PORTABLE SAFETY FEATURES FOR BAG

SASITHAREN A/L SANGKAR

08DEP17F2010

POLYTECHNIC SULTAN SALAHUDDIN ABDUL AZIZ SHAH

ENDORSEMENT

"I hereby acknowledge that I have read this report and I find that its contents meet the requirements in terms of scope and quality for the award of the Diploma in Electronic Engineering (COMMUNICATION)"

Name of Supervisor: PUAN. AKMARYA SYUKHAIRILNISAH BT MOHD AKHIR
Date: DECEMBER 2019
Signature:

Name of Supervisor: PUAN. ASTRAHUDA KAMARULAINI BINTI MOHD FAHMI
Date: DECEMBER 2019
Signature:

Name of Supervisor: ENCIK. KHAIROL NAPISHAM BIN ABD RAZAK
Date: DECEMBER 2019
Signature:

Name of Supervisor: PUAN. ZAITUN BINTI TAAT
Date: DECEMBER 2019
Signature:

DEDICATION

We proudly dedicate this project to our highly dedicated lecturers and the citizens of Polytechnic Sultan Salahuddin Abdul Aziz Shah, without them accompanies, suggestions and guidance it is impossible to finish this project successfully. We also dedicate this project to us cherish family members who helps us to complete our project without any interruption. Lastly, we would like to dedicate our project to our classmate for their combined effort while conducting our survey. It is also for the people who involved in our project directly and indirectly.

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This part is sincerely to our respectful lecturers who have been our motivation to complete this project successfully and gave us enough energy by providing their support and caring. We have learned a lot of project management skills and we have learned the chances of achieving the desired results. Thanks to our classmates for helping us. A very special tribute to my group partner who was there with me at every stage and finished this project without backing up from the project even in my worst times. Finally, thanks to our great parents for their advocate through this project. In sum, a very big thanks to everyone who assist to finish our project. Much obliged for everyone's assistance.

ABSTRACT

People nowadays often carry bags wherever they travel. Be it a handbag, school bag, laptop bag or even traveling backpacks. Bags helps us to carry all our important things such as wallet, laptop and basic necessaries. Moreover, bags also keep us organized. But, have you ever imagined how hard it will be to find our bag when it's stolen when we are outdoors. Finding bags at crowded place can be very miserable especially for students who travel using public transportation. In this research we have mainly did about portable safety features for bags which will helps us to find our bag incase stolen and also to protect our personal belongings.

Safety features of bag is very important especially when we are bringing it outdoors and carry valuable things in our bag. Carrying valuable things such as wallet, camera and laptop can be threatening at some point as people may steal it or even we can misplace our bag carelessly at very crowded place. The chance of missing their bag in public transportation is very high for a student. This research is mainly about providing portable safety features for students who are using public transportation. This portable safety feature comes with a Wi-Fi module and a fingerprint sensor.

Wi-Fi module in this model helps students to track their bag location if its missing. This model also comes up with a fingerprint sensor in order to prevent someone from opening our bag without our acknowledgement. The main advantage of this safety feature is that it is portable, which means the student can use it in all kind of bags to prevent their bag being stolen or missing. The main component used in this project is Arduino Nano hardware system which controls the running of this whole system. Therefore, this project will be very useful for students who travel by public transportation. Even tough, the main focus of this project is students who use public transportation, this device still can be used in all type of backpacks.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, bag have become an important part in our daily life. Everybody, is carrying backpacks with them while travelling outside. People are still unable to protect their personal belongings when travelling outside or in a crowd place. This is more problematic to students or workers who use public transportation as their main transportation on daily basis. Portable safety feature for backpacks will be able to solve this issue by protecting the user's valuable belongings.

This portable safety feature for backpacks will prevent our personal belongings from being stolen by others and also misplaced by us. Other than that, this portable safety feature for backpack also find the location of the backpack in case it is missing. This device is also portable. This feature makes the device to be used by everyone in all type of bags by everyone. But, our main target of this device is students and workers who travel using public transportation in their everyday life. Students and workers who travel using public transportation is our main focus because they usually carry valuable belongings to college or working place such as laptop or even important and confidential documents. This device will help them to protect such valuable objects from being lost or being stolen by others.

Arduino Nano is used as the main component in this project. Arduino Nano is one type of microcontroller board which is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board. This Arduino Nano board can be supplied with 6 to 20volts using a mini USB port on the board. The Arduino Nano board is similar to an Arduino UNO board including similar microcontroller like Atmega328p. Thus, they can share a similar program. The main difference between these two is the size. Because Arduino Uno size is double to Nano board. So, Uno boards use more space on the system. The programming of UNO can be done with a USB cable whereas Nano uses the mini USB cable.

Portable safety feature for bags is a device which will help you to protect your important things in your bag. In this device, we have used fingerprint sensor to protect our valuable objects we carry in our bag. We have used fingerprint sensor in this device as it is highly secured and can only be accessed by the owner of the bag. Thus, the bag can only be accessed by the owner. We choose fingerprint because that is the best choice to protect our things we carry in bag. For example, a lock and key can be used to lock our bag. But, the keys can be misplaced, the keys can rust and break. This will lead to a more stressful situation. Next, analog number lock can also be used to protect our bag. But, analog number lock can be forgotten by people easily. So, we made the decision to use fingerprint sensor as it seems to be best way to protect our valuables.

Fingerprint does have its disadvantages. Fingerprint sensor cannot read the fingerprint if it has smudges or if it gets wet. As an alternative way we have also provided button in "BLYNK" app. We have used "BLYNK" in this project to lock and unlock the solenoid fixed in the bag. The button in this app is to lock or unlock the bag when we are in a crowded place. It makes the job easier to lock and unlock the bag.

The next function of this portable safety features for backpack is to find the location of the bag if it is missing. To fulfill this action, we have used Wi-Fi module to find the location of bag. A Wi-Fi module with GPS system is attached in this device to make it easier to find the destination of the bag. We have used the Wi-fi module as it can provide real time location of the bag. Wi-Fi module is also easy to detect the location both indoor and outdoor without any disturbance. But, Wi-Fi module has one disadvantage which is the location of the bag cannot be detected if the bag has moved more than 100m away from us. To avoid this situation, we have provided an alternate way to protect the bag from being lost. We have set a certain distance limit in the programming, where when the bag has moved exceeding the limit "Blynk" app will send a notification to our handphone to warn us that the bag has moved exceeding the distance limit. We have used solenoid in our project to lock and unlock the zip. The buzzer is used to indicate the opening and closing of the bag by the owner.

1.2 Problem statement

Individual face problem to ensure the safety of our personal belongings in the bag when they carry it outside. Next, it is also hard to find the location of bags when missing. Moreover, need to change different backpack while travelling to different destinations as different type of bag serve different purposes. Finally, Safety features in travelling backpacks are usually embedded in the bag itself. It restricts the access of backpack by everyone.

1.3 Objective

The main objective, of this project is to develop a portable safety features for bags which can be used in all type of bags. Several other objectives of this project are, for students who use public transportation. Other than that, to ensure the safety of our personal belongings from being stole by others. Lastly, to find the exact location of bag when it's missing.

1.4 Project scope

This research is mainly about portable safety features that can be carried in our bags to keep our belongings safely. This portable safety features can be used in all kind of bags. But, our main focus in this project is also students who travel by public transportation. As we know backpack is a necessary thing to carry while we are going out. Backpacks with additional features will help to protect our valuable belongings such as documents, laptop and wallet when we go out somewhere. But, changing different bags for different destinations will be very hard as not all the bags contain safety features. We have added several features such as fingerprint sensor, GPS tracker using wi-fi module and buzzer.

CHAPTER 2

LITERATURE REVIEW

2.1 Tile (Gen 2) Luggage tracker

Tile is a compact Bluetooth tracking device that integrates with user friendly app. Is sole purpose being to help you find things that you don't want to lose in seconds, like your keys, phone and your luggage. With a wide location range, a super loud alarm and a large crowd finding network, you can track luggage within seconds. Unlike, GPS trackers, Bluetooth tracking devices only work within a certain range but the plus side is that there are no hefty fees and when your tracker does fall out of your own Bluetooth range, then you can use the crowd finding feature which allows other individual to connect to the device to help you locate your items. Key features: can make your lost phone ring- even if it's on silent. Speaker sounds a 90-decibel alert that's easy to hear. Advantages: boasts two way finding capabilities, compact, discrete and light and suitable for tracking even the smallest items. Disadvantage: the battery cannot be replaced.

2.2 Bag having Safety Features

This project is developed by Alicia Amaral at the year of 2005. The present invention relates to a bag including a removable penlight flashlight for providing adequate lighting of a path in front of a bag. The bag comprises a pair of handles at a top thereof, one or more of the handles comprises a cavity for receiving the penlight flashlight. The bag and handles can be formed of light-weight nylon. An expandable section can be formed in the bottom of the bag such that in an extended condition the area within the bag is enlarged. Reflective stitching can be formed on one or more of a top edge or a side edge of the bag. A magnetic closure can be used to close the bag. The invention relates to a bag having safety features, such as for trick or treating, in which a removable flashlight can be received in a handle of the bag for providing adequate lighting onto a path external of the bag and reflective stitching or reflective panels can be used on the bag for providing visibility of the bag.

2.3 Backpack for motorcyclists

This study by, Melvin White, JR is a backpack for motorcyclists provides a rigid outer shell with an electrical system wherein an onboard battery powers rear signal lights, each comprising a plurality of light emitting diodes (LEDs), which are linked with the motorcycle's electrical system to function as brake lights and turn signals. The electrical system also charges a cellular telephone or other portable device via a Universal Service Bus (USB) port, and may be recharged by one or more solar panels mounted to the exterior of the backpack. A cellular telephone, music player, or similar device may also be connected via the USB port to play digital music files via speakers provided by the backpack, and a headphone socket is also provided. An onboard mapping device or homing beacon, enabled by the Global Positioning System (GPS), may be optionally provided.

2.4 Backpacks configured to utilize safety harnesses

According to Steven Demsky, Novel backpacks, configured to utilize seat and/or chest harnesses are disclosed herein. Preferred backpacks are configured to attach to and be supported by intermediary connectors including hip belts or backpack supports that can operably couple to separate seat harnesses. A backpack assembly configured to be worn by a user and comprising: a main storage enclosure with one or more shoulder straps that when said straps are worn, the main storage enclosure abuts a user's back and a portion of the main storage enclosure's load is transferred to the user's shoulders. Next, a separate seat harness comprised of an adjustable waist loop in operable connection with pliable material configured to form leg loops such that the separate seat harness has sufficient strength to safely disperse fall-arrest forces to the user's legs and waist when worn by itself. Other than that, a hip belt constructed from a bottom panel of pliable material having a top edge.

2.5 Spy Tec STI GL300 Mini Portable Real Time GPS Luggage Tracker.

Spy Tec STI GL300 is a compact device that not only allows you to track your luggage but can be placed in your car or even in your kid's pocket to keep tabs on their location. This GPS luggage tracker is lightweight and small enough to discretely fit into your suitcase, backpacks and even your handbag. It tracks the real time location using Google maps. You will get notified via e-mail or text when the tracker moves out of range. Includes a rechargeable battery. The advantage of this device is tracking accuracy is extremely reliable.

2.6 Americaloc GL300W GPS luggage Tracker.

This is a practical and compact designed, not only been built to keep track of luggage and other valuable possessions, but it is also sturdy and reliable enough to follow the whereabouts of your car. This is a handful device for excellent luggage tracking. It sends the location updates within one minute. The alert modes to alert the owner can be customised accordingly. The advantage of this device is it has long lasting battery. And the device is small yet durable. The disadvantage of this device is that the locations are not always precisely shown.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Methodology is one of the important aspects completing a project. Methodology is the specific procedures or techniques used to identify, select, process and also to analyse information about our research. Methodology helps us at every stage of a project to complete successfully.

For this project, we have stated our full process of methodology from starting of the project until end of the project. We have used questionnaire method to identify the problems among random people. We also have done a lot of surveys on this project before proceeding with it to gain knowledge in this field.
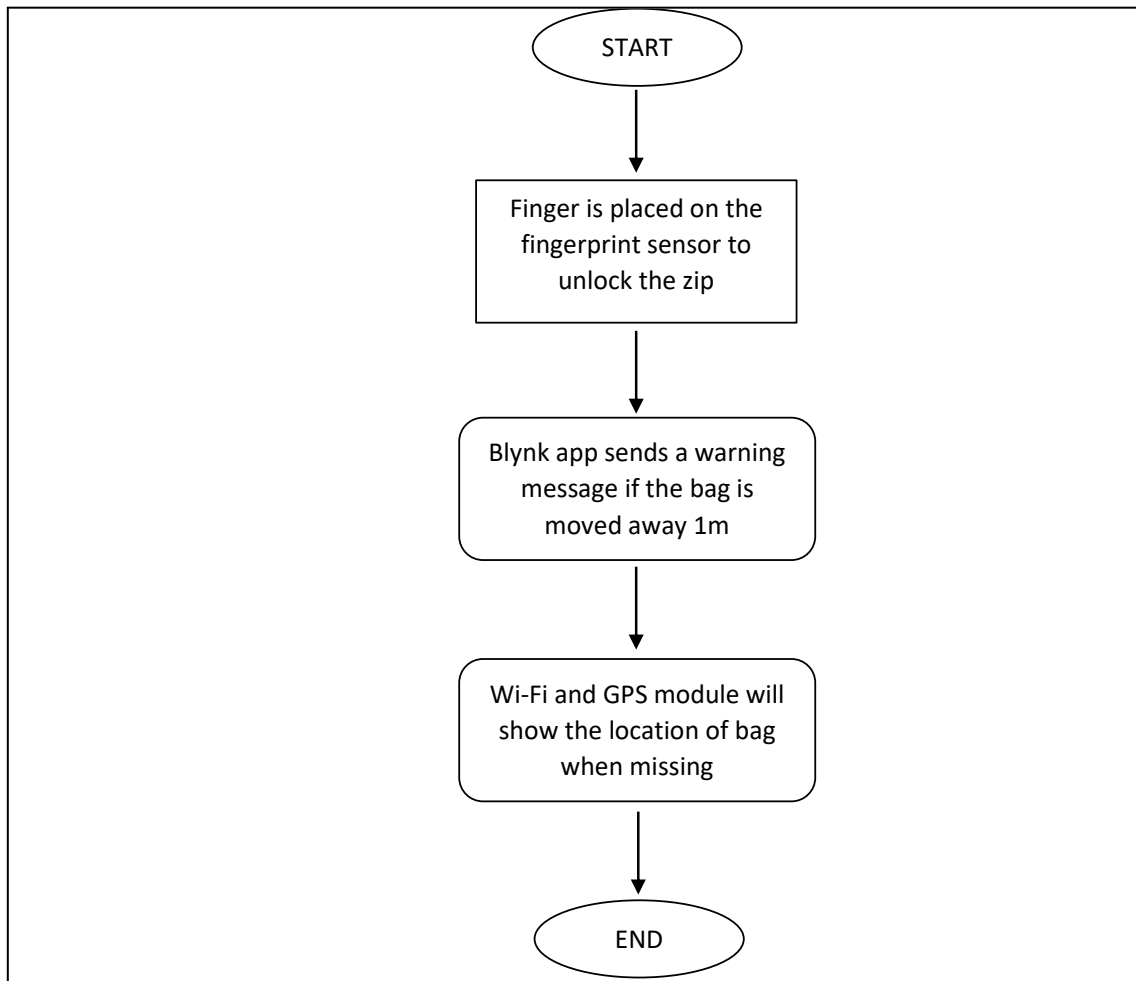
3.2 Process of project

Figure 1: Flowchart of the project

3.3 Gantt chart

TASK	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Preparation of logbook	▉	▉	▉	▉	▉	▉	▉	▉	▉	▉	▉	▉	▉	▉
Selection of project	▉	▉												
Defend on project title			▉											
Gannt chart				▉										
Proposal					▉									
Literature review						▉	▉							
Methodology						▉								
Project plan						▉								
Reference							▉							
Presentation and proposal submission								▉	▉					
Design and stimulate								▉	▉	▉				
Project testing									▉	▉	▉			
Presentation											▉	▉		
Final report submission													▉	▉

Table 1: Gantt Chart
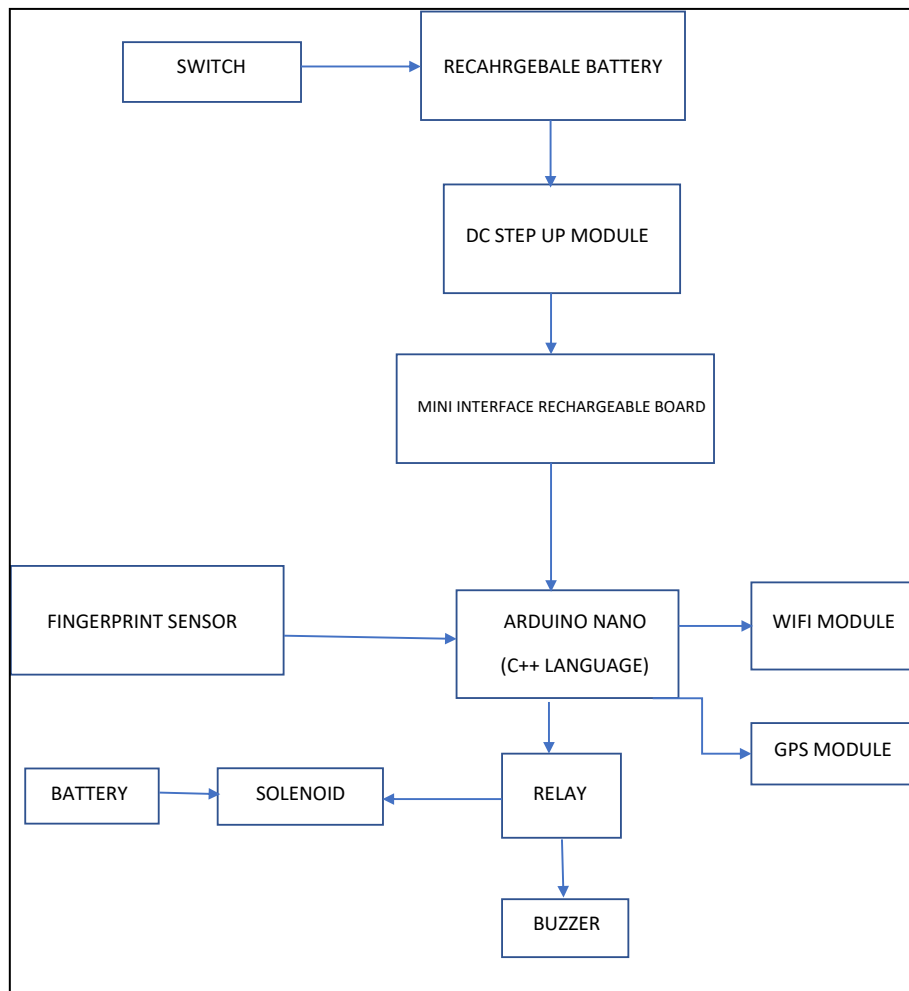
3.4 Block diagram and functions

Figure 2: Block Diagram

Fingerprint Module

Fingerprint sensor modules, like the one in the following figure, made fingerprint recognition more accessible and easier to add to your projects. This means that is super easy to make fingerprint collection, registration, comparison and search. These modules come with FLASH memory to store the fingerprints and work with any microcontroller or system with TTL serial. These modules can be added to security systems, door locks, time attendance systems, and much more. Specifications of the fingerprint sensor module we have used in this project: Voltage supply: DC 3.6 to 6.0V, Current supply: <120mA, Baud rate: 9600, False Accept Rate (FAR): <0.001% (security level 3), False Reject Rate (FRR): <1.0% (security level 3) and able to store 127 different fingerprints

Wi-Fi module

The ESP8266 Wi-Fi Module is self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware. The ESP8266 module is an extremely cost-effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

Buzzer

A "piezo buzzer" is basically a tiny speaker that you can connect directly to an Arduino. "Piezoelectricity" is an effect where certain crystals will change shape when you apply electricity to them. By applying an electric signal at the right frequency, the crystal can make sound. A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications. There are two types are buzzers that are commonly available. First is a simple buzzer which when powered will make a Continuous sound. Next, the other type is called a readymade buzzer which will look bulkier and will produce a sound due to the internal oscillating circuit present inside it. This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval. Applications of Buzzer are such as alarming Circuits, where the user has to be alarmed about something. Next, communication equipment's, Automobile electronics and finally, portable equipment's, due to its compact size.

Solenoid

Solenoid is the generic term for a coil of wire used as an electromagnet. It also refers to any device that converts electrical energy to mechanical energy using a solenoid. The device creates a magnetic field from electric current and uses the magnetic field to create linear motion. Common applications of solenoids are to power a switch, like the starter in an automobile, or a valve, such as in a sprinkler system. Solenoids are incredibly versatile and extremely useful. They're found in everything from automated factory equipment to paintball guns and even doorbells. In a chime doorbell, the audible chime is produced when a metal piston strikes a tone bar. The force that moves the piston is the magnetic field of a solenoid that receives electric current when the doorbell is pushed.

Rechargeable battery cell

A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

Arduino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P; offers the same connectivity and specs of the UNO board in a smaller form factor. The Arduino Nano is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline. The Arduino Nano is very much similar to the Arduino UNO. They use the same Processor (Atmega328p) and hence they both can share the same program. One big difference between both is the size UNO is twice as big as Nano and hence occupies more space on your project. Also, Nano is breadboard friendly while Uno is not. To program an Uno, you need Regular USB cable whereas for Nano you will need a mini USB cable. There are totally 14 digital Pins and 8 Analog pins on your Nano board. The digital pins can be used to interface sensors by using them as input pins or drive loads by using them as output pins. A simple function like pin Mode and digital Write can be used to control their operation. The operating voltage is 0V and 5V for digital pins. The analogue pins can measure analogue voltage from 0V to 5V using any of the 8 Analog pins using a simple function liken analogue. These pins apart from serving their purpose can also be used for special purposes which are discussed below: Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip. External Interrupt Pins 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. PWM Pins 3, 5, 6, 9 and 11: These pins provide an 8-bit PWM output by using analogue. Write function. SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK): These pins are used for SPI communication. In-built LED Pin 13: This pin is connected with a built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off. I2C A4 (SDA) and A5 (SCA): Used for IIC communication using Wire library. AREF:

Used to provide reference voltage for analogue inputs with analogue. Reference function. Finally, reset Pin: Making this pin LOW, resets the microcontroller.

GPS module

GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellite, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.

Relay

Circuits that operate at high voltages or at high currents cannot be controlled directly by an Arduino. Instead, you use a low-voltage control signal from the Arduino to control a relay, which is capable of handling and switching high-voltage or high-power circuits. A relay consists of an electromagnet that, when energized, causes a switch to close or open. Relays provide complete electrical isolation between the control circuit and the circuit being controlled. Coil input pin1. This is generally connected to the positive terminal of your signal source. Firstly, Coil input pin2. This is generally connected to the negative terminal of your signal source. Second, Normally Open pin (NO). This pin is normally not connected to the common pin, it is connected when the relay is activated. Third, Normally closed pin (NC). This pin is normally connected to common pin and is disconnected when relay is activated. Finally, Common. In most of the cases, this pin is connected to the ground of the source we use to drive the appliance.

DC step-up module

A boost converter (step-up converter) is a DC-to-DC power converter that steps up voltage (while stepping down current) from its input (supply) to its output (load). It is a class of switched-mode power supply (SMPS) containing at least two semiconductors (a diode and a transistor) and at least one energy storage element: a capacitor, inductor, or the two in combination. To reduce voltage ripple, filters made of capacitors (sometimes in combination with inductors) are normally added to such a converter's output (load-side filter) and input (supply-side filter).
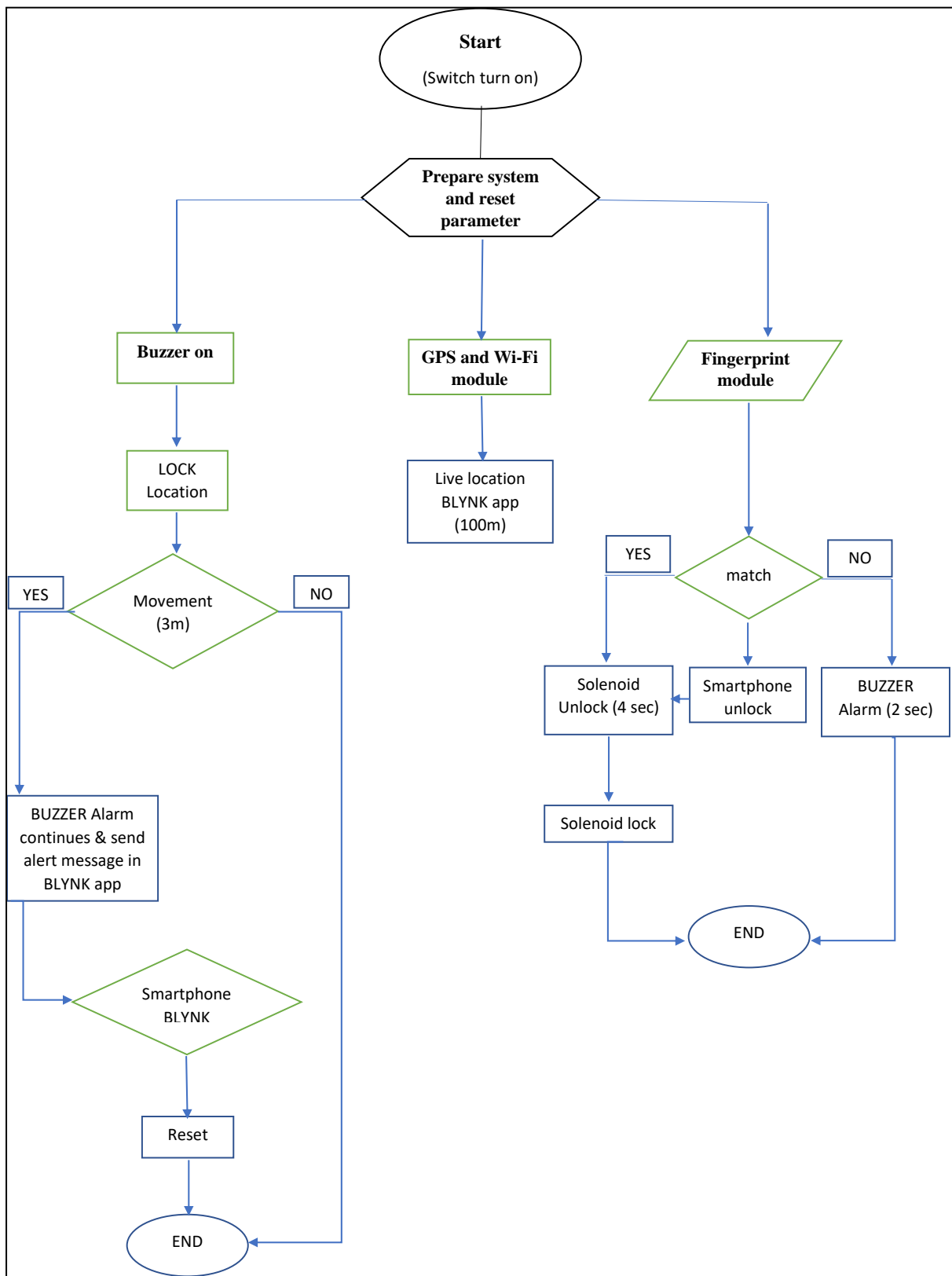
3.5 Circuit assembly

Figure 3: Flow chart of the project.

3.5.1 Circuit

The circuit we used is to lock and unlock the zip. It is also to find the location of bag.
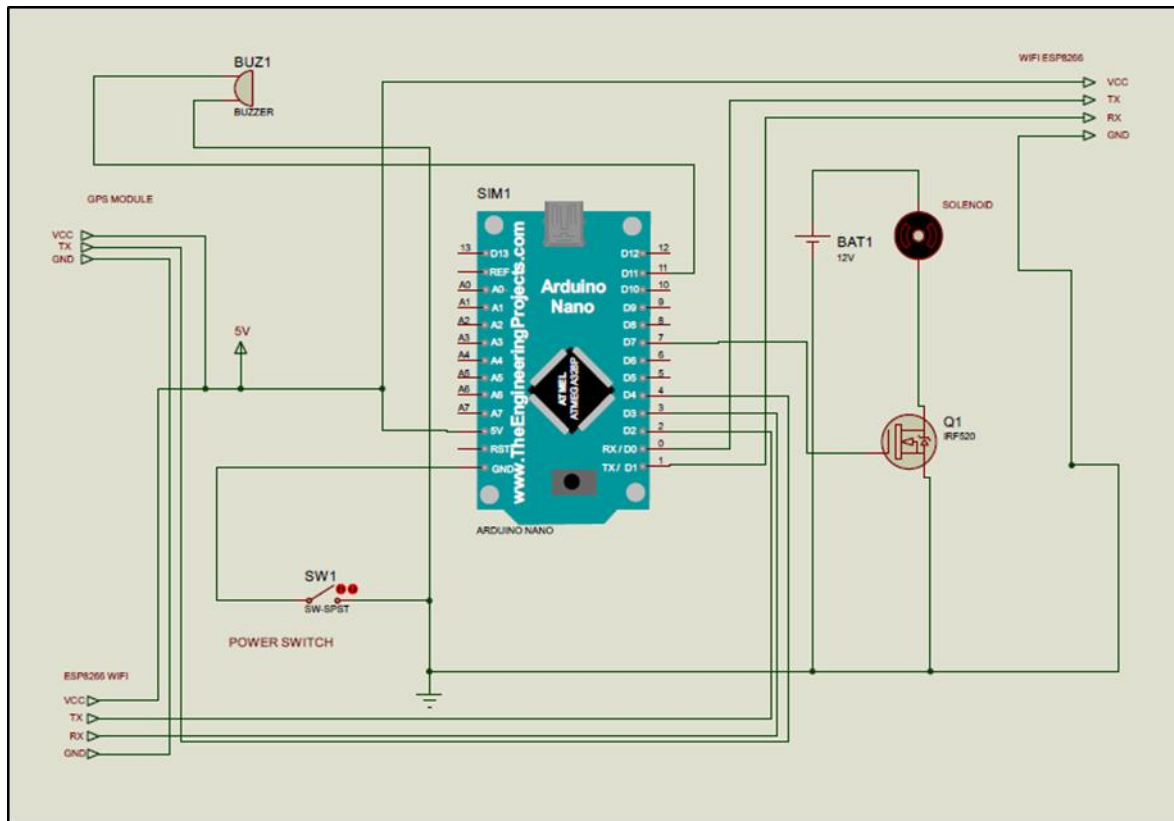
3.5.1.1 Schematic diagram

Figure 4: Schematic diagram of the circuit.

3.5.2 List of components

3.5.2.1 Fingerprint Module

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### 3.5.2.4	Solenoid

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### 3.5.2.5	Rechargeable battery cell

A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

### 3.5.2.6	Arduino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P; offers the same connectivity and specs of the UNO board in a smaller form factor. The Arduino Nano is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline. The Arduino Nano is very much similar to the Arduino UNO. They use the same Processor (Atmega328p) and hence they both can share the same program. One big difference between both is the size UNO is twice as big as Nano and hence occupies more space on your project. Also, Nano is breadboard friendly while Uno is not. To program an Uno, you need Regular USB cable whereas for Nano you will need a mini USB cable. There are totally 14 digital Pins and 8 Analog pins on your Nano board. The digital pins can be used to interface sensors by using them as input pins or drive loads by using them as output pins. A simple function like pin Mode and digital Write can be used to control their operation. The operating voltage is 0V and 5V for digital pins. The analogue pins can measure analogue voltage from 0V to 5V using any of the 8 Analog pins using a simple function liken analogue. These pins apart from serving their purpose can also be used for special purposes which are discussed below: Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip. External Interrupt Pins 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. PWM Pins 3, 5, 6, 9 and 11: These pins provide an 8-bit PWM output by using analogue. Write function. SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK): These pins are used for SPI communication. In-built LED Pin 13: This pin is connected with a built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off. I2C A4 (SDA) and A5 (SCA): Used for IIC communication

using Wire library. AREF: Used to provide reference voltage for analogue inputs with analogue. Reference function. Finally, reset Pin: Making this pin LOW, resets the microcontroller.

3.5.2.7 GPS module

GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellite, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.

3.5.2.8 Relay

Circuits that operate at high voltages or at high currents cannot be controlled directly by an Arduino. Instead, you use a low-voltage control signal from the Arduino to control a relay, which is capable of handling and switching high-voltage or high-power circuits. A relay consists of an electromagnet that, when energized, causes a switch to close or open. Relays provide complete electrical isolation between the control circuit and the circuit being controlled. Coil input pin1. This is generally connected to the positive terminal of your signal source. Firstly, Coil input pin2. This is generally connected to the negative terminal of your signal source. Second, Normally Open pin (NO). This pin is normally not connected to the common pin, it is connected when the relay is activated. Third, Normally closed pin (NC). This pin is normally connected to common pin and is disconnected when relay is activated. Finally, Common. In most of the cases, this pin is connected to the ground of the source we use to drive the appliance.

3.5.2.9 DC step-up module

A boost converter (step-up converter) is a DC-to-DC power converter that steps up voltage (while stepping down current) from its input (supply) to its output (load). It is a class of switched-mode power supply (SMPS) containing at least two semiconductors (a diode and a transistor) and at least one energy storage element: a capacitor, inductor, or the two in combination. To reduce voltage ripple, filters made of capacitors (sometimes in combination with inductors) are normally added to such a converter's output (load-side filter) and input (supply-side filter).

3.6 Cost

COMPONENT	PRICE
Fingerprint module	RM 180.00
Wi-Fi module	RM 90.00
Solenoid	RM 25.00
Buzzer	RM 15.00
Arduino Nano	RM 68.00
GPS module	RM 105.00
Relay	RM 25.00
DC step-up Module	RM 3.93
Mini interface board rechargeable	RM 1.48

Table 2: Component Chart

3.7 Proposal

The proposal consists of abstract, introduction for the project, problem statement, objectives, scope research, literature review, methodology, block diagram, flow chart, schematic diagram and references. The project can be proceeded once the proposal is accepted.

CHAPTER 4

ANALYSIS AND RESULTS

4.1 Introduction

For this chapter we picked people randomly from the college of Polytechnic Sultan Salahuddin Abdul Aziz Shah to test whether the portable safety features can protect our personal belongings and can find our location of bag.

Before we perform the test, we asked to fill the questionnaire that consist of questions about portable safety features for backpack usage of portable safety features for backpack in daily life.

4.2 Results and discussion

4.2.1 Results

Once the circuit was built completely as discussed in chapter 3, Arduino Nano, fingerprint sensor and Wi-Fi module was programmed. Fingerprint sensor was programmed to detect the fingerprint of the owner so that other people cannot access our backpack. The Wi-Fi module was programmed to track the real time location of bag in case missing.

PIE CHART SHOWS THE NUMBER OF PEOPLE PARTICIPATED IN QUESTTIONAIRE OF PORTABLE SAFET FEATURES FOR BACKPACK.

Link of questionnaire: https://docs.google.com/forms/d/e/1FAIpQLSdnz-4GtAI6fv98g9BBbZzJhU7NQh93Lzxl6bpR5nWUWVUnKQ/viewform?usp=sf_link

Results of questionnaire:

Figure 5: Questionnaire i
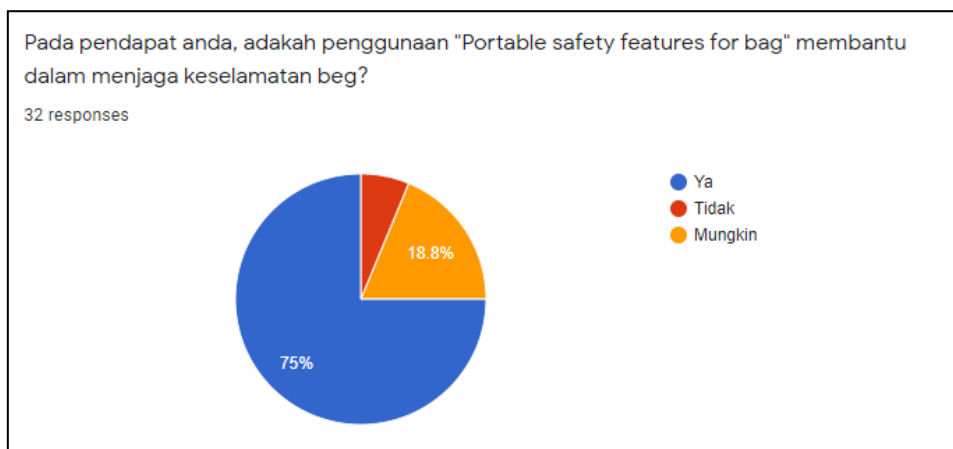
Figure 6: Questionnaire ii
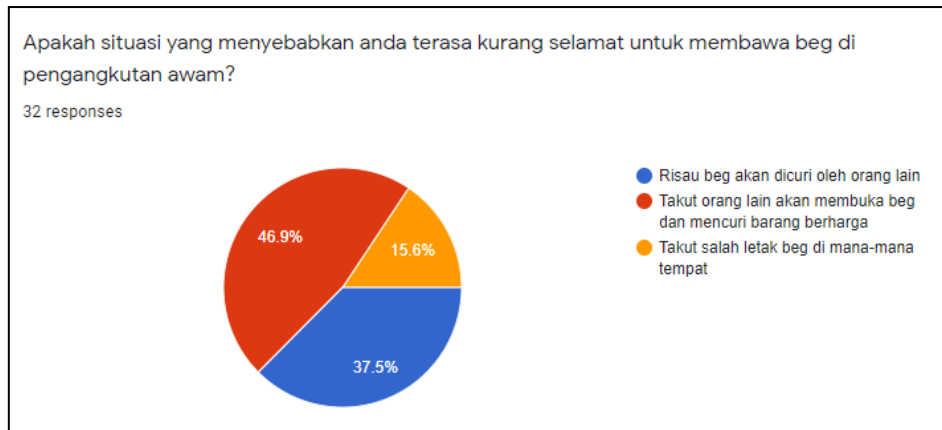
Figure 7: Questionnaire iii

4.2.2 Discussion

This portable safety features for bags help people to protect valuable things they carry in their bag along with them. It has a fingerprint attached with this device to protect the things in our bag so that other people cannot open our bag without our permission. Next, it also allows user to find the location of bag if the bag is lost or misplaced. This device comes with a Wi-Fi module and also a GPS module to track the location of bag when it is missing. This device is a portable device which means it can be used in all type of bags by everyone.

CHAPTER 5

CONCLUSION

5.1 Conclusion and recommendation

Conclusion

Portable safety features for bags is a very helpful device which will find bags when it's missing or misplaced. This device has its own advantages to find the bags. Wi-fi module in this device will help to track the real-time location and find the bag. Fingerprint sensor in this device will help to protect personal objects in bag. Another main advantage of this portable safety feature is that it can be used in all kind of bags. As a conclusion, this portable safety feature is useful to public and it prevents our bag from being stolen.

Recommendation

Our project is mainly focused on students and workers who travel by public transport but it still can be used by everyone. One of the limitations in our project is that we cannot find the location of bag once it has exceeded 100m.

References

[1] https://www.elprocus.com/an-overview-of-arduino-nano-board/

[2] https://sciencing.com/what-solenoid-4902174.html

[3] https://www.sparkfun.com/products/13678

[4] https://www.allaboutcircuits.com/projects/use-relays-to-control-high-voltage-circuitswwith-an-arduino/

[5] https://www.gearhungry.com/best-luggage-trackers/

[6] https://components101.com/microcontrollers/arduino-nano

[7] https://randomnerdtutorials.com/fingerprint-sensor-module-with-arduino/

[8] https://components101.com/buzzer-pinout-working-datasheet

[9] https://www.myduino.com/index.php?route=product/search&search=Dht2

[10] https://en.wikipedia.org/wiki/Boost_converter

[11] https://patents.google.com/patent/US20060256546A1/en

[12] https://patents.google.com/patent/US9862443B2/en

[13] https://patents.google.com/patent/US8459518B2/en
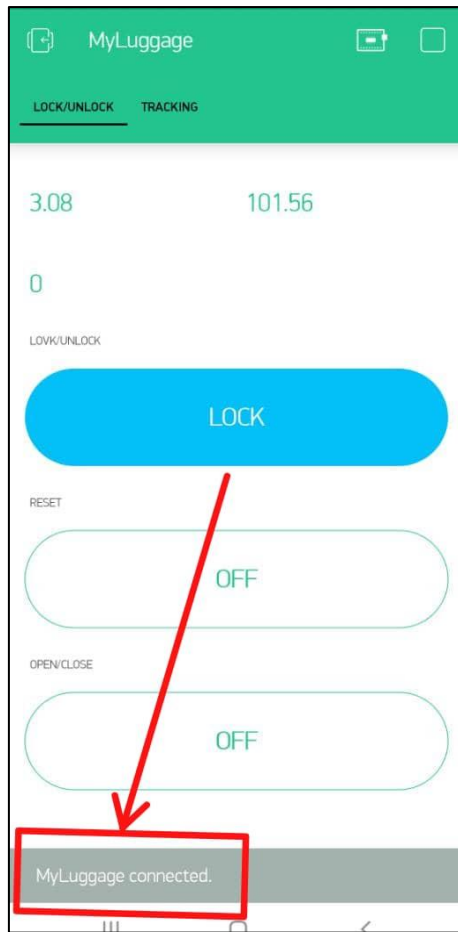
APPENDIX

USER MANUAL

PORTABLE SAFETY FEATURE
FOR BACKPACKS
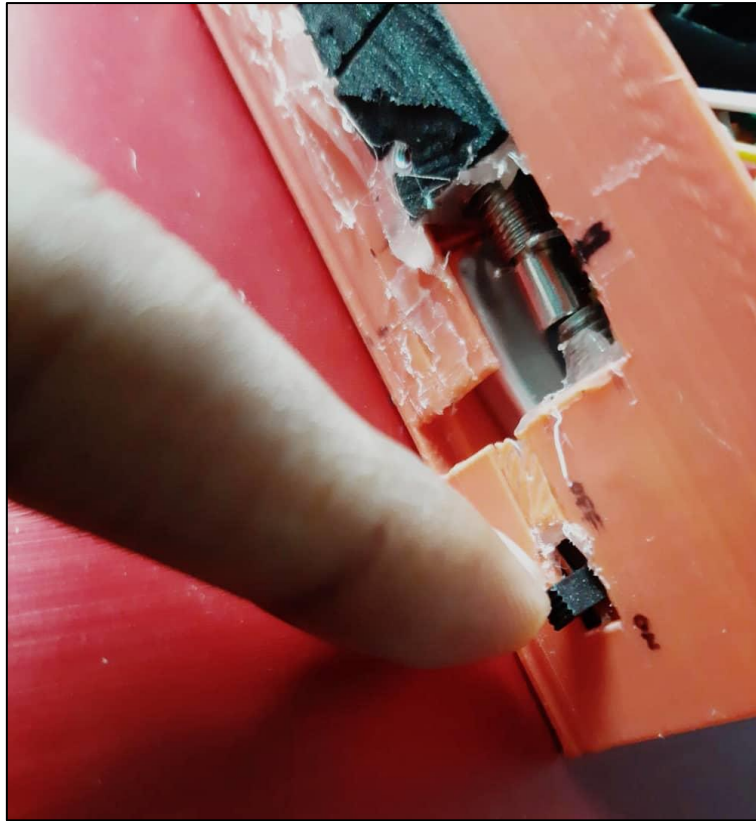
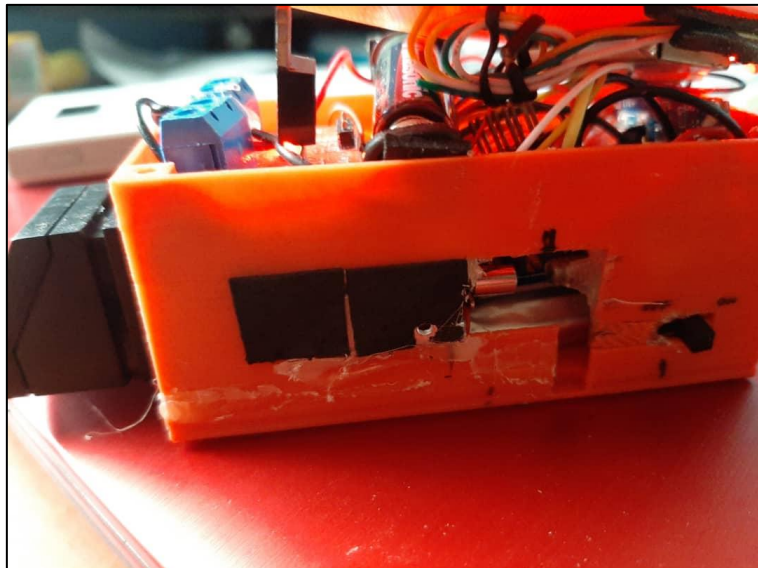STEP 1: ON the power switch of the portable safety feature.
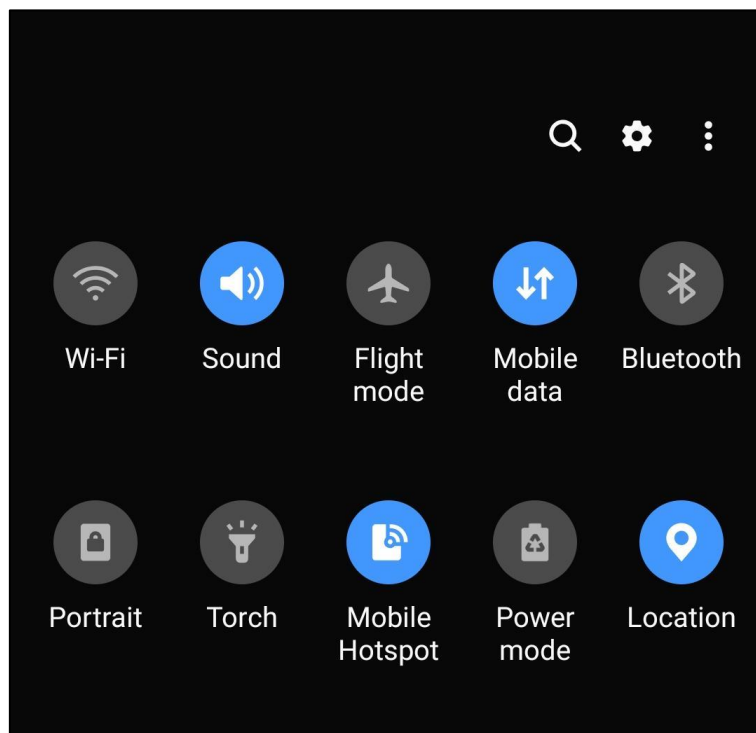
STEP 2: In the smartphone at the notification bar activate WI-FI, GPS and Mobile hotspot.

STEP 3: Go to the BLYNK application the portable safety feature will connect to the application

STEP 4: Press your thumb at the fingerprint sensor for the identification

STEP 5: After the identification is verified the portable safety feature unlocks and wait for 3 seconds for the bag key to be inserted.

STEP 6: Finally, the bag has been locked using the portable safety features.
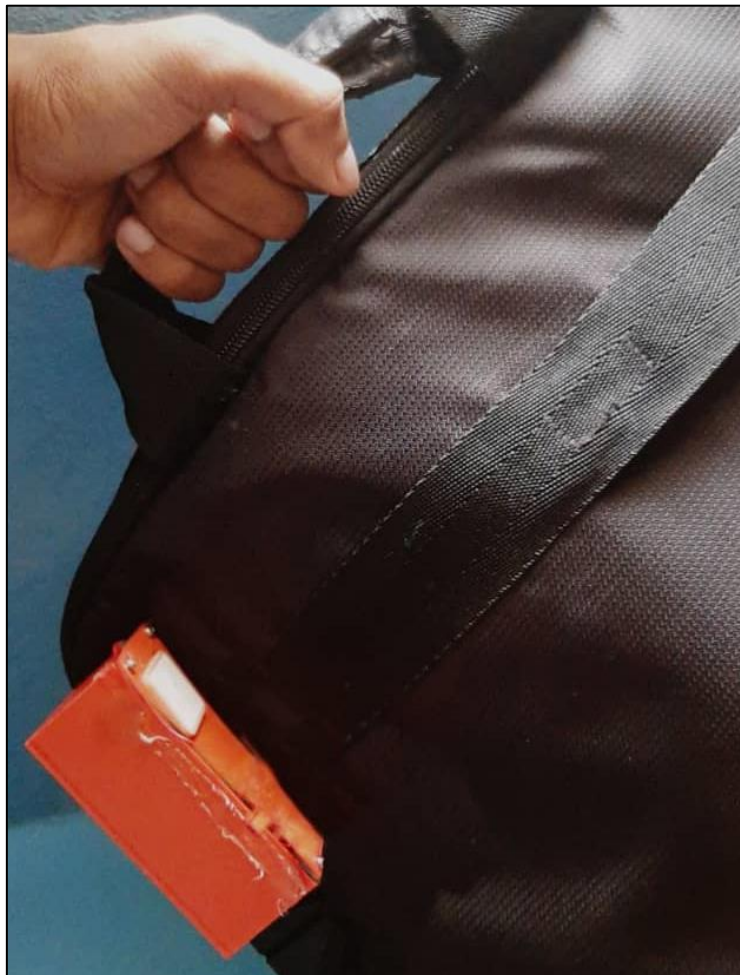
Figure 8: portable safety feature attached at the bag.

TECHNICAL PAPER

PORTABLE SAFETY FEATURES FOR BAG

PN.AKMARYA BT SYUKHAIRILNISAH BT MOHD AKHIR,PN. ASTRAHUDA
KAMARULAINI BT MOHD FAHMI, PN. NUR HADIANA NASRUDDIN
SASITHAREN A/L SANGKAR, SIVA ABIRAMI A/P THANABALAN

Jabatan Kejuruteraan Elektrik,
Politeknik Sultan Salahuddin Abdul Aziz Shah

sasi.shana@email.com , thanabalan533@gmail.com

Abstract

Safety features of bag is very important especially when we are bringing it outdoors and carry valuable things in our bag. Carrying valuable things such as wallet, camera and laptop can be threatening at some point as people may steal it or even we can misplace our bag carelessly at very crowded place. Situations like this can make one's life miserable, especially for students who are using public transportation. The chance of missing their bag in public transportation is very high for a student. This research is mainly about providing portable safety features for students who are using public transportation. This portable safety feature comes with a Wi-Fi module and a fingerprint sensor. **Wi-Fi module** in this model helps students to track their bag location if its missing. This model also comes up with a **fingerprint sensor** in order to prevent someone from opening our bag without our acknowledgement. The main advantage of this safety feature is that it is **portable**, which means the student can use it in all kind of bags to prevent their bag being stolen or missing. The methodology used in this project is **Arduino Nano** hardware system which controls the running of this whole system. Therefore, this project will be very useful for students who travel by public transportation.

Keywords: *Safety features, portable, Wi-Fi module, fingerprint, Arduino Nano.*

1.0 Introduction

People nowadays often carry bags wherever they travel. Be it a handbag, school bag, laptop bag or even traveling backpacks. Bags helps us to carry all our important things such as wallet, laptop and basic necessaries. Moreover, bags also keep us organized. But, have you ever imagined how hard it will be to find our bag when it's stolen when we are outdoors. Finding bags at crowded place can be very miserable especially for students who travel using public transportation.

In this research we have mainly did about portable safety features for bags which will helps us to find our bag incase stolen and also to protect our personal belongings. Portable safety feature is a portable device which will helps to detect the location of bag when it is missing. This device is highly secured as it uses fingerprint sensor to open the bag. This prevents the bag being accessed by unwanted person in crowded place. The portable feature of this device is an advantage as one does not need to change bags while they are going out.

Figure 9: Technical paper page 1

1.1 Problem Statement

Nowadays everyone carries a bag with them to school, college and office. Mostly, they use public transportation to travel to their colleges and workplace. But, missing of bags and bags being stolen are becoming a most common problem. First of all, it is hard to ensure the safety of our personal belongings when we carry it outside. Next, it is also hard to find the location of bags when missing. Other than that, we need to change different backpack while travelling to different destinations. Finally, Safety features in travelling backpacks are usually embedded in the bag itself. It restrict the access of backpack by everyone.

1.2 Objectives

The main objective, of this project is to develop a portable safety features for bags which can be used in all type of bags. Several other objectives of this project are:

- For students who use public transportation.
- To ensure the safety of our personal belongings from being stole by others.
- To find the exact location of bag when it's missing.

1.3 Scope of Project

This research is mainly about portable safety features that can be carried in our bags to keep our belongings safely. Our main focus in this project is also students who travel by public transportation. As we know backpack is a necessary thing to carry while we are going out. Backpacks with additional features will help to protect our valuable belongings such as documents, laptop and wallet when we go out somewhere. But, changing different bags for different destinations will be very hard as not all the bags contain safety features. We have added several features such as fingerprint sensor, GPS tracker using wi-fi module and buzzer.

2.0 Methodology

Hardware specifications:
1) Fingerprint module
2) Wi-Fi module
3) Buzzer
4) Solenoid
5) Rechargeable battery cell
6) Arduino NANO
7) GPS module
8) 3D printing casing
9) Relay
10) Step-down transformer

Software specifications:
1) Arduino software
2) BLYNK application

3.0 Conclusion

Portable safety features for bags is a very helpful device which will find bags when it's missing or misplaced. This device has its own advantages to find the bags. Wi-fi module in this device will help to track the real-time location and find the bag. Fingerprint sensor in this device will help to protect personal objects in bag. This two functions make the device to be highly secured. Another main advantage of this portable safety feature is that it can be used in all kind of bags. As a conclusion, this portable safety feature is useful to public and it prevents our bag from being stolen.

Figure 10: Technical paper page 2

References

[1] https://patents.google.com/patent/US20060256546A1/en
[2] https://patents.google.com/patent/US9862443B2/en
[3] https://patents.google.com/patent/US8499518B2/en

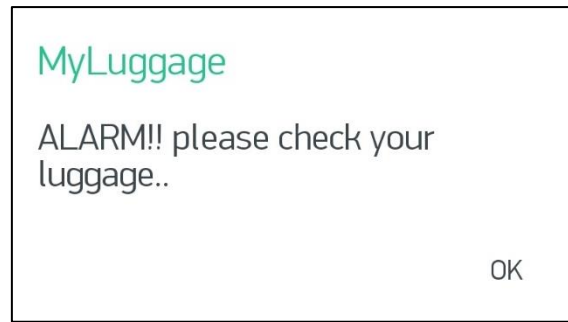**Figure 11**: Technical paper page 3

TESTING

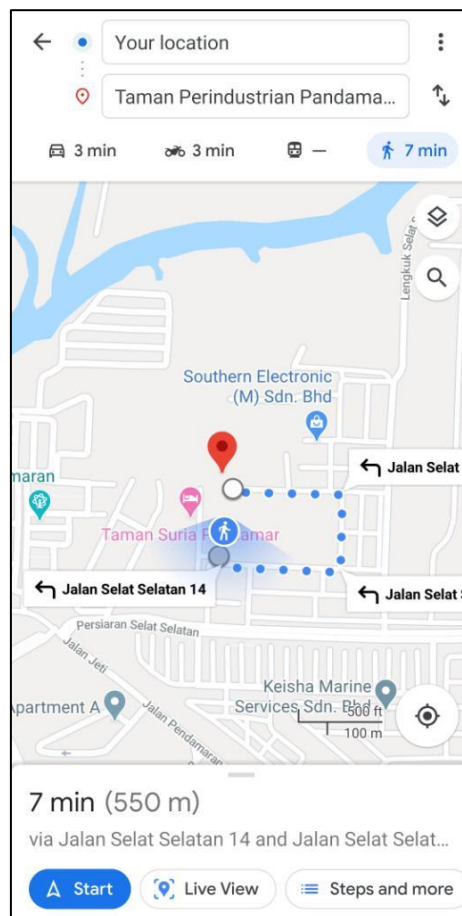**Figure 12**: warning message sent by Blynk application.

Figure 13: Testing the google maps on the location of bag shown by GPS module.
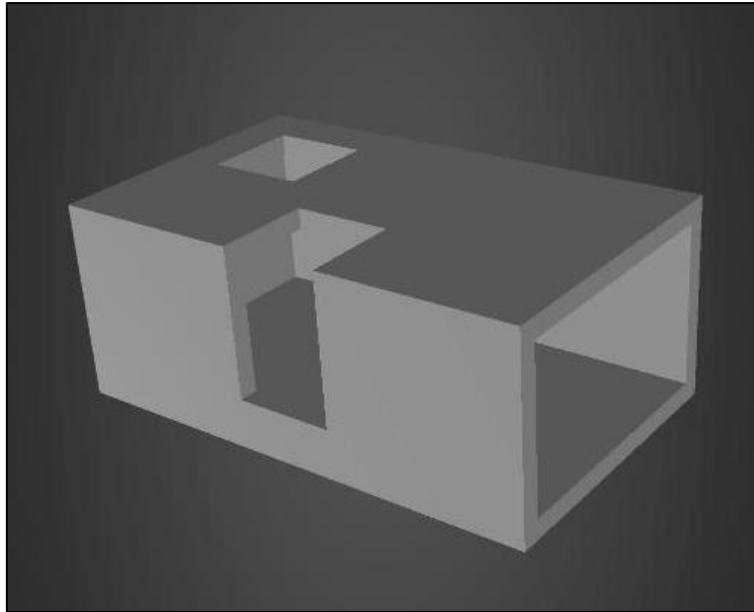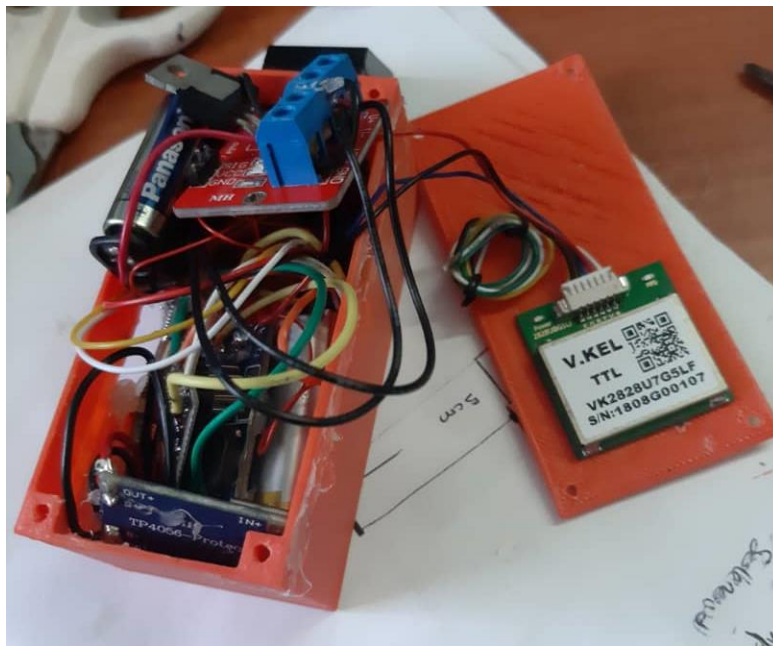
DESIGN CASING

Figure 14: Design casing at beginning.

Figure 15: Design casing 75% complete

PRODUCT

Switch

wifi module

GPS module

Battery

Solenoid

Buzzer

Fingerprint module

Arduino Nano