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Proposal Defence FYP I

Easy Parcel: IoT-Based Parcel Storage System for University Villages

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INTRODUCTION

INTRODUCTION

UNIVERSITI TEKNOLOGI PETRONAS (UTP)

Final Year Project I

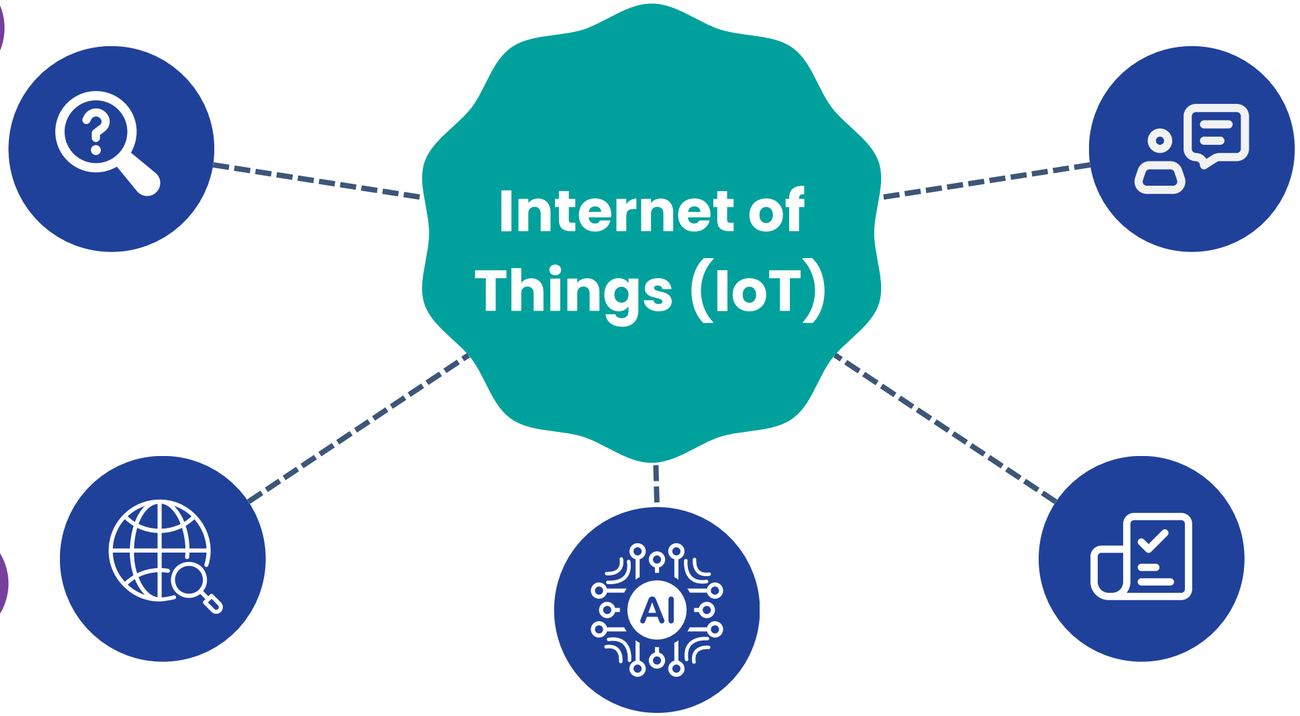
OBJECTIVES

The purpose of the project is to develop a framework, which will enhance students' skills in the process of applying knowledge, expanding thoughts, solving problems independently and presenting findings through minimum guidance and supervision.

INTRODUCTION

WHAT?

Network of interconnected devices that collect, send, and receive data through the internet to automate and improve processes.



IMPORTANCE

- **Enables automation and real-time monitoring**
- **Increases efficiency and reduces manual work**

APPLICATION

- **Smart Homes**
- **Healthcare**
- **Transportation**
- **Agriculture**
- **Logistics and Delivery**

TECHNOLOGIES USED

- **Sensors & Actuators**
- **Microcontrollers (e.g., ESP32, Raspberry Pi)**
- **Cloud Platforms & Mobile Apps**

FEATURES

- **Remote access & control**
- **Data collection & analytics**
- **Integration with mobile apps**

BACKGROUND OF STUDY

1 Malaysia E-commerce Growth

- E-commerce in Malaysia has seen remarkable growth in recent years
- Malaysia is now one of Southeast Asia's leading digital markets
- E-commerce users projected to increase by over 75% reaching expected 18.81 million users by 2029

2 University Students Role in E-commerce

- University students make up a large and growing portion of online shoppers
- Known for high digital literacy and frequent internet and mobile usage
- Prefer e-commerce for its convenience, affordability, and variety

SUMMARY

ParcelHub is created as a solution to help manage the growing number of parcels received by university students from online purchases. As students increasingly rely on e-commerce, the need for a secure, convenient, and organized parcel handling system has become essential. ParcelHub aims to streamline the delivery process by providing a reliable storage system that ensures students can receive their packages safely and at their own convenience.

PROBLEM STATEMENT

While the ParcelHub aims to simplify parcel collection, it still has notable flaws that impact student convenience.

- One centralized location (ParcelHub), far from most student residences
- Long queues during peak hours
- Inconvenient for students without transport
- Creates parking problems for those who drive
- Students must pay additional charges to collect parcels

OBJECTIVES

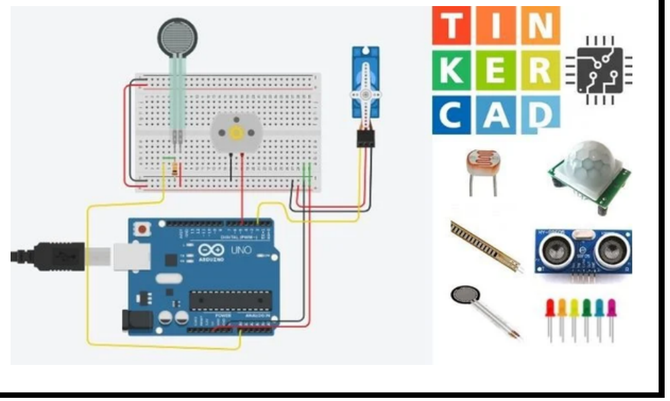
To design and develop an IoT-based smart locker system for student villages to store small parcels securely

To build a mobile application for both students and couriers to manage locker access, track deliveries, and receive parcel notifications.

To implement a random password lock system and barcode scanning for secure identification of parcel senders (couriers) and receivers (students).

SCOPE OF STUDY

Design and develop a smart locker prototype using microcontrollers, sensors, and electronic locks. Tinkercad will be used to simulate the circuit design before building the hardware.



Develop a mobile app using Flutter for students and couriers to access lockers, track parcels, and receive notifications. Data will be managed using Firebase Firestore.

Implement OTP-based access using Firebase Authentication and integrate barcode scanning to log parcel sender and receiver details, with records stored in the cloud.

LITERATURE REVIEW

LITERATURE REVIEW

01

LITERATURE REVIEW

02 Sample Preservation on COD Analysis

LITERATURE REVIEW

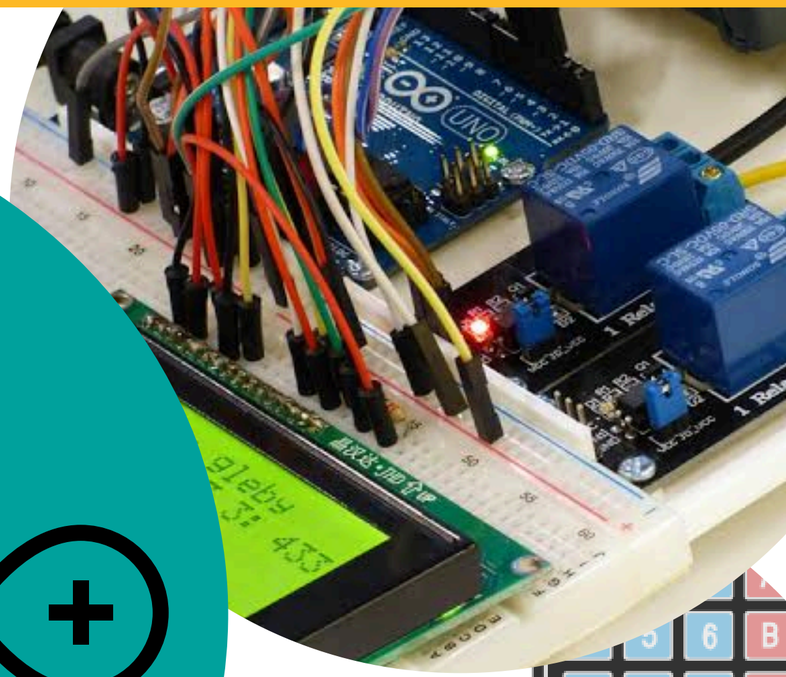
03 Sampling and Testing Period

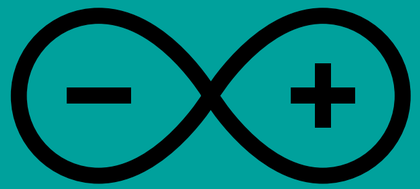
METHODOLOGY

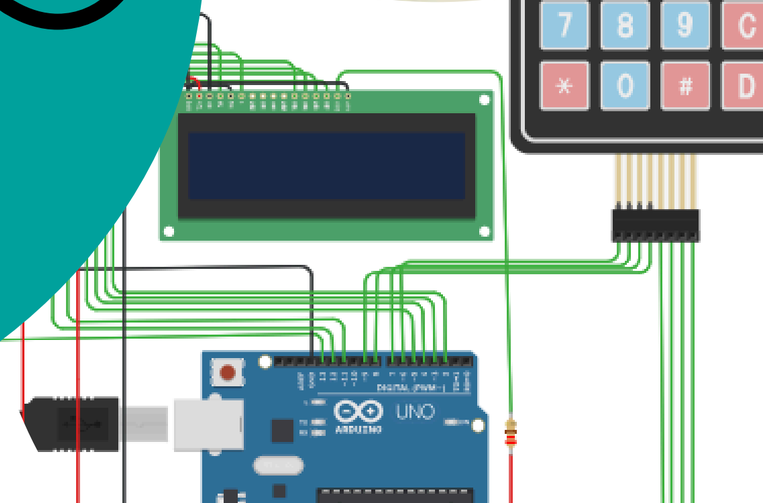
METHODOLOGY

SMART LOCKER – HARDWARE

To develop the smart locker system, I will use the Arduino Uno R3 as the main microcontroller to control the hardware components. Before assembling the physical model, I will design and simulate the electronic circuit using Tinkercad, an online simulation tool. This allows for safe and cost-effective testing of the component connections, logic flow, and system behavior. Once the design is verified and functional in the simulation environment, I will proceed to build the actual prototype using physical components.



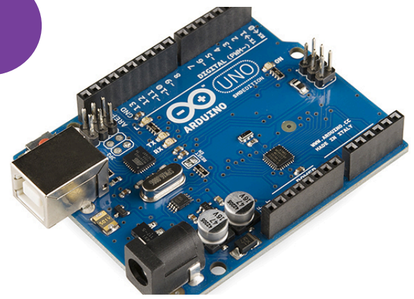




METHODOLOGY

HARDWARE COMPONENTS

1 Arduino Uno 3



Main microcontroller for controlling inputs and outputs.

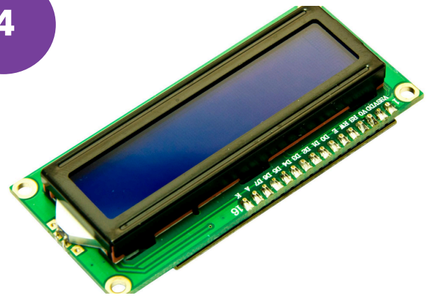
2 Servo Motor

To open and close the locker door electronically.

3 Keypad

To allow manual entry of OTP or password.

4 LCD



To display status messages or OTP confirmations.

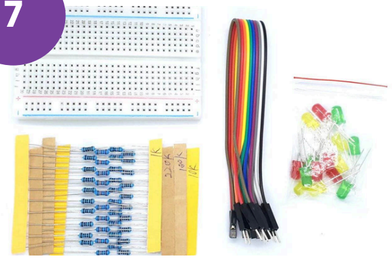
5 Locker

To house the electronics and simulate the parcel storage compartment.

6 Barcode Scanner

To scan courier and parcel information.

7 Breadboard, Wires, Capasitor and LED



For circuit connections and prototyping.

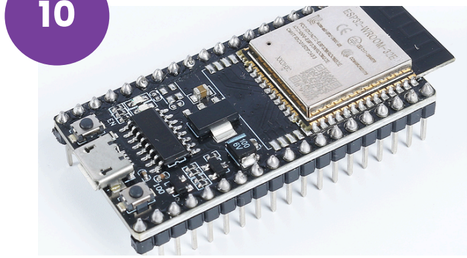
8 Buzzer

To provide audible feedback (e.g., when access is granted or denied).

9 OV7670

(optional) For capturing images/videos during locker access.

10 ESP32



(optional) To enable wireless communication with Firebase if direct integration is needed.

METHODOLOGY

MOBILE APPLICATION - SOFTWARE

The mobile application will be developed using Flutter, a cross-platform framework by Google that allows building Android and iOS apps from a single codebase. Flutter is chosen for its fast development, beautiful UI capabilities, and seamless integration with Firebase.

Flutter

Development Process

UI Design

- Create wireframes and user flow diagrams to outline the structure and navigation of the app.

App Development

- Build the app using Dart and Flutter's widget system for smooth, responsive interfaces.

Firebase Integration

- Use Firebase Authentication for OTP-based login.
- Use Firestore to manage parcel and locker data.
- Enable Firebase Cloud Messaging (FCM) for push notifications.

Testing

- Perform functional and usability testing to ensure smooth performance across platforms.

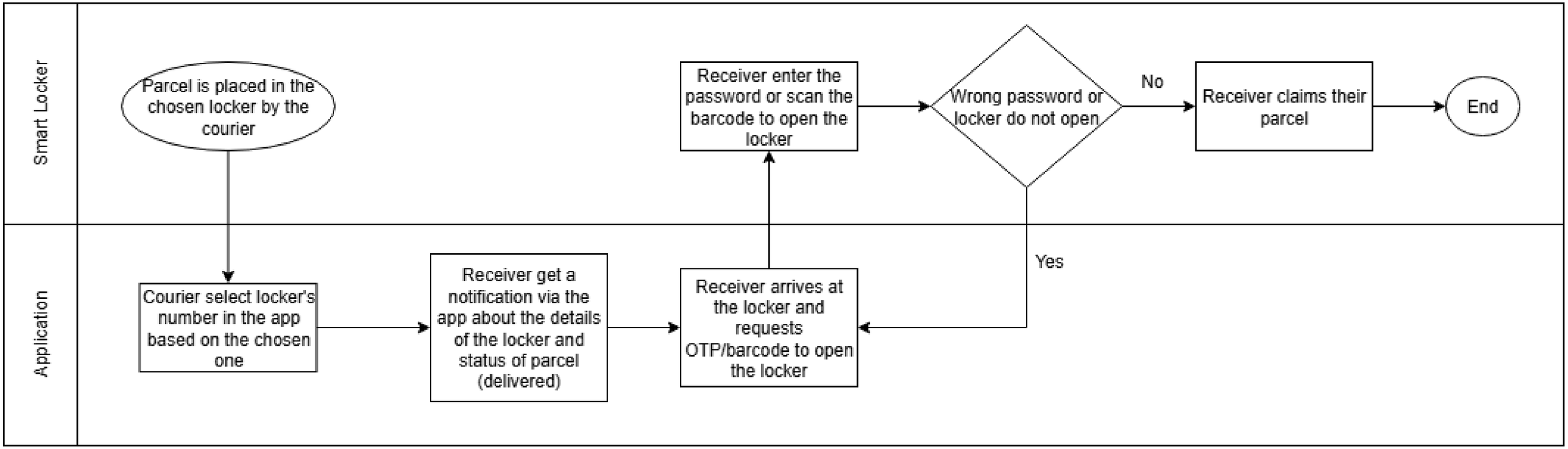
METHODOLOGY

GANNT CHART & MILESTONES – FYP I

No	Activities	Duration (Weeks)													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Project Title confirmation and submission of Form 1A														
2	Prelimanary Research Work (Literature Review)														
3	Identify Methodology and Tools														
4	Identify Equipments														
5	Proposal Defence Preparation														
6	Proposal Defence														
7	FYP I Interim Report Preparation														
8	Design hardware model														
9	Design mobile apps interface and functionality														
10	Review design with Supervisor														
11	Submission of FYP I Interim Report Draft to Supervisor														
12	Submission of FYP I Interim Report														
13	Purchasing Equipments														
14	First step of hardware development														

METHODOLOGY

SYSTEM ARCHITECTURE



CONCLUSION & FUTURE WORKS

FUTURE WORK

1	Deeper Understanding of Flutter	Continue exploring advanced Flutter features to improve UI/UX, performance, and maintainability of the mobile app.
2	Enhance System Integration	Improve the integration between the mobile app and hardware components for more stable real-time communication and response.
3	Optimize Firebase Usage	Explore advanced Firebase functions like real-time syncing, cloud functions, and analytics to boost system efficiency.
4	Improve Hardware Troubleshooting Skills	Gain deeper hands-on experience with Arduino components to quickly identify, test, and resolve hardware issues during development.

To achieve all outlined objectives and complete the work within the planned timeline

CONCLUSION

This project aims to improve the parcel collection experience for students by introducing a smart, secure, and accessible locker system within residential villages. By integrating IoT hardware with a mobile app, it offers a more convenient and efficient solution compared to the current centralized ParcelHub system.