Pre-Condition	Expected Result	Tester	Result
1	Soil moisture sensor	Main sensor in the system. Automatically detect the soil moisture level	The sensor detect the soil moisture level	The sensor detect the soil moisture level	Muhammad Muqry Haqimy	Pass
2	DHT sensor	The sensor automatically detect humidity & temperature	The sensor detect the humidity & temperature	The sensor detect the humidity & temperature	Muhammad Muqry Haqimy	Pass
3	Water pump	The water pump will open when the soil moisture's data is below moist level	None	The water pump opens after soil moisture sensor's data is below moist level	Muhammad Muqry Haqimy	Pass
4	Notification via Telegram	Notification will pop up after the sensors receive data	None	Notification via Telegram popped up & showed real-time data	Muhammad Syazwan Syahmi	Pass

Table 2: Integration Testing Result

No	Test Case Name	Test Procedure	Pre-Condition	Expected Result	Tester	Result
1	Soil moisture sensor	Main sensor in the system. Automatically detect the soil moisture level	The sensor detect the soil moisture level	The sensor detect the soil moisture level	Muhammad Muqry Haqimy	Pass
2	DHT sensor	The sensor automatically detect humidity & temperature	The sensor detect the humidity & temperature	The sensor detect the humidity & temperature	Muhammad Muqry Haqimy	Pass
3	Water pump	User can see the water pump will pump the water into the plant pot.	None	The water pump opens after soil moisture sensor's data is below moist level	Muhammad Muqry Haqimy	Pass
4	Notification via Telegram	User can check the notification in Telegram	None	Notification via Telegram popped up & showed real-time data	Muhammad Syazwan Syahmi	Pass

The project offers several key advantages for modern agricultural practices. Firstly, it enhances efficiency by automating irrigation and enabling remote control of fertilizer application. This reduces manual labour while ensuring crops receive optimal amounts of water and nutrients, minimizing the risks of over-watering or under-fertilization. As a result, farmers can allocate more time to other vital tasks, improving overall productivity and crop yields. Secondly, the system supports real-time monitoring and instant alerts through Telegram, allowing farmers to stay informed about environmental conditions in their fields. This timely awareness enables early interventions, helping prevent crop damage and enhancing overall farm management. Thirdly, the integration of a user-friendly interface via the Blynk app, alongside Telegram notifications, simplifies system usage. This accessibility encourages wider adoption among farmers, promoting the use of smart agricultural technology.

Despite its strengths, the project also presents some disadvantages. One major limitation is its dependency on reliable internet connectivity. In rural areas with weak or unstable internet access, the system's real-time monitoring and remote-control features may be compromised, delaying important data updates and alerts. Another concern is the relatively high initial setup cost. Purchasing sensors, controllers, and other hardware, along with software configuration, may be a financial burden for small-scale farmers. Furthermore, maintaining the system and resolving technical issues require a basic level of technical knowledge, which could pose challenges for less tech-savvy users. This may lead to additional costs for support and maintenance services.

To improve the system, several recommendations are proposed. Integrating AI and analytics would allow the system to predict crop needs, analyse patterns, and provide proactive resource management, thereby boosting efficiency and yields. Adding more environmental sensors—such as those for light intensity, CO_2 levels, and soil nutrients—would offer a more comprehensive overview of field conditions, enabling better optimization and higher crop quality. Implementing offline functionality with local data storage on the ESP8266 would ensure the system remains operational even in areas with poor connectivity. Incorporating solar power could enhance sustainability, reduce operating costs, and increase suitability for remote locations. Lastly, improving the Blynk app and Telegram bot with customizable dashboards, detailed graphs, and smart suggestions would make the interface more intuitive and help users make informed decisions more easily.

CONCLUSION

The Agrotech Monitoring System project marks a significant advancement in smart agricultural technology. By delivering real-time data on essential environmental parameters—including soil pH, air and soil temperature, humidity, and moisture levels—and automating critical processes such as irrigation and fertilizer application, the system enables farmers to optimize their agricultural practices and enhance crop yields. Developed using the prototype model, the system undergoes iterative refinement through continuous client feedback, ensuring a robust, user-friendly solution tailored to the specific demands of modern farming. This innovative approach not only improves resource efficiency and reduces manual labour but also contributes to the development of more sustainable and productive agricultural ecosystems.

REFERENCES

"Applications of Remote Sensing in Precision Agriculture: A Review" by Rajendra P. Sishodia, Ram L. Ray and Sudhir K. Singh. Retrieved from https://www.mdpi.com/2072-4292/12/19/3136

"A Review of the Applications of the Internet of Things (IoT) for Agricultural Automation" by Wan-Soo Kim, Won-Suk Lee and Yong-Joo Kim. Retrieved from https://link.springer.com/article/10.1007

"Internet of Things in Agriculture: A Survey" by Mahmoud Abbasi, Mohammad Hossein Yaghmaee and Fereshteh Rahnama. Retrieved from https://ieeexplore.ieee.org/abstract/document/8808839/authors#authors

DIGITAL GUARDIAN

Azizah binti Md Aziz[1*], Mardhiatul Syamira binti Mustapa[2] , Nurul Wahidah binti Ahmad Jefry[3] & Ardinie Larasati binti Hapizudin[4]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

Corresponding author: azizahmdaziz@psis.edu.my

Abstract: Digital Guardian is a comprehensive solution for Tabika Kemas within PSIS, enhancing childcare security and efficiency. It features a fingerprint-based pickup system and camera integration, allowing children to verify visitors and parents to monitor pickups remotely. Developed by parents and teachers, it prioritizes simplicity and child safety, speeding up pickups and boosting confidence among parents and staff. Continuous user feedback ensures ongoing improvements, providing a safer and more seamless childcare experience.

Keywords: *Fingerprint-based pickup system, child safety, digital guardian*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. Traditional methods for picking up children from kindergarten often lack strong security, making it possible for unauthorized people to pick up children. This can put children's safety at risk because there's no reliable way to check if the right person is picking up the child.
ii. Many kindergartens do not have a good system to watch the pickup area live. This makes it hard for staff to manage pickups smoothly, causing delays, longer wait times, and confusion. Without real time monitoring, the process is less efficient and more stressful for everyone.
iii. Without a good system to communicate and send notifications, staff may find it difficult to quickly identify and verify parents or guardians during pickup. If staff don't get instant alerts and clear information, they might not recognize authorized people, leading to mistakes and security issues. This lack of communication can reduce parents' trust in kindergarten.

1.2 Objective

The objectives of this project are:

i. To develop a system that utilizes fingerprint checks and surveillance cameras to ensure only authorized individuals can pick up children from the kindergarten premises.
ii. To improve the safety and security of children at kindergarten pickup times, providing peace of mind to parents and teachers.
iii. To decrease wait times and eliminate confusion by automating identity verification through the implementation of fingerprint checks and surveillance cameras.

1.3 Scope of Project:

The project focuses on improving the safety and efficiency of the child pickup process at the kindergarten. The user scope includes three main groups: parents or guardians who will use the system to pick up their children; teachers and staff who will manage the pickup process and ensure each child is safely released; and administrative staff who oversee kindergarten operations and may access system data for monitoring and reporting purposes.

The system scope involves the development and use of a biometric authentication system that verifies the identity of parents or guardians using their fingerprints. This helps ensure that only authorized individuals are allowed to enter the premises. In addition, surveillance cameras will be installed at the kindergarten entrance to provide real-time visual monitoring, allowing staff to confirm identities before granting access. All user information, including fingerprint data, will be securely stored in a database, with measures in place to protect data security and privacy.

METHODOLOGY

The Agile model is used for this project, where the development process is divided into smaller, manageable parts called iterations. This approach focuses on flexibility and allows changes to be made along the way. At the start of the *DigitalGuardian* project, the project scope and requirements are clearly outlined. The number, duration, and content of each iteration are planned in advance to keep the project on track. This method helps ensure the project is completed within the given timeframe while meeting the goals and expectations of the students involved.

Requirement Analysis
The first step involves meeting with stakeholders—including parents, teachers, and administrators—to understand and prioritize their needs for the *DigitalGuardian* system. User stories are created to outline specific features and functionalities. All requirements are then compiled into a product backlog, which is organized based on importance and urgency.

Design
A high-level system design is created to show how the NodeMCU V3, ESP32 Camera, and JM101 Fingerprint Scanner will work together. Detailed documents are prepared, including circuit diagrams, data flows, and user interface layouts. These designs are reviewed with stakeholders to ensure they meet expectations and are revised if needed.

Development
The project is divided into smaller development sprints, each focusing on specific system components. Development begins with the most critical functions, gradually integrating the hardware and software, including NodeMCU V3, ESP32 Camera, and JM101 Fingerprint Scanner. Regular sprint reviews are conducted to gather continuous feedback from stakeholders.

Testing
Testing starts with unit tests to check each individual component. This is followed by integration testing to ensure all components work smoothly together. User acceptance testing (UAT) is carried out with parents and staff to verify usability. Any bugs or issues found during testing are quickly resolved to keep the project on schedule.

Deployment
Deployment begins by setting up the system's hardware and software at the kindergarten. Staff are trained and provided with documentation to help them use the system effectively. A phased rollout is conducted, starting with a small group of users to identify any issues before launching the system to all users.

Review
After deployment, feedback is collected from all users to identify areas for improvement. A retrospective meeting is held with the development team to review successes and challenges. Based on the feedback, necessary updates and improvements are planned and implemented to keep the system aligned with the kindergarten's needs.

RESULTS AND DİSCUSSİON

The functional requirements of the *DigitalGuardian* system outline how users interact with it to ensure a secure pickup process for children in a kindergarten setting. The system begins with fingerprint registration, where each parent or guardian must register their fingerprint along with their name and their child's name. Once registered, users must scan their fingerprint every time they pick up their child. This step is critical in verifying identity and preventing unauthorized access.

The system also includes a live camera stream at the kindergarten entrance, which allows staff to visually monitor and verify individuals in real-time. Staff can access this stream through the *DigitalGuardian* application on their devices, enabling them to confirm that only authorized persons are present during child pickup times.

Additionally, the system sends a notification to staff when a fingerprint is scanned. This alert prompts them to verify the individual's identity before allowing access, adding an extra layer of security and ensuring the safety of all children in the kindergarten.

For security requirements, the DigitalGuardian system incorporates key security features to ensure the safety and integrity of its operations. One of the main security measures is that the system functions entirely within the same local network. This setup limits data transmission and system access to only authorized devices connected to that network, effectively reducing the risk of external attacks or unauthorized access. By keeping critical functions—such as fingerprint registration, live camera streaming, and notification alerts—within a secure local environment, the system provides a reliable and robust security framework to protect children and maintain safety in the kindergarten setting.

The following are the logical design for the project developed:

Figure 1: Flowchart for DigitalGuardian System Process

A circuit diagram typically shows how electronic components are connected to form a complete circuit. It uses symbols to represent components like resistors, capacitors, transistors, and wires, illustrating their connections and the flow of current. Circuit diagrams are essential for engineers, technicians, and hobbyists to understand and design circuits accurately. The following are the circuit diagram for the project developed:

Figure 2: Circuit Diagram

The following are the interfaces for the project developed:

Figure 3: Home page for project

Figure 4: Sign up interface.

Figure 5: IP address for camera.

Figure 6: Setting interface for application.

The following are the physical design for the project developed which is the visual depiction of the system illustrates the ongoing progress of the project implementation. The kindergarten is constructed using plastic board, which is ideal due to its suitability for our prototype's size, ease for its lightweight nature, making it easy to handle during construction and transportation. Its durability ensures longevity, making it suitable for repeated use in various prototypes. Moreover, its affordability aligns with our project's budget constraints, allowing for cost-effective implementation without compromising quality The following is a 2D sketch of the kindergarten includes measurements at each site of project construction:

Figure 7: 2D Sketch of the Project Prototype.

To build a server room prototype, the process begins with constructing a base using an A3-sized cardboard sheet, which serves as the foundation. Next, A2-sized plastic boards are measured, cut into four pieces, and assembled as walls, securely glued to the base for stability. One of these walls includes a door opening to represent system access.

Wiring for system components such as the ESP8266, ESP32 CAM, and fingerprint scanner is then installed, with functionality checks to ensure smooth operation. The ESP8266 is placed inside a customized box with holes cut in the lid to accommodate the ESP32 CAM and fingerprint scanner, and an additional hole is added at the back for the Micro USB cable.

This system box is positioned in the prototype's doorway, allowing the camera and fingerprint scanner to remain accessible from the outside while the rest of the components are kept securely inside. An exit hole is also made in one of the side walls to allow the USB cable to connect to a power source. Finally, the prototype is decorated with creative, kindergarten-themed materials to make

it visually engaging and suitable for its educational
purpose.

Figure 8: Project prototype from outside and front view.

Figure 9: Project prototype from top view for the kindergarten class only.

Figure 10: Project prototype from top view of the whole kindergarten from outside to inside the class.

The following are the components of the project
developed:

Figure 11: Project prototype for the components – outside casing

Figure 12: Project prototype for the components – inside the casing.

Table 1: Type of components.

No.	Component	Function
1.	NodeMCU V3	The NodeMCU V3 acts as the central controller for the system. It processes data from the fingerprint scanner and the camera, connects to the Wi-Fi network to enable communication between devices, and sends notifications to the staff app when a fingerprint is recognized. It serves as the main communication hub, ensuring all components work together seamlessly.
2.	ESP32 Camera	The ESP32 Camera captures real-time video and images of the pickup area. It streams the live feed to the staff app, allowing staff members to visually verify who is at the pickup area. This enhances security by providing an additional layer of visual confirmation along with fingerprint verification.
3.	JM101 Fingerprint Scanner	The JM101 Fingerprint Scanner captures and verifies the fingerprints of parents or guardians picking up children. When a fingerprint is scanned, it sends the data to the NodeMCU V3 for processing and verification. Upon successful verification, it triggers notifications to the staff app with the names of the parent and child, ensuring only authorized individuals can pick up children.
4.	Jumper Wires	Jumper wires are used to connect various components within the system, such as the NodeMCU V3, ESP32 Camera, and JM101 Fingerprint Scanner. They provide the necessary electrical connections for communication and data transfer between these components, ensuring the system operates correctly.

The following is the Unit Testing result of the project:

Table 2: Unit Testing result of the project.

No.	Test Case	Test Procedure	Pre-condition	Expected Result	Tester	Result
1.	Wi-Fi Connectivity	Configure and connect NodeMCU to Wi-Fi.	Wi-Fi network available	"Connected" displayed on the serial monitor	Ardinie	Pass
2.	Data Processing and Firebase Integration	Process mock fingerprint data, send to Firebase	Firebase configured	Data correctly stored in Firebase	Syamira	Pass
3.	Notification System via DigitalGuardian App	Trigger notification, verify in Firebase and DigitalGuardian App	DigitalGuardian App installed and configured	Notification received in DigitalGuardian App	Ardinie	Pass
4.	Video Streaming	Start video stream, verify in DigitalGuardian App	DigitalGuardian App configured for live feed.	Smooth video feed with minimal lag.	Syamira	Pass
5.	Fingerprint Capture	Capture fingerprint	Scanner connected	Fingerprint captured accurately	Wahidah	Pass
6.	Fingerprint Verification	Verify stored fingerprint	Fingerprint data pre-stored	Fingerprint matches stored data	Wahidah	Pass
7.	Electrical Connectivity	Connect components, verify data transmission	Components ready for connection	Stable, reliable connections	Wahidah	Pass

Table 3: Integration Testing result of the project.

No.	Test Case	Test Procedure	Pre-condition	Expected Result	Tester	Result
1.	System Initialization	Power on all components and check Wi-Fi connection.	Components connected and powered on	Successful initialization and Wi-Fi connection.	Wahidah	Pass
2.	Fingerprint Verification & Notification	Capture fingerprint, verify, send data to Firebase, trigger notification	Pre-stored fingerprint data; Firebase and app configured	Accurate verification, data stored in Firebase, notification received	Syamira	Pass
3.	Live Video Streaming	Start video streaming from ESP32 Camera, view on app	Camera connected; app configured	Smooth, lag-free live feed on app.	Ardinie	Pass
4.	Pickup Process	Simulate parent pickup, scan fingerprint, verify, send data, trigger notification, verify with live feed.	All components connected and configured; pre-stored data	Verification, data stored, notification received, visual verification via live feed.	Syamira	Pass

The DigitalGuardian project offers several advantages that enhance the safety and efficiency of child pickup processes in kindergartens. The use of fingerprint authentication significantly strengthens security by ensuring that only authorized individuals can collect children. Real-time surveillance through live camera feeds allows staff to visually verify the identity of visitors instantly, while instant notifications sent to staff via the application help ensure timely responses during pickups. The system's user-friendly interface makes it accessible for both parents and staff, reducing the likelihood of errors. By operating within a local network, the system ensures secure data transmission and minimizes the risk of external threats. Furthermore, the ability to monitor cameras feeds remotely adds to the overall vigilance and provides peace of mind to all stakeholders by assuring them of the children's safety.

However, the project also has some limitations. Its reliance on a local network makes it vulnerable to connectivity issues, which could disrupt key functions like fingerprint scanning and live video streaming. The hardware components, such as fingerprint scanners and cameras, require regular maintenance and proper handling, which may lead to additional costs and resource allocation. Effective use of the system also depends on thorough training for both staff and parents, which might slow down the adoption process initially. Moreover, maintaining and updating both the hardware and software can incur extra expenses, and continuous technical support may be necessary to keep the system functioning smoothly.

CONCLUSION

To ensure the continued effectiveness and reliability of the *DigitalGuardian* system, several key recommendations should be implemented. Regular maintenance and updates of the system's components—such as fingerprint scanners and surveillance cameras—are crucial in preventing damage and ensuring consistent performance. Comprehensive training programs for both staff and parents are also essential to minimize the learning curve and promote smooth operation. Additionally, investing in a strong and stable local network infrastructure is necessary to support continuous functionality, particularly for features like fingerprint authentication and live camera feeds. Establishing a dedicated technical support team will further enhance system reliability by promptly addressing any technical issues that may arise.

In conclusion, the *DigitalGuardian* system marks a significant step forward in improving the safety and security of children in kindergarten environments. By incorporating technologies such as fingerprint verification, real-time video surveillance, and instant notifications, the system provides a secure and efficient method for managing child pickups. Its user-friendly interface and local network-based operation ensure that both parents and staff can interact with the system effectively and securely. Although the system presents some challenges—like network dependency and maintenance needs, these can be managed with strategic planning. Overall, the *DigitalGuardian* project offers a comprehensive and practical solution for enhancing child safety, with the potential to become a benchmark in early childhood care security systems.

REFERENCES

Brightwheel. (2020, April 25). *Daycare security: A guide to protecting your children and staff*. Retrieved from https://mybrightwheel.com/blog/daycare-security

Bryce, T. G. K. (2010). *Biometric surveillance in schools: Cause for concern or case for curriculum?* University of Strathclyde. Retrieved from https://www.researchgate.net/publication/277217238_Biometric_surveillance_in_schools_cause_for_concern_or_case_for_curriculum

Journal of Computer and Communications. (2019, April). *A security system for kindergarten school using RFID technology*, 7(4). Retrieved from https://www.scirp.org/journal/paperinformation?paperid=91793

Procare. (2015, March 5). *Fingerprint check-in for child care*. Retrieved from https://www.procaresoftware.com/blog/fingerprint-check-infor-child-care/

Zhu, X. W., Mukhopadhyay, S. K., & Kurata, H. (2012). A review of RFID technology and its managerial applications in different industries. *Journal of Engineering and Technology Management,* 29(1), 152–167. https://doi.org/10.1016/j.jengtecman.2011.09.011

LAB VISAGE ENTRY (LVE)

Syaiful Idzwan bin Mahmud[1*], Nageswaran Gownder a/l Sundaraju[2] , Sharvin a/l Marimuthu[3] & Viknes Kumar a/l Saravanan Kumar[4]

[1]*Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor*

Corresponding author: idzwan@psis.edu.my

Abstract: Lab Visage Entry is a face recognition door locking system designed to enhance security and efficiency at the laboratory in Jabatan Teknologi Maklumat dan Komunikasi (JTMK), Politeknik Sultan Idris Shah (PSIS). By employing optical face recognition and real-time detection, this system enables authorized staff to quickly and securely access laboratory preparation room. The project utilizes users' face data, pre-trained models, and a magnetic door lock to ensure accurate identification and access control. Additionally, it includes entry logging and a QR code scan mode as fallback options, further enhancing security. By using Waterfall Methodology, this project aims to integrate modern technology, reduce delays caused by traditional access methods, and improve security against unauthorized entries. Developed using Python, OpenCV, and Haar Cascade models, this project creates a reliable face recognition door locking system, maintaining a user database and providing alternative access via a Telegram bot with QR code scanning for laboratory in Jabatan Teknologi Maklumat dan Komunikasi (JTMK), Politeknik Sultan Idris Shah (PSIS).

Keywords**:** *Door locking system, face recognition, Telegram bot*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. Lecturers face delays in accessing the laboratory preparation room due to the time spent searching for keys or cards, leading to late classes and potential disruptions if access is compromised.

ii. The traditional key and card systems pose security risks, allowing unauthorized student access to labs, which leads to potential theft, prompting the need for a facial recognition system to improve access control and security while tracking lab entries.

1.2 Objective

The objectives of this project are:

i. To make a door locking system that uses a face recognition system to unlock the door.
ii. To make a system that will recognize the user's face.
iii. To make a system that will store the details of the user with the facial detail in database.
iv. To make a Pin mode option if face recognition fails

1.3 Scope of Project:

The user scope of the system includes several key features for staff authentication and access control. Staff members can unlock the laboratory preparation room by scanning their faces, leveraging advanced facial recognition technology for seamless and efficient access. If the facial recognition system fails after five attempts, staff have an alternative option to access the room by entering a PIN, ensuring uninterrupted access. Additionally, staff inside the lab can easily exit by pressing an exit button, allowing them to leave without the need for face recognition or PIN entry. The system also allows the Lab's Person in Charge (PIC) to monitor the usage of the laboratory

preparation room, manage access permissions, and ensure that only authorized personnel are allowed entry.

The system scope includes several features designed to enhance security and streamline access to the laboratory preparation room. It will maintain a face recognition database to store and accurately identify recognized faces for future access. The system will automatically unlock the laboratory preparation room when it recognizes a registered face, providing a smooth and secure entry experience. If the system fails to recognize a face after five attempts, it will prompt the user to enter a PIN as an alternative access method, ensuring continuous access without delays. Additionally, an exit button will be installed inside the lab, allowing users to easily exit the room without needing face recognition or a PIN. The system will also log all entries, recording the usage of the room by lecturers and authorized personnel for monitoring, security, and auditing purposes.

METHODOLOGY

The Waterfall model is used for this project. It is a traditional software development life cycle model introduced by Royce in the 1970s. It is widely used due to its structured approach, where development is broken down into clearly defined phases. Each phase must be completed before moving on to the next, ensuring thorough planning and documentation throughout the process.

The first phase is Requirement Analysis, which involves defining the problem statement, identifying constraints, and clearly outlining the scope of the project. Both functional and non-functional requirements are specified and documented in detail to guide the development process.

In the System Design phase, the system's architecture is created, including the algorithms, techniques, and network setup to be used. The design also covers user interface elements, ensuring the system is user-friendly and meets the project's needs.

During the Implementation phase, the software components are developed, algorithms are implemented and integrated into the designed system architecture. The user interface is also built to allow effective interaction between users and the system.

The Testing phase includes unit testing, integration testing, and system testing to verify that the final product functions as required. Additionally, performance testing is carried out to ensure the system works efficiently with the hardware in the lab environment.

In the Deployment phase, the face recognition unlocking system is installed and configured in the lab. This includes setting up both hardware and software components and providing training for users to enroll their faces into the system.

Finally, the Support and Maintenance phase involves providing ongoing support, monitoring system performance, and making necessary updates to the software and algorithms to maintain security and efficiency over time.

RESULTS AND DİSCUSSİON

Functional requirements specify the key tasks and behaviours that a system must perform to meet user needs and fulfil its purpose. For a door locking system with face recognition, these requirements focus on access control, security, and user management.

One of the core functions is Face Recognition, where the system must accurately identify and authenticate the faces of authorized staff. For instance, it should be able to recognize a staff member's face within three seconds to ensure quick and seamless access.

The system must also provide Access Control, automatically unlocking the door upon recognizing an authorized face. For example, when a lecturer is identified, the magnetic door lock should disengage to allow immediate entry.

Another important feature is Entry Logging, where the system keeps a record of every entry attempt. This includes both successful and failed access, along with the date, time, and user identity, stored securely in a database for monitoring and auditing purposes.

In situations where face recognition fails after five attempts, the system must offer PIN Alternative Access. This backup option ensures that lecturers can still enter the room by inputting a predefined PIN without needing assistance from the person in charge.

To facilitate secure and easy exits, the system should also include an Exit Button. This allows users inside the lab to unlock the door and leave without scanning their face or entering a PIN, ensuring safety and convenience.

Lastly, the system must support User Management, enabling administrators to add, update, or delete user profiles and face data. For example, the system should allow new lecturers' facial data to be added and existing records to be modified as necessary to maintain up-to-date access control.

For system configuration, two (2) Python scripts were created which is **MainRPi.py** and **LabVisageEntryAdmin.py** files. The **MainRPi.py** Python scripts script creates a face recognition application using Tkinter for the GUI and OpenCV with face recognition for face detection and recognition. It initializes a Tkinter window tailored for a 3.5-inch screen, streams video from a camera, and loads pre-computed facial encodings from a pickle file. The application continuously captures frames, detects faces, and compares them against stored encodings to identify users. Upon recognition, it fetches user details from a MySQL database and updates the GUI with the user's name and ID. It includes features for logging access attempts, displaying access statuses through message boxes and Pin System, and allows restarting the application. This setup is geared towards managing access control with face recognition, and logging events.

The LabVisageEntryAdmin.py files Python script utilizes Tkinter to build an administrative interface for managing a face recognition system and related operations. It begins by importing necessary modules such as json, tkinter, mysql.connector, and others, loading configuration settings from config.json, and applying a dark theme for a cohesive UI. The DataEntryForm class creates a popup window (Toplevel) for entering user details like Name, IC Number, and Phone Number, styled uniformly using ttk.Style(). Functionality includes capturing user face images upon entering an IC Number, inserting user data into a MySQL database (lect table) with confirmation, and clearing input fields. The script features check_db_connection to monitor MySQL connectivity and updates a status label accordingly. The main interface (main() function) includes buttons for inserting user data, viewing system logs, training face recognition models, checking device status, and listing authorized users with options for management. Detailed instructional text within a text box guides users on utilizing each feature effectively. The script integrates GUI elements with backend functionalities, offering a comprehensive tool for administering and monitoring a face recognition system.

For security requirements, the face recognition unlock system is required to store facial data securely to uphold user privacy and comply with established privacy standards. It must be designed to prevent unauthorized access to sensitive facial recognition information, thereby maintaining the confidentiality and integrity of the stored data.

Access to the system's database should be limited strictly to authorized personnel. Any unauthorized access attempts must be automatically logged and flagged for administrative review, ensuring proactive monitoring and threat detection. Furthermore, the system should maintain detailed logs of all access attempts—whether successful or failed—including timestamps, usernames, and entry methods used. This logging feature plays a crucial role in reinforcing overall system security and ensuring accountability.

The following are the logical design for the project developed:

Figure 1: Logical design of the project.

Figure 2: Wiring diagram of the project.

Figure 3: Project Functional Decomposition Diagram (FDD)

Figure 4: Project Data Flow Diagram (DFD)

The following are the physical design of the project:

Figure 5: Prototype of the Project

The following are the interface design of the project application:

Figure 6: Graphical User Interface of the Lab Visage Entry (Face Recognition)

Figure 7: Message box to show the user access is granted.

Figure 8: Message box to show the user access is denied.

The face recognition unlocking system captures a real-time image of a lecturer and compares it with stored facial data in its database. If a match is found, it recognizes the lecturer as an authorized user, unlocks the magnetic door, and displays the lecturer's name on a screen. If no match is found, access is denied and a message is displayed, ensuring secure entry and preventing unauthorized access.

Figure 9: Graphical User Interface of the Lab Visage Entry Admin

Figure 10: Graphical User Interface of the LVE User Data Form in the Lab Visage
Entry Admin

The interface supports the secure registration of new staff and students into the face recognition system. It offers key features such as Insert User Data, System Logs, Train Face, Device Status, and List Names. During registration, admins input user details like name, IC number, and phone number, while the system captures and stores their facial data in the database for future authentication.

Figure 11: Graphical User Interface of the LVE Choose Log Viewer Form in the Lab
Visage Entry Admin

System logs allow administrators to view detailed logs of system activities, including access attempts, user registrations, and any system events. Logs provide valuable insights for monitoring and auditing purposes.

Figure 12: Graphical User Interface of the LVE Face Recognition Training in the Lab
Visage Entry Admin

Admins can use this feature to train the face recognition model with new data or update existing user profiles. Training ensures the system maintains high accuracy in recognizing registered faces.

Figure 13: Graphical User Interface of the LVE Remote System Information in the
Lab Visage Entry Admin

Figure 14: Graphical User Interface of the LVE Remote System Information, Add
New Device in the Lab Visage Entry Admin

The system offers real-time updates on the status of connected hardware components like the camera, Raspberry Pi, and magnetic door lock. Admins can monitor device performance and health, add new devices by entering their details (name, hostname/IP, username, and password), and integrate additional hardware, allowing for scalability and redundancy.

Figure 15: Graphical User Interface of the LVE List of Names in the Lab
Visage Entry Admin

The "List Names" feature displays a comprehensive list of registered users with their essential details, allowing admins to easily manage, update, or delete user information to ensure data accuracy and remove outdated or unauthorized entries.

Figure 16: MySQL Database

The face recognition system uses MySQL, a secure and efficient relational database, to store user data (names, IC numbers, and phone numbers) while ensuring quick access and retrieval for real-time face recognition.

Figure 17: Graphical User Interface of Pin Mode.

If the system fails to match a face, it offers an alternative access method by prompting the user to enter a PIN, ensuring secure and efficient entry for authorized users.

To enhance the security and efficiency of the face recognition unlocking system, we recommend developing a mobile application that integrates seamlessly with the system. This app should feature a user-friendly interface, allowing users to manage profiles, view access logs, receive real-time notifications, and provide alternative access options like PIN entry. Additionally, it should enable remote monitoring by the Lab's Person in Charge (PIC) and integrate customer support features, such as helpdesk chat and troubleshooting guides.

To ensure smooth implementation, training sessions should be conducted for staff to familiarize them with the new application. Comprehensive support resources, including user manuals and a dedicated help desk, should also be provided to assist users with any issues or questions they may encounter.

CONCLUSION

The facial recognition unlocking system at Sultan Idris Shah Polytechnic improves access control for lab facilities by replacing traditional key methods with advanced biometric technology. This system saves time, boosts security, and eliminates issues like lost or stolen access cards. It uses reliable facial recognition and a secure database to prevent unauthorized entry and protect user data. Overall, the system supports the Polytechnic's move toward smarter, more efficient, and safer lab management, with ongoing improvements needed to fully maximize its benefits.

REFERENCES

Bakheet, H. (2018). IoT based embedded smart lock control system. ResearchGate. Retrieved from https://www.researchgate.net/publication/334120063_IoT_Based_Embedded_Smart_Lock_Control_System

Basyal, L., Karki, B., Adhikari, G., & Singh, J. (2018). Efficient human identification through face detection using Raspberry Pi based on Python-OpenCV. ResearchGate. Retrieved from https://www.researchgate.net/publication/332706214_EFFICIENT_HUMAN_IDENTIFICATION_THROUGH_FACE_DETECTION_USING_RASPBERRY_PI_BASED_ON_PYTHON-OPENCV

Dunn, C. (2022, September 17). How to train your Raspberry Pi for facial recognition. Tom's Hardware. Retrieved from https://www.tomshardware.com/how-to/raspberry-pi-facialrecognition

GeeksforGeeks. (2021, October 16). How to install face recognition in Python on Linux? GeeksforGeeks. Retrieved from https://www.geeksforgeeks.org/how-to-install-face-recognition-in-python-on-linux/

Ghael, H. (2020). A review paper on Raspberry Pi and its applications. ResearchGate. https://doi.org/10.35629/5252-0212225227

Rosebrock, A. (2021, April 17). OpenCV Haar cascades - PyImageSearch. PyImageSearch. Retrieved from https://pyimagesearch.com/2021/04/12/opencv-haar-cascades/

Tam, A. (2024, January 29). Using Haar Cascade for object detection. MachineLearningMastery.com. Retrieved from https://machinelearningmastery.com/using-haar-cascade-for-object-detection/

LOGISTICS AUTOMATION MODEL PROTOTYPE

Dr. Norliza binti Abdullah[1*], Wan Arifuddin bin Wan Ahmad[2] , Nik Muhammad Naufal bin Mohd Narang[3] & Muhammad Faris Zakwan bin Mohd Noor Zalee[4]

[1]Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor

*Corresponding author: norliza.abdullah@psis.edu.my

Abstract: The Logistics Automation Model Robot represents an innovative solution tailored for implementation within the manufacturing or sorting industry. In traditional manufacturing or sorting operations, the conventional methods of arranging or sorting products often result in time-consuming processes that exceed what is considered optimal for efficient operations. For better output for the company, the logistic robot prototype is ensured to be involved in optimizing various aspects of operations to enhance productivity, efficiency, and overall performance. We rely on prototype methodology because it is a strong, reliable method that leads to efficient workflow and productivity to ensure this project achieves its objectives. The robot prototype uses a user-friendly mobile app that allows real-time monitoring and control of logistics robots, it also reduces manual labor and associated costs by deploying autonomous robots for picking, sorting, and transportation tasks. In conclusion, the implementation of our logistics automation model robot revolutionizes traditional logistics practices by offering a comprehensive solution that combines speed, accuracy, and cost effectiveness.

*Keywords***:** *Smart logistic robot, Autonomous navigation, Mobile app integration*

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i. Traditional processes like sorting and bagging are time-consuming and prone to human error.

ii. Workers often place packages on the wrong routes, causing delivery delays and confusion.

iii. Insufficient manpower negatively affects warehouse efficiency and overall productivity.

1.2 Objective

The objectives of this project are:

i. To design and develop a logistic prototype robot.

ii. To develop a mobile app using Blynk to control the forklift and the robot movement manually.

iii. To monitor the route obstacle using installed camera.

1.3 Scope of Project:

The primary users of the product will have secure access to all its key features. They will be able to manually control the robot, direct it to a designated target, adjust its speed, and view the route it takes in real-time. These functionalities are designed to give users full control and flexibility over the robot's operations.

To ensure the success of the system, the prototype must provide reliable access control and a user-friendly interface. This will enable users to operate the robot efficiently and effectively, meeting the intended objectives of ease of use and secure operation.

The scope of the prototype includes conducting a root cause analysis to identify the underlying factors contributing to the challenges faced in

logistics operations. The main deliverables will be a functional hardware prototype of the logistics automation robot, along with user manuals and technical documentation. The development will be constrained by a specified budget and timeline, while ensuring adherence to relevant security and safety standards. Additionally, the project will include a risk assessment to address system integration challenges and identify potential security vulnerabilities for mitigation.

METHODOLOGY

The project adopted the prototype methodology due to its reliability and ability to enhance workflow and productivity, ensuring the project's objectives are met. The robot prototype can be controlled via an app to navigate to destinations, lift parcels, and place them onto vehicles without human assistance. In conclusion, the implementation of this logistics automation robot transforms traditional logistics practices by providing a fast, accurate, and cost-effective solution.

The project planning involved designing the robot's physical appearance and selecting suitable components and materials. In the design phase, a cardboard mockup was created to test the robot's structure, and the circuit was designed using "Fritzing." For the interface, a subscription to the Blynk app was purchased, and a control interface was designed using Canva. The ESP board was connected to Blynk via WiFi, and each control button was tested. During prototyping, essential components and tools were purchased, circuits were assembled based on the schematic diagram, and each part was tested for functionality. Finally, the robot's foundation was built, the circuit was secured on it, and the entire setup was tested again.

RESULTS AND DİSCUSSİON

The functional requirements of the Logistics Automation Robot Prototype include autonomous navigation, a picking and sorting mechanism, and real-time monitoring. Users control the robot's movements—forward, backward, left, and right—using an interface created in the Blynk app, which also includes speed control for the DC motors. The forklift function, powered by a servo motor, is also controlled via the same interface, allowing users to pick up items from designated spots. For real-time monitoring, the robot is equipped with an ESP camera that streams live video through the Blynk app, enabling users to navigate the robot safely and monitor parcel locations throughout its route.

The following are the logical design for the project developed:

Figure 1: Interface created in the Blynk App to operate the robot.

Table 1: Explanation of Interface on the Blynk App in Figure 1

No	Function
1	This Window will allow the ESP-Camera to display a live video feed directly on to the top of the Interface.
2	This slider button is for the user to control the speed of the DC Motor that are using to control the movement of the robot.
3	This slider button is for the user to control the servo motor that is controlling our forklift on the robot.
4	This button is for the user to move the robot in forward direction, this button will control the DC motor to go forward.
5	This button is for the user to move the robot to the left, this button will control the DC motor to go to the left direction.
6	This button is for the user to move the robot to the right, this button will control the DC motor to go to the right direction.
7	This button is for the user to move the robot in backward direction, this button will control the DC motor to go backward.

Figure 2: Project Flowchart

Figure 3: Project Circuit Diagram

Table 2: Description of Components in Circuit Diagram

No.	Hardware	Description
1	L298N Motor Drive Module H Bridge	The L298N Motor Drive Module H Bridge controls the direction and speed of DC motors.
2	DC Motor	The DC motor is used to control the movement of the robot.
3	LiPo battery	The LiPo battery act and used as a power supply to generate electricity for the ESP32, ESP32-Cam,Servo motor, and the DC motor.
4	ESP32	The ESP32 is used to integrate our coding to control our functions and are being used to integrate with Blynk mobile Application.
5	Servo Motor	The Servo motor is used to control the forklift on our robot.
6	ESP32-Cam	The ESP32-Camera is being used to monitor the route.

The following are the prototypes of the project:

Plastic board that we used to build the foundation of the robot and the panel of the board.

Popsicles stick That we used to build the foundation of the ESP-32 Camera

Popsicles stick that we used to create the forklift

Fishing line that we used to create a mechanism for the forklift

Figure 4: Robot Prototype from Front View

Figure 5: Robot Prototype from top view

Figure 6: Robot Prototype from side view

Figure 7: Robot Prototype from back view

The following are the testing results for the prototype:

Table 3: Unit Testing Results

No.	Test Case	Test procedure	Pre-condition	Expected result	Tester	Result
1	Test the esp module	Required to make the robot functional	All the connections to the esp module must be correct	Able to received input	Hairil	pass
2	Test the dc motor	Required to move the robot	Must be in the right voltage	Able to move the robot	Hairil	pass
3	Test the esp camera	Required to able to monitor	Place the esp camera on top of the robot	Able to monitor the route	Hairil	pass
4	Test the servo motor	Required to able to move the forklift that we build	The servo motor must be glued to our robot in the right place to be able to move accordingly	Able to move our forklift	Aiman Hakimi	Pass

Table 4: Integration Testing Results

No.	Test Case	Test procedure	Pre-condition	Expected result	Tester	Result
1	Move the robot	Required to move the robot in forward, backwards ,left ,and right motion	None	The robot behave according to our input	Aiman Hakimi	Pass
2	Able to move the forklift	Required to move the forklift up and down motion	None	The forklift goes up and down without any difficulties	Aiman Hakimi	Pass
3	Route viewing	Required to see the route	None	Observe the route through the mobile app	Hairil Anwar	Pass
4	Control robot through Blynk app	Control all of the functions above through Blynk app	Esp module to connect to the device hotspot	Robot behave exactly as the commands that we do	Hairil Anwar	Pass

Table 5: User Acceptance Testing Results

No.	Test Case	Test procedure	Test result	Tester	Comment
1	Move the robot	Required to move the robot in forward, backwards,left ,and right motion	Pass	Muhammad Haziq Fitri	-
2	Able to move the forklift	Required to move the forklift up and down motion	Pass	Muhammad Haziq Fitri	-
3	Route viewing	Required to see the route	Pass	Muhammad Haziq Fitri	-
4	Control robot through Blynk app	Control all of the functions above through Blynk app	Pass	Muhammad Haziq Fitri	-

The project offers several key advantages that enhance the efficiency and effectiveness of logistics automation. Firstly, the use of a DC motor provides reliable and controlled movement for the robot. DC motors are well regarded for their simplicity, durability, and ability to deliver accurate motion, which is essential for navigating within a logistics environment.

Secondly, the integration of an ESP32 camera enables real-time obstacle detection and surveillance. This feature allows the system to visually monitor its surroundings and dynamically adjust its route to avoid collisions, increasing both safety and operational reliability.

Additionally, the servo motor, functioning as a forklift, allows for precise and versatile package handling. Its high torque and accuracy make it well-suited for lifting and positioning items along

the robot's path, improving the handling process in logistics tasks.

Finally, the use of the Blynk platform for remote control and monitoring adds a layer of convenience and responsiveness. Operators can access and manage the robot from anywhere with internet connectivity, enabling real-time adjustments, remote troubleshooting, and improved oversight, all of which contribute to more efficient and flexible operations.

The disadvantages of the project include the complexity of integrating multiple technologies such as DC motors, ESP32 cameras, servo motors, and IoT for control, which can lead to coordination challenges. Additionally, the hardware components are costly, even for a prototype, and the robot requires consistent technical support and maintenance, particularly

in ensuring the battery remains fully charged for proper operation.

The recommendations for improving the logistics automation robot include increasing its battery capacity to extend operational time, configuring it for autonomous movement to designated routes, using higher-quality materials to enhance its sturdiness, and designing the robot to operate automatically rather than relying on manual control.

CONCLUSION

The robot automation system is a revolutionary advancement in logistics and supply chain management, leveraging cutting-edge technology to address industry challenges. It accelerates operational cycles, increases product movement in and out of warehouses, and reduces delivery times, enhancing productivity. With superior accuracy and consistency, the robot outperforms human workers, minimizing errors and ensuring operational success, ultimately improving customer satisfaction.

REFERENCES

Clickpost. (2024, january 8). DHL vs UPS: detailed comparison. Retrieved from clickpost: https://www.clickpost.ai/blog/dhl-vs-ups

DHL. (2023, June). How robotic picking is revolutionizing warehouse productivity. Retrieved from DHL Delivered: https://www.dhl.com/global-en/delivered/digitalization/locus-robotics-roboticpicking.html

Dresser, S. (2023, October 18). Amazon announces 2 new it's using robots to assist employees and deliver for customers. Retrieved from Amazon: https://www.aboutamazon.com/news/operations/amazon-introduces-new-robotics-solutions

Dynamics, B. (2000, september 12). Robotics, R&D, Ethics, and Innovation. Retrieved from https://bostondynamics.com/: https://bostondynamics.com/

NSDigitalWorld. (2020, January 21). Amazon now has 200,000 robots working in its warehouses. Retrieved from Robotics & Automation news: https://roboticsandautomationnews.com/2020/01/21/amazon-now-has-200000-robots-workingin-its-warehouses/28840/

Wheeler, C. (2023, October 19). 5 Disadvantages of Automated Warehouse Robots. Retrieved from newcastle systems: https://www.newcastlesys.com/blog/disadvantages-of-automated-warehouserobots

SCANSMART HOSTEL PSIS

Nur Atiqah Mohd Nasir[1*], Saoumya a/p Arjuna[2] , Diana a/p Lawrence[3] & Muhammad Faris Nandini a/p Rames[4]

[1]*Department of Information Technology and Communication, Politeknik Sultan Idris Shah, Selangor*

Corresponding author: atiqah@psis.edu.my

Abstract: Scansmart Hostel is designed to facilitate dormitory access for students using their matrix cards. It addresses the need for a secure and convenient method of entry into dorm room without traditional keys. There is a problem with the security and accessibility of dorm rooms, as traditional key-based systems are prone to issues such as loss or theft of keys. Therefore, this project aims to implement an RFID-based door lock system, functional standalone system and a database to provide a secure and efficient access solution for students. This project uses an agile methodology, which allows for iterative development and continuous improvement based on stakeholder feedback. It helps to emphasize collaboration and flexibility delivery. As a conclusion, this project hopes to enhance dormitory security and accessibility, providing students with a reliable and convenient access system while ensuring that only the college administration can manage user information.

Keywords: Door lock system, RFID, standalone system

INTRODUCTION

1.1 Problem Statement:

The problem statements of this project are:

i.   Students often misplace their keys: Vehicle keys may get mixed up with room keys, making it hard to locate them, and lost key tags make identification difficult.

ii. Physical registration and key pickup process is time-consuming: Students must register and collect their keys within a specific time and may miss the schedule due to conflicts.

iii. Limited key return time: Keys must be returned during weekdays only, which may be difficult for students whose parents cannot pick them up during those times.

iv. High manpower requirement for registration: A significant number of staff and student effort is needed to manage key distribution and registration, leading to long working hours.

v.   Risk of key duplication: Traditional keys can be duplicated, increasing the risk of unauthorized access.

1.2 Objective

The objectives of this project are:

i   To identify the traditional way of accessing the dorm, strengths, weakness, and improvements to be made.

ii   To develop a prototype of Scansmart Hostel PSIS using the RFID and standalone hostel system.

iii To test the functionality and usability of the Scansmart Hostel PSIS system using unauthorized testing and penetration testing

1.3 Scope of Project:

The system scope for Scansmart Hostel PSIS includes several key components aimed at enhancing access control and management. The administrator interface enables hostel staff to manage student accounts, access permissions, and modify room access for students. The system's core functionality is based on an access control mechanism, which grants or denies access based on student credentials and permissions. To implement this system, both hardware

components (for the access control panels) and software interfaces are required for management and security purposes. Additionally, the system must be integrated with the existing hostel infrastructure to ensure compatibility.

The user scope for Scansmart Hostel PSIS defines three primary user categories. Resident users, or students, will utilize the system to gain access to their respective dorm rooms through the authentication system. The administrator user, typically hostel staff, has the responsibility to manage the system, including adding, modifying, or deleting student access. A "Felo User," which refers to lecturers or staff associated with the hostel, will have the privilege to grant room access to students in cases such as a lost matrix card.

METHODOLOGY

We chose the Agile methodology for our project because it is flexible and adaptable, allowing us to adjust to changes and evolving requirements. This methodology emphasizes attention to detail, ensuring customer satisfaction by fulfilling their needs. Agile helps break the project into smaller phases, providing a clear guide for planning, executing, and evaluating the project.

The project began with the planning phase, where we defined the scope, prioritized tasks, and set achievable goals for the iteration. Meetings were held to discuss tasks, gather project requirements, and order the necessary items. During the design phase, we focused on creating the user interface for the system, designing features and buttons, and developing a prototype with lightweight documentation that evolved over time.

In the development phase, we implemented the planned features and functionalities, ensuring continuous integration and frequent testing to maintain alignment with customer needs. The testing phase verified that the product met expectations, quality standards, and requirements, including unit tests, software testing, and integration tests to catch defects early. Although deployment was not a primary focus since we created a prototype, Agile encourages frequent releases of working software to customers. Finally, in the review phase, we evaluated the outcome, showcased the completed work to stakeholders, and gathered feedback for future improvements, adjusting the backlog and processes as needed.

RESULTS AND DİSCUSSİON

The following are the logical design for the project developed:

Figure 1: Work breakdown Structure (WBS) during project development

The functional requirements for the system focus on several key features to ensure efficient operation and user interaction. First, the RFID detection system must be able to read the student's matrix card, granting access only if the card number is registered. If the card is not registered, access will be denied. Additionally, an authorization access status check is essential, where the system performs real-time validation and provides feedback through an LED light green indicating authorized access and red for unauthorized access.

The user interface should be user-friendly, accommodating three types of users: students,

felo (staff), and hostel administrators. Each user type will have a tailored interface suited to their specific needs. Students can view the felo's duty roster and report issues. Administrators can update and modify student and felo details and review room access records. Felo users will be able to manage the duty roster and check access records. Lastly, the lock and unlock operation is crucial; the latch lock will automatically unlock for authorized users and remain locked for unauthorized access, ensuring a seamless and secure process.

The followings are the project prototype:

Figure 2: Components of Project

Based on Figure 2, Arduino Maker Uno, RFID module, jumper wires, servo motor, LED light, latch lock, iron wire were assembled to complete the installation of hardware components.

The followings are the logical design of the project:

Figure 3: Network Topology Diagram

Figure 4: Network Topology Diagram with explanation

Figure 5: Project Context Diagram

Figure 6: Project Flowchart Diagram

The following are the interface designs of the project:

Figure 7: Change Password Interface

Figure 8: Notification to enter the correct password

Figure 9: Notification of incorrect old password

Figure 10: Home page

Figure 11: Login page

Figure 12: Student Authentication Granted Pop Up Message

Figure 15: Felo Duty Roster Interface (View Only)

Figure 13: Invalid Username/Password Pop Up Message

Figure 16: Felo Authentication Granted Pop Up Message

Figure 14: Student Main Interface

Figure 17: Admin Main Interface

The following are the project prototypes:

Figure 18: Project Prototype Top View

Figure 19: Project Prototype from Outside

Figure 20: Components for Project Prototype

The following are the test results for the project:

Table 1: Integration Testing Result

INTEGRATION TESTING PLAN (ITP)						
Num.	Test Case Name	Test Procedure	Pre-Condition	Expected Result	Tester	Result (Pass / Failure)
1.	Motor rotation (180 degrees for unlock and 80 degrees for lock)	The servo motor needs to rotate 180 degrees for unlock and 80 degrees for lock degrees once it has detected an 'Authorized Access'.	Connect the latch lock to the servo motor for the lock and unlock operation	The servo motor rotates 180 degrees for unlock and 80 degrees for lock once an authorized access is detected	Diana	Pass
2.	Lighting up the green and red LED light	The green LED needs to light up when the access is authorized. Red LED needs to light up when an unauthorized access is detected	Connect the pins and make sure the coding is set correctly.	The green LED lights up when the access is authorized. Red LED lights up when an unauthorized access is detected	Nandini	Pass

The project offers several advantages. First, it enhances security by eliminating the risks of key loss or theft, as RFID cards are harder to duplicate and can be remotely deactivated if lost. It also improves accessibility for students, allowing easy access to dorm rooms without the need for physical keys. The use of Agile methodology allows for iterative development, ensuring continuous improvement based on feedback, making the system more adaptable to user needs. The RFID-based system is reliable and convenient, providing seamless experience for students. Finally, it ensures centralized and secure management of user information, with the college administration overseeing access control.

The project has several disadvantages. The initial cost of implementing an RFID system can be high due to the expenses for RFID readers, tags, and system integration. There is also a dependency on technology, meaning that power outages or technical failures could compromise access, requiring backup solutions like manual keys. Privacy concerns arise from the storage and management of student data in a centralized database, which could pose risks to data protection. Maintenance is necessary to ensure the system functions correctly, including software updates, hardware repairs, and reconfigurations. Updating information in databases can be time-consuming and complex. Additionally, environmental factors such as extreme weather or physical obstructions can affect the performance of RFID readers and tags.

Recommendations for the project include establishing a support system to assist students and staff with technical difficulties and improve user feedback. To enhance data privacy, robust encryption protocols should be implemented to protect user information. The system should be designed for scalability to accommodate future growth and user expansion. Regular maintenance schedules for the RFID system and database are essential for continuous, efficient operation. A contingency plan should be developed for potential system failures, including alternative access methods and backup systems. Finally, user experience optimization should be prioritized by monitoring interactions and making improvements to the system's interface and features.

CONCLUSION

In conclusion, the RFID-based door lock system implemented through Scansmart Hostel PSIS offers significant advantages in enhancing access control and security for the dormitory. It ensures only authorized students can access the dorm, creating a safer environment. The system also allows college administration to manage user information and access control. However, there are challenges such as the high cost of setting up the system, including RFID readers, door locks, and matrix cards, and the need for technical expertise for initial setup and troubleshooting. Hostel management must also be trained to handle potential issues. Despite these challenges, the system provides a reliable, convenient, and secure solution, significantly contributing to a safer and smarter dormitory environment, provided that best practices are followed during implementation.

REFERENCES

Dejan. (2022, February 17). How RFID Works and How To Make an Arduino based RFID Door Lock. How to Mechatronics. https://howtomechatronics.com/tutorials/arduino/rfid-works-make-arduinobased-rfid-door-lock/

How To Use Microsoft Access. (2023, October 16). Process Street | Checklist, Workflow and SOP Software | Checklist and Workflow Software for Businesses. Create Recurring Processes and Standard Operating Procedures in Seconds. https://www.process.st/how-to-use-microsoft-access/

ITS InfoTechSkills. (2021, December 3). HOW TO CONNECT VISUAL BASIC .NET TO DATABASE (MS ACCESS) | VISUAL BASIC TUTORIAL [Video]. https://www.youtube.com/watch?v=1Cl8EGz7Nx8

SriTu Hobby. (2021, April 12). RFID door lock access control system | How to make an RFID door lock system using Arduino [Video]. YouTube. https://www.youtube.com/watch?v=GOO84CGBPz8

Too Long; Didn't Watch Tutorials. (2022, October 28). MS Access - How to split your database and allow multiple users to enter data at the same time [Video]. YouTube. https://www.youtube.com/watch?v=olw7PFXHeOA

Tutorialspoint. (2018, January 4). MS Access 2016 - Create Simple Database [Video]. YouTube. https://youtu.be/pbtoCktlX1Y?si=udJaXzRtHxdszVoW

NOTES

Welcome to the first issue of the **"E-Book of Extended Abstract : Digital Technology, Innovation, Idea and eXhibition (dTiiX) 2024"** with the theme "**Driving Towards 4IR Technology in TVET Education**," This compilation brings together a diverse range of innovative ideas and groundbreaking final year projects presented by fifth-semester students in the Department of Information and Communication Technology, enrolled in the DFT50114 - Integrated Project course for the 2024 Short Semester Session.

Within these pages, readers will discover extended abstracts spanning topics such as networking, programming, apps, systems, the Internet of Things, digital multimedia, artificial intelligence, machine learning, cybersecurity, digital entrepreneurship, and more. This compilation serves not only as a testament to the ingenuity and dedication of the participants but also as an invaluable resource for those seeking to stay abreast of the latest trends and developments in the digital landscape.

We invite you to delve into this collection of extended abstracts and be inspired by the creativity and forward-thinking that characterize the DTiiX community. May this compilation spark new ideas and collaborations, driving further innovation and excellence in the field of digital technology.