POLITEKNIK

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RFID BRACELET REGISTRATION SYSTEM FOR BUS PASSENGERS

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JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

RFID BRACELET REGISTRATION SYSTEM FOR BUS PASSENGERS

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This report submitted to the Electrical Engineering Department in fulfilment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

CONFIRMATION OF THE PROJECT

The project report titled "RFIF Bracelet Registration System for Bus Passengers" has been submitted, reviewed and verified as a fulfils the conditions and requirements of the Project Writing as stipulated

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"I acknowledge this work is my own work except for the excerpts I have already explained to our source"

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TITLE : RFID BRACELET REGISTRATION SYSTEM FOR BUS PASSENGERS

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2. I acknowledge that 'The Project above' and the intellectual property therein are the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electrical Engineering** to me.

Made and in truth that is recognized by;

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As a project supervisor, on the date: 26 MAY 2023

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ABSTRACT

In Selangor, Malaysia, to use a free bus service, passengers require to scan before getting on the bus. The scanning action is to register bus passengers into the registration system. The purpose of the registration system is for the daily count or data collection of the number of passengers who use the bus. The data collection can obtain information for scheduling, forecasting and service-related decisions. The action consists of the passenger scanning a QR code using a particular app on their phone before getting on the bus. In hard times, passengers have problems with the standard procedure before getting on the bus. Problems such as the phone camera taking too long to scan, getting logged out from the app before scanning, getting scolded by the bus driver for not scanning (due to not having the app downloaded), and not being capable to take out their phone to scan (carry many items at the same time). To ease the passenger's situation before getting on the bus, this project is made for the passenger doesn't need to use their phone to register into the registration system and just walk into the bus leisurely. This project comes up with a wearable device that automatically registers bus passengers into the system. A wearable device, which is in bracelet shape, automatically registers bus passengers as they enter the bus using an RFID transceiver. When the passenger is successfully registered into the registration system, it will notify the bus passenger (the RFID bracelet user) that the passenger is successfully registered into the registration system. It also notifies the bus driver by a sound that notifies the passenger is allowed to take the bus.

ABSTRAK

Di Selangor, Malaysia, untuk menggunakan perkhidmatan bas percuma, penumpang perlu mengimbas sebelum menaiki bas. Tindakan mengimbas adalah untuk mendaftarkan penumpang bas ke dalam sistem pendaftaran. Tujuan sistem pendaftaran adalah untuk kiraan harian atau pengumpulan data bilangan penumpang yang menggunakan bas. Pengumpulan data boleh mendapatkan maklumat untuk penjadualan, ramalan dan keputusan berkaitan perkhidmatan. Tindakan itu terdiri daripada penumpang mengimbas kod QR menggunakan aplikasi tertentu pada telefon mereka sebelum menaiki bas. Dalam masa sukar, penumpang menghadapi masalah dengan prosedur standard sebelum menaiki bas. Masalah seperti kamera telefon mengambil masa terlalu lama untuk mengimbas, log keluar daripada apl sebelum mengimbas, dimarahi oleh pemandu bas kerana tidak mengimbas (kerana apl tidak dimuat turun), dan tidak dapat mengeluarkan telefon mereka ke imbasan (membawa banyak barang pada masa yang sama). Bagi meredakan keadaan penumpang sebelum menaiki bas, projek ini dibuat untuk penumpang tidak perlu menggunakan telefon mereka untuk mendaftar ke sistem pendaftaran dan hanya berjalan ke dalam bas dengan santai. Projek ini hadir dengan peranti boleh pakai yang mendaftarkan penumpang bas ke dalam sistem secara automatik. Peranti boleh pakai, yang berbentuk gelang, mendaftarkan penumpang bas secara automatik apabila mereka memasuki bas menggunakan transceiver RFID. Apabila penumpang berjaya didaftarkan ke dalam sistem pendaftaran, ia akan memberitahu penumpang bas (pengguna gelang RFID) bahawa penumpang berjaya didaftarkan ke dalam sistem pendaftaran. Ia juga memberitahu pemandu bas dengan bunyi yang memberitahu penumpang dibenarkan menaiki bas.

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CHAPTER 1

1 INTRODUCTION

1.1 Introduction

Nowadays, public bus transportation has already been a tremendous aid for those who don't own a car or who want to travel while lowering their carbon imprint. Free public transportation was provided to Selangor in Malaysia, and it appears that residents use it frequently. Before boarding the bus, travellers must scan to access the free bus service. Bus passengers are registered into the registration system using the scanning process. The daily count or data gathering of passengers who utilise the bus is the purpose of the registration system. Information for scheduling, forecasting, and service-related choices can be obtained through data collecting. The procedure entails the bus passengers scanning a QR code using a specific app on their phone before boarding the bus.

1.2 Background Research

In this project, the free bus service always got complaints about its registration method to board the bus. As the problems occur, it affected their time to get to their destination. Based on a survey that had been done to the students of Politeknik Sultan Salahuddin Abdul Aziz Shah in Shah Alam, which consisted of questions of whether they are satisfied or not with the registration system for the passengers when they are about to board the bus. Answers of not satisfied with the system came along with another question of the reasons why? 28 of the 40 respondents, answered that they are not satisfied with the registration system because of the QR code scanning method. Complained about the malfunction of the QR code registration system.

1.3 Problem Statement

The necessary action that was mentioned earlier has flaws in its way of executing it. In difficult times, travellers experience difficulties with the routine before boarding the bus. The registration system's use of QR code scanning was the main source of the issue. Based on a survey that had been done of the students of the Politeknik Sultan Salahuddin Abdul Aziz Shah in Shah Alam, a series of problems have been mentioned from them. Such as other passengers may have to wait while the other passenger registers their phone because of issues like the phone camera taking too long to scan. Next, there's the issue of unexpectedly losing access to the app before scanning. Other issues include getting reprimanded by the bus driver for not scanning because they didn't have the app downloaded and being unable to take out their phone to scan since they were carrying multiple products at once.

1.4 Research Objectives

The main objective of this project is to design a new method for the registration system for bus passengers instead of using a QR code. A registration system using an RFID-based system that allows the passengers to easily registered to the registration system when trying to board the bus:

- To design an RFID bracelet tag for the bus passengers
- To design a circuit that can detect RFID tags using an RFID reader.
- To create and develop an app for this registration system.
- To design a system that produces light and sounds indicating whether their RFID tag is successfully identified.
- To design a system that shows notifications to the passengers' phones and the driver's data display indicating the passenger's tag is successfully detected.

1.5 Scope of Research

1) This project is focusing on bus passengers rather than any other public transport service.
2) The main focus of this project is it only allows pre-registered bus passengers to board the bus.
3) The main controller is using Arduino Uno.
4) This project will be designed as a prototype and the budget estimate for the implementation of this project is not over RM500.
5) The limitation of this project can only read either pre-registered passengers or not but can't show the precise live location of the passengers.

1.6 Project Significance

Based on the previously completed study. Every time a person attempts to register for an RFID-based system to gain access to a place, their personal information is sent to a server system to ensure that their identification or financial account complies with the requirements of the system. In this system, the pic-microcontroller compares the data that the RFID transceiver reads from the RFID tag. If the RFID tag of the person is identified and it meets the system requirement in the first scenario, the person is allowed to pass through whether a gate is open for them or a green light appears. In the second scenario, if the RFID bracelet tag is identified but doesn't meet the system requirements, the person is not allowed to pass through whether the gate is still closed or a red light appears. It also gives a new idea to put some improvements to this project. For example, the project consists of sections of the whole prototype. Such as the first section is the sensor section which is the RFID transceiver//reader, and the alarm section. This prototype consists RFID transceiver to read the RFID bracelet tag. If the RFID bracelet tag is identified as the passenger approaches the bus door in the first scenario, a green light will turn on and a sound will play to let the driver know the passenger is welcome to board. Then a notification that the passenger is riding that specific bus will be sent to their phone. In the second scenario, if the RFID bracelet tag is not detected and identified when the passenger is about to board the bus near the

door, a red light and a sound will be made to alert the driver that the passenger is not permitted to board the bus but is free to try again for their RFID bracelet tag to be identified again. The registration system doesn't involve payment since the bus service is free.

1.7 Chapter Summary

The passengers of the free public bus service are not satisfied with the registration system and concluded that the QR code scanning method is not efficiently effective but instead, it came with errors and malfunctions in the way of its execution to the users. This chapter discussed its solution to replace its registering system as it will ease the use of the passengers when they are about to board the bus. This means the system will be applied to all free buses that the free bus service provided thus the system of the free bus service will become more efficient the system. The RFID technology that has been chosen to be the solution is the best option, as the system will be contactless and it requires an easy step for the pre-registered passenger only to tap their RFID bracelet onto the RFID reader and board the bus. Finally, this chapter demonstrated the critical nature of installing the project's prototype, dubbed 'RFID Bracelet Registration System for Bus Passengers.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

One of the crucial components that must be included in the creation of a project and report is a literature review. Any literature review should try to synthesise and summarise the theories and arguments of previously published research on a certain topic without making any original contributions. They aid the researcher in even turning the wheels of the research topic because they are built on existing information. Only a thorough understanding of the specific flaws in the existing findings makes it possible to overcome them. The literature review identifies the route that other research should take to be successful. The objective of this review was what suitable model of the RFID reader to be chosen to implement the RFID technology in the registration system by using what method. The second is to recognize the pre-registered bus passengers that allow them to board directly the bus. Last but not least, how the bus passengers are going to see their track history of their past boarding onto the bus.

2.2 Suitable RFID model reader for the RFID registration system

There is a lot of RFID reader or called transceiver to detect RFID tag, however, each kind of RFID reader have different specification based on the range of frequencies they use to communicate data. There are low-frequency (LF), high-frequency (HF) and ultra-high frequency (UHF). Based on the past study on RFID-related projects, according to the study of 'Student Smart Card' written by Mr Pratik M. Sonar, Mr Sourabh S. Walke and Prof. Raman R. Bane in Proceedings of the International Conference on Inventive Research in Computing Applications (ICIRCA 2018), they used MRFC-522 RFID reader model as they mention in their journal as it is a highly integrated reader/writer IC for contactless communication at 13.56 MHz. The MFRC522 reader supports ISO/IEC 14443 A/MIFARE and NTAG. The MFRC522s internal transmitter can drive a reader/writer antenna designed to communicate with ISO/IEC 14443 A/MIFARE cards and transponders without additional active circuitry. Its receiver module provides a robust and efficient implementation for demodulating and decoding signals from ISO/IEC 14443 A/MIFARE compatible cards and transponders. The digital module manages the complete ISO/IEC 14443 A framing and error detection (parity and CRC functionality. It uses the SPI interface to communicate with MCU. The RC522 RFID reader/writer module is a great choice. It is low power, low cost, very rugged, easy to interface and extremely popular among hobbyists.

2.3 Recognition of the pre-registered and the non-pre-registered bus passengers

The purpose of the pre-registration of the bus passengers is to allow the pre-registered bus passengers to board the bus while non-pre-registered bus passengers are not allowed to board. The literature review section will define how the system in this project will differentiate the pre-registered and non-pre-registered passengers before they are about to board the bus. This system can be based on a past study titled 'An Automated Toll Plaza System Using RFID and GSM Module: Perspective of Bangladesh' written by Md. Armanul Haque, Md. Shahid Iqbal and Md. Monirul Kabir in *2020 2nd International Conference on Sustainable Technologies for Industry 4.0 (STI), 19-20 December, Dhaka*. Observation for unregistered vehicles, it is observed that when an unregistered vehicle passes through a toll plaza area, the RFID reader searches the unique codes of RFID tags attached to all vehicles. If the vehicle RFID tag numbers are matched with the data stored in the main database system of the MCU then MCU communicates with the GSM module by serial communication. After that, the GSM module communicates with the vehicle owner DBBL rocket account with the association of the microcontroller. Because of the unregistered vehicle, the GSM module cannot recognize the vehicle. Such information is then displayed in the LCD as well as in the main controller display. Therefore, the gat barrier does not open and the toll plaza road is locked. The system can be implemented for this project as its system will read the RFID tag of the passenger, process it in the microcontroller using Arduino Uno, and identify their id tag number by searching their id in stored data of the passenger's data in the programming of the microcontroller then display their data to Adafruit.io website through Wi-Fi connection by the help of the ESP8266.

2.4 The display of the passenger's track history of boarding the bus

As mentioned above, it functions to display the track of bus passengers' data to see the record of the history of boarding the free public bus. To let this function can be executed in this project, it can be based on the past study titled 'An Improved Version of Student Attendance Management System Based on RFID' written by Danijel Mijić, Ognjen Bjelica, Jelena Durutović and Miloš Ljubojević in 18th International Symposium INFOTEH-JAHORINA, 20-22 March 2019. As they implemented the use of Web GUI where its main feature is the management of classroom resources, users and RFID tags, the recording of teaching activities performed by the teaching staff, the provision of various reports on students' attendance, teachers' work in class and use of classrooms and laboratories. The reports are available in a web-based form and could also be exported as PDF and Microsoft Excel files. The RFID bracelet registration system for bus passengers will execute in the same manner based on the mentioned past study. The website of Adafruit.io will be the platform to display the track record of the passengers when they board a bus (data feeds are private by default).

2.5 Chapter Summary

This chapter, chapter are focusing more on the way how the project will execute its system using the recognition of the pre-registered and the non-pre-registered bus passengers by matching their id of the RFID tag with stored passenger data in stored data of the passenger's data in the main database system of MCU using Wi-Fi. The successfully registered passengers to the bus registration system will be recorded on the Adafruit.io website and will display the track record history of the bus passengers when they board the bus. This prototype will make sure that it functions properly and with a low budget.

CHAPTER 3

3 RESEARCH METHODOLOGY

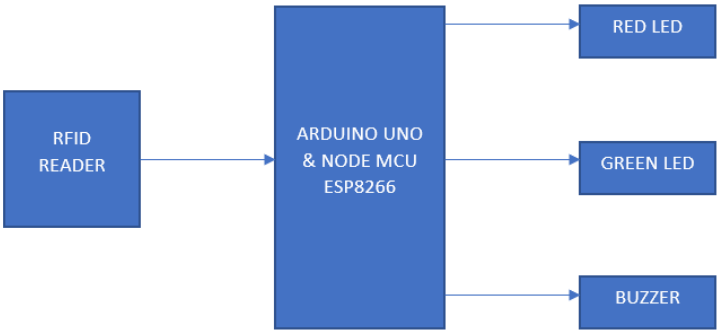
3.1 Introduction

To realize this project as a product that is ready to use, a very comprehensive plan is undertaken. A step-by-step procedure is done so that the project can be completed in time. This includes building and programming a coding, designing the RFID reader part, circuit design testing and verification. The RFID reading tag section will use the RC-522 RFID reader model. The method we use is using Arduino to the coding and process the input and output. We will also be using the Node MCU ESP8266 for the Wi-fi implementation of the project and will be connected to the Adafruit.io website to let data transfer.

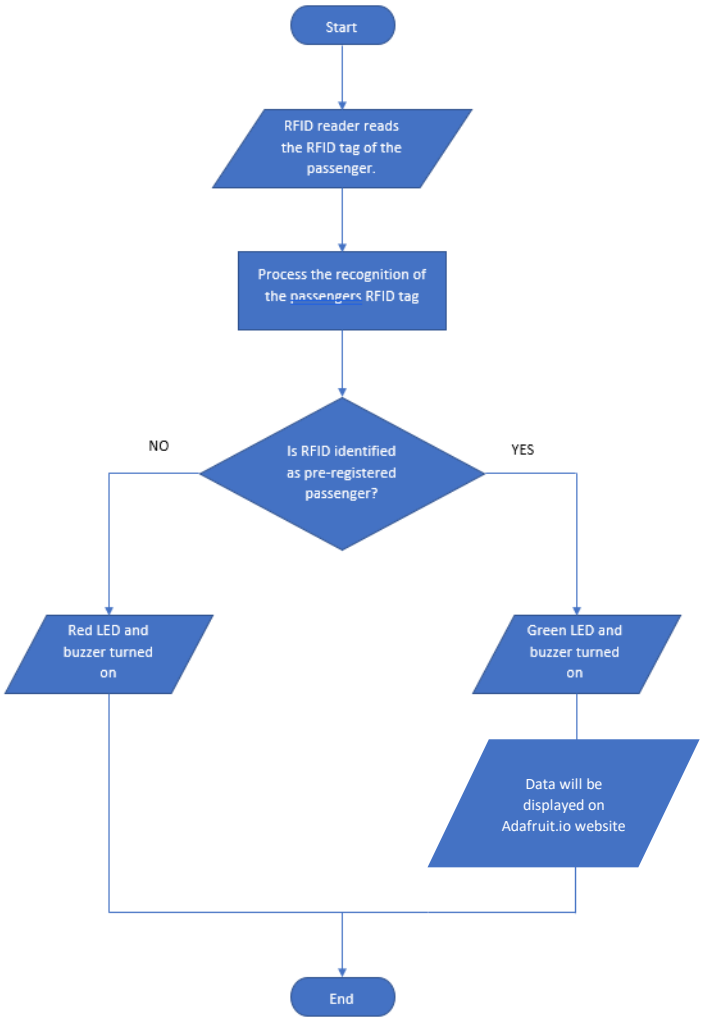
3.2 Project Design and Overview

As mentioned before in the previous chapter, the design will be included a close-loop system with Arduino as the main controller. The design of the circuit uses Arduino for the process and connected it to the Node MCU ESP8266. Buzzer and red and green LED will be for the output. Proteus software was used to design the circuit but did not support Arduino. The zip file may be found and downloaded from the websites, therefore that is what needs to be done. Once the file has been downloaded, it must be imported into Proteus, where it will display a list of every Arduino component.

3.2.1 Block diagram for the project



3.2.2 Flowchart of the project



3.2.3 Project description

This project develops an RFID registration system for the bus passengers. The RFID reader will read the detected RFID tag from the bracelet, then will send signal to the Arduino then to the Node MCU ESP8266 for the recognition of the RFID id tag. If the RFID tag is identified as a pre-registered bus passenger, a green LED and a buzzer will be turned on, then display their data to the Adafruit.io website confirming that they are boarding the bus. If the RFID tag is not identified as a pre-registered bus passenger, a red LED and a buzzer will be turned on.

3.3 Project hardware

In this project, the design will be using Arduino RFID RC522, Arduino Uno, Node MCU ESP8266, red LED, green LED, buzzer, resistor and relay. The RFID reader will read the detected RFID tag from the bracelet, then will send the signal to the Arduino and then to the Node MCU ESP8266 for the recognition of the RFID id tag. If the RFID tag is identified as a pre-registered bus passenger, the green LED and buzzer will be turned on, display their datathe to Adafruit.io website confirming that they are boarding the bus. If the RFID tag is not identified as a pre-registered bus passenger, the red LED and buzzer will be turned on.

3.3.1 Schematic circuit

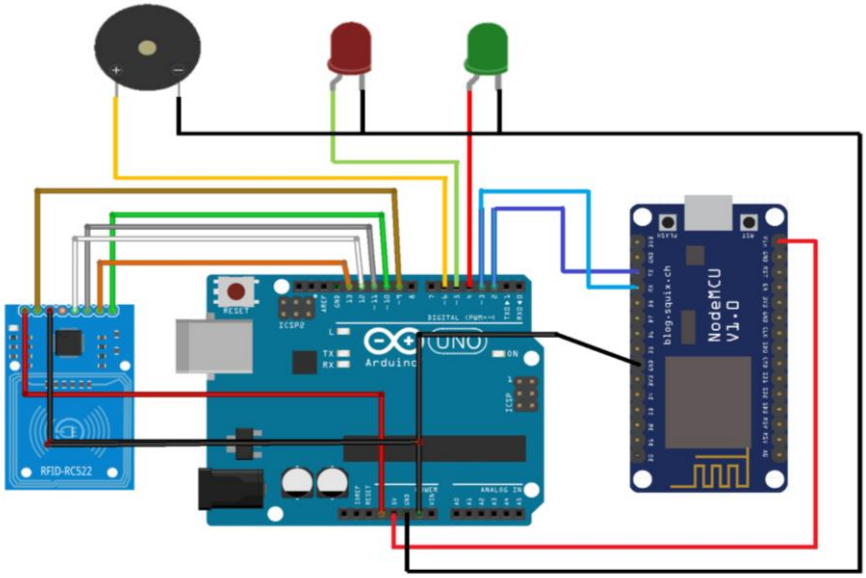


Figure 3.3 shows circuit diagram that connect to Arduino Uno with RFID RC522 and Node MCU ESP8266 connected to LEDs and buzzer

3.3.2 Description of the main component

3.3.2.1 RFID RC522

The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors. The module can support I2C, SPI and UART and normally is shipped with an RFID card and key fob. It is commonly used in attendance systems and other person/object identification applications.

3.3.2.2 Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

3.3.2.3 Node MCU ESP8266

NodeMCU is an open-source firmware for which open-source prototyping board designs are available. The firmware uses the Lua scripting language. The firmware is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266. It uses many open-source projects, such as lua-cjson and SPIFFS. The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications.

3.3.2.4 LED

LEDs (light-emitting diodes) are small, bright, power-efficient lights commonly used in electronic products. An LED light is a polarized part, meaning it has to be connected to a circuit in a certain way to work properly.

3.3.2.5 Buzzer

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

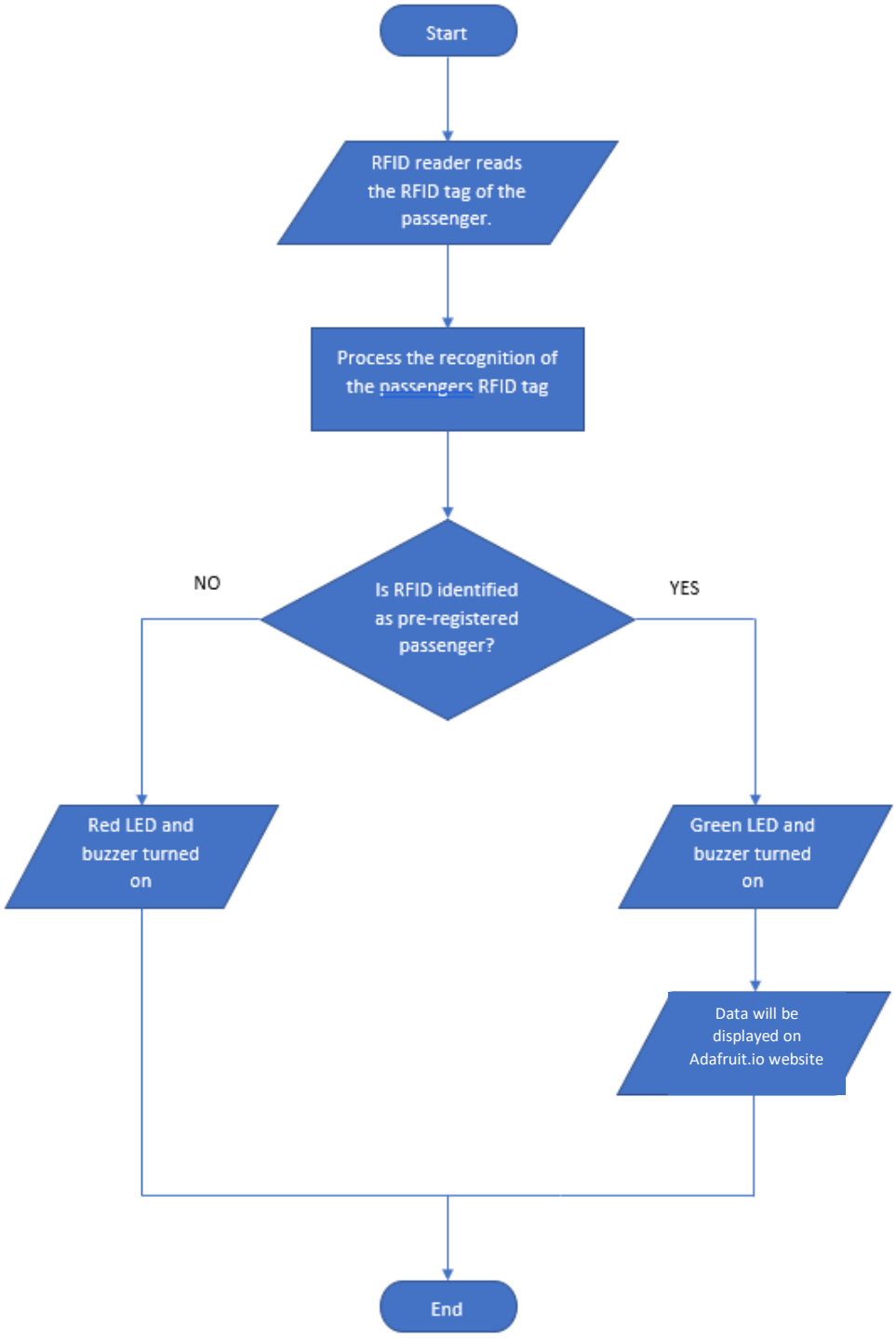
3.3.2.6 Resistor

A resistor is an electrical component that limits or regulates the flow of electrical current in an electronic circuit. Resistors can also be used to provide a specific voltage for an active device such as a transistor.

3.4 Project software

For this project, we're simulating this circuit using Proteus Arduino. The Arduino software is the next programme we use to programme the Arduino uno. The Proteus Arduino can build a circuit even before we start a prototype. Using this software, we can simulate the circuit and ensure that electricity flows into each of our components. Additionally, it ensures that every component can function as expected. Because it allows us to test in the programme before testing on a prototype, this software can also assist us in protecting our components from over voltage. After coding is complete, the code can be checked for errors using the Arduino software before being converted to the Proteus Arduino to run the programme. After the coding has been converted into the software, the component in question can be tested to see if it is functioning properly. This can reduce the amount of time needed to troubleshoot coding or circuit issues.

3.4.1 Flowchart of the system



3.4.2 Description of the flowchart

From the flowchart of the system, first the RFID reader will read the detected RFID tag from the bracelet, then will send signal to the Arduino then to the Node MCU ESP8266 than connected it to Adafruit.io website for the recognition of the RFID

id tag. If the RFID tag is identified as a pre-registered bus passenger, a green LED and a buzzer will be turned on, then a notification from Adafruit.io website will be sent to the the passenger that they are boarding the bus. If the RFID tag is not identified as a pre-registered bus passenger, a red LED and a buzzer will be turned on.

3.5 Prototype development

Figure 3.5.1: Project Prototype

The prototype above is the project. By using some of the material like, PVC case, hot glue gum, PCB board, soldering iron and some hand tool for cutting and drilling the holes. First, we measured the size of all components that we use for the project. After doing the measurement, cut the PCB board for the size we need for it to be glued at the bottom of the PVC case. After the cutting of the PCB board, all of the electronic components were soldered onto the board. Then the board was glued at the bottom of the case. Then the front part of the case was drilled to make holes for the buzzer and the LEDs. The mentioned components were glued at the holes and the MRFC522 was glued at the back cover of the front part of the case. The RFID bracelet tag was simply made of the tags that were glued on the rubber bracelet.

3.5.1 Mechanical design /Product layout

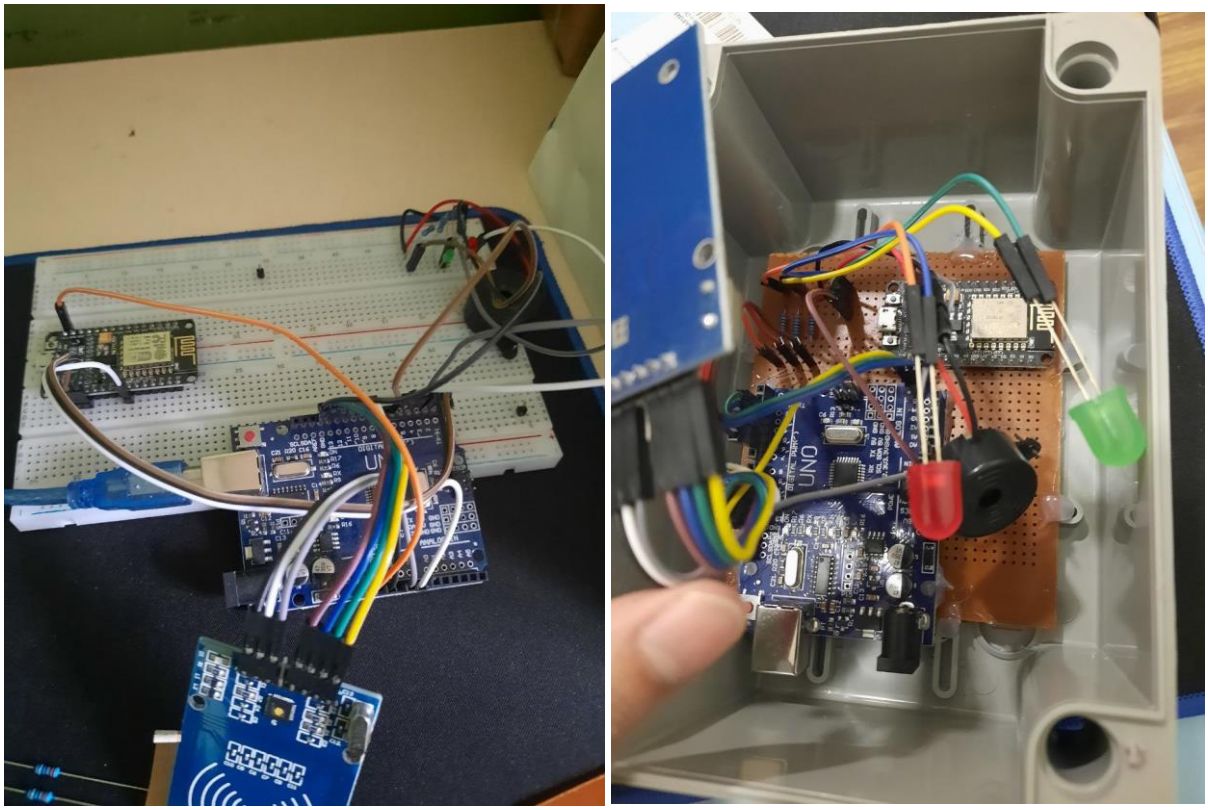


Figure 3.5.1.1: The circuit

3.6 Sustainability element in the design concept.

In this project, the design and creation of the RFID bracelet registration system for it to be implemented into the public bus service are low-budget and environmentally friendly. The goal of this project is to ease the flow of the bus passengers' trip without any interruption happened at the process of registration before boarding. There is no need for a large room for the RFID reader to be put at the entrance door of the bus since the project is just a simple PVC case box.

3.7 Chapter summary

In this chapter, the method used to design or develop the project. The project will function as the block diagram and flowchart above and the user able to imagine the design of this project. First, the system will start with the RFID reader reads the detected RFID tag from the bracelet, then will send signal to the Arduino then to the Node MCU ESP8266 than connected it to Adafruit.io website for the recognition of the RFID id tag. If the RFID tag is identified as a pre-registered bus passenger, a green LED and a buzzer will be turned on, then the data of passengers will be displayed on the Adafruit.io website, confirming they are successfully registered to the registration system.. If the RFID tag is not identified as a pre-registered bus passenger, a red LED and a buzzer will be turned on. The design of the project will be using Arduino RFID RC522, Arduino Uno, Node MCU ESP8266, red LED, green LED, buzzer, resistor and relay. This project able to install on every free bus that the free bus public service provided.

CHAPTER 4

4 RESULT AND DISCUSSION

4.1 Introduction

According to online resources, many users of the mentioned app for scanning the QR code have too many bugs thus making the performance of the app crumble. For example, a user on Google Play commented under the app reviews, mentioning a frustrating experience with the app. The user states that it automatically logs them out if they don't use the app for more than four days. When they attempt to log in again, they are unable to do so unless they change their password. However, when they try to change the password, the app sends a verification code to their email. Unfortunately, it is deemed invalid every time they enter the verification code. The user expresses their dissatisfaction by describing the app as the "lousiest app on earth" and extends their frustration to a "lousy bus" and a "lousy bus driver," although the connection to the app is unclear. Many comments have similar issues as this, proving the problem statements in the investigation are true. Not only do the issues create inconvenience to using the app, but they also ruin the flow for the passengers taking a bus trip. This project aims to ease the flow for the passengers to board the bus and register to the registration system. The best outcome of this project will be a product that is released to the market with a variety of benefits for our bus passengers without requiring large capital investments to configure.

4.2 Result and Analysis

Finally, this project demonstrates the function of the entire endeavour once the product is prepared. The RC522 read the detected RFID tag from the bracelet. The data from the RFID tag then be processed by the microcontroller, which in this case is an Arduino Uno and the data of the passengers will be displayed on the Adafruit.io website. If the RFID tag is identified as a pre-registered bus passenger, a green LED and a buzzer will be turned on, then displaying the data on the Adafruit.io website then be sent to the passenger that they are boarding the bus. If the RFID tag is not identified as a pre-registered bus passenger, a red LED and a buzzer will be turned on and their data can't be displayed hence there were no pre-registered data. For instance, a pre-registered RFID bracelet tag contains data from a female adult, a pre-registered RFID bracelet tag contains data from an elderly male and an RFID tag that hasn't been pre-registered (No data included) was provided. The RFID reader automatically identified (the green led was on and the buzzer buzz once) the 2 pre-registered RFID bracelet tags and display their data on the Adafruit.io website. For the RFID tag that hasn't been pre-registered, the RFID reader hadn't identified the tag (the red led was on and the buzzer buzzed twice). Since it is not a pre-registered tag, no data will be displayed on the Adafruit.io website.

RFID TAG NO.	1	3	6
Pre-Registered	Yes	Yes	No
Green LED ON	Yes	Yes	No
Red LED ON	No	No	Yes
Buzzer ON	Once	Once	Twice
Data Displayed	Yes	Yes	No

Table 4.2.1: The observation for the 3 tags

Figure 4.2.1: RFID bracelet tag 1

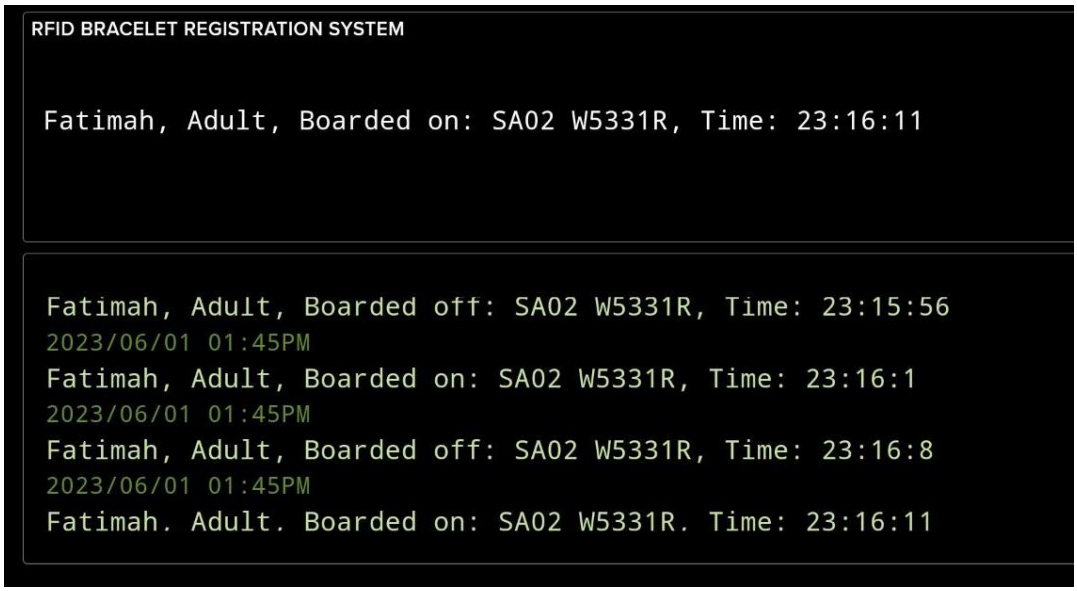


Figure 4.2.2: Data displayed for tag 1

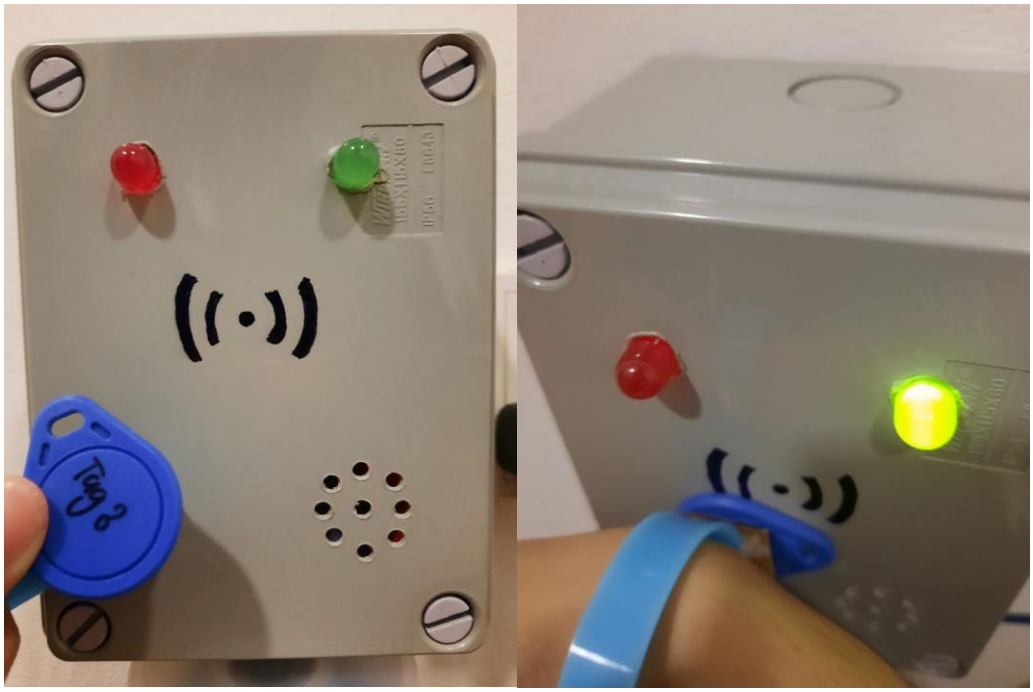


Figure 4.2.3: RFID bracelet tag 3

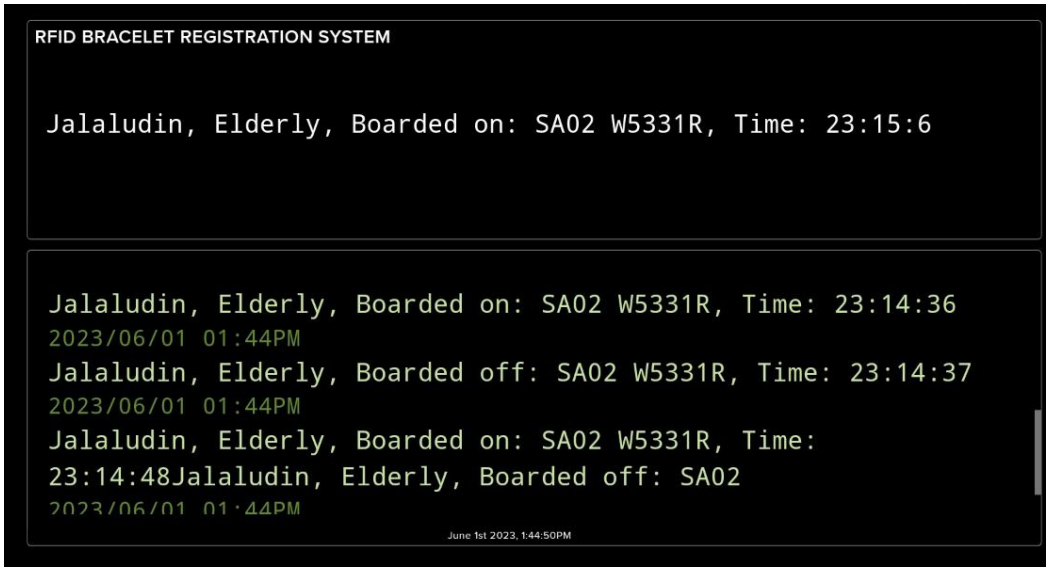


Figure 4.2.4: Data displayed for tag 3

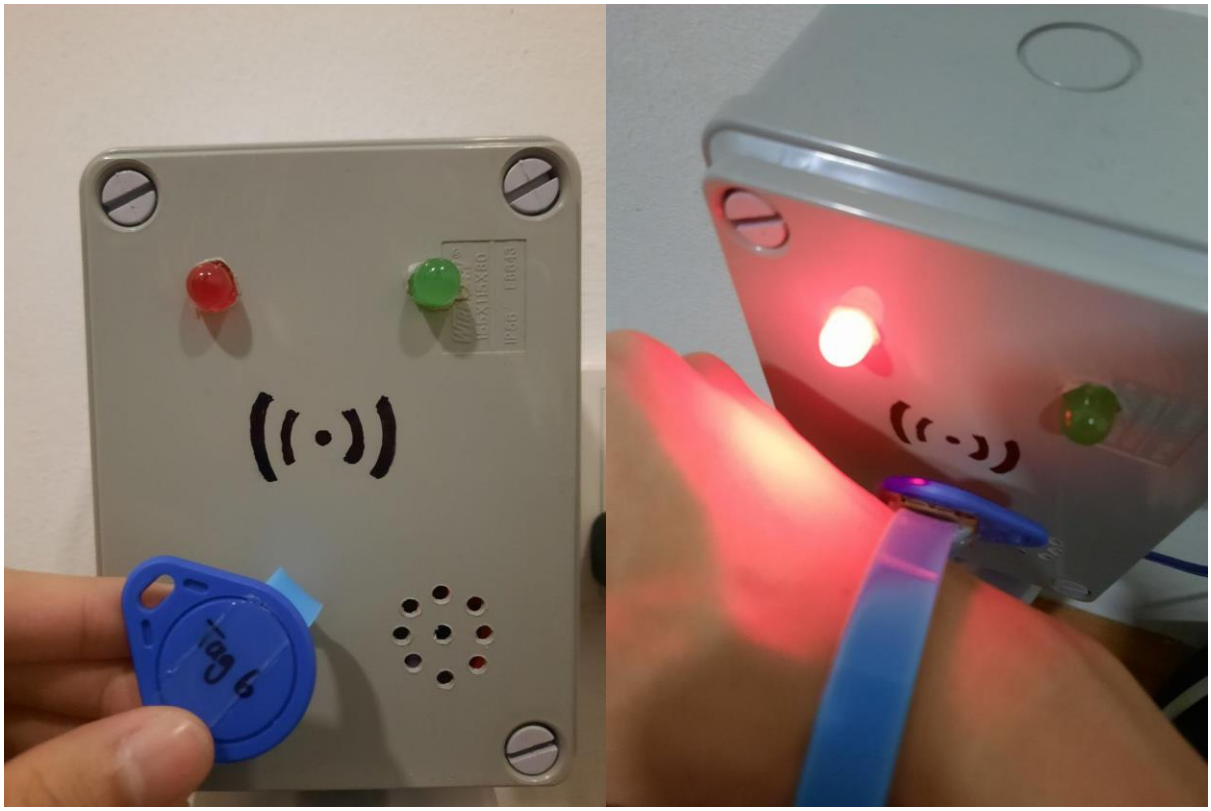


Figure 4.2.5: RFID bracelet tag 6

4.3 Discussion

This project's output can detect 2 different RFID bracelet tags from the RFID reader, whether it is a pre-registered RFID tag or not. If the RFID tag is identified as a pre-registered bus passenger, a green LED and a buzzer will be turned on, and then the data of passengers will be displayed on the Adafruit.io website, confirming they are successfully registered to the registration system. If the RFID tag is not identified as a pre-registered bus passenger, a red LED and a buzzer will be turned on. It's telling that the passengers' RFID bracelet tags have no data on them. This happens because there were no data of the passenger written in the program for the controller to process for the RFID bracelet tag that hasn't been pre-registered. There was an error for the RFID reader when it is detecting the RFID tag because the red LED and the buzzer were automatically on when the tags were not properly tapped onto the right position of the reader, even for the pre-registered tags. This type of issue must be resolved to not let any confusion happen when the passengers try to use the RFID reader.

4.4 Chapter Summary

This project is realised as a ready-to-use commodity with protected attributes using a thorough method. A step-by-step process is used to make sure the project is finished on schedule. The most active part of this project is concentrated on the objective and result that were determined before to creating this product. To provide other users with more information, it will display the outcome for the whole feature section in this segment. This component is noteworthy because it exemplifies how the circuit combines the best aspect of the project into the complete output element before the finest item is offered to the consumer.

CHAPTER 5

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this chapter is to discuss and conclude that any proposals for future work or analysis for this project should be added. This chapter also offers some useful suggestions for developing every idea soon for a new project. To create a product that is more valuable to customers, every next generation of young people needs to have fresh ideas.

5.2 Conclusion

It was the registration system itself that make the flow of the system become an inconvenience. The QR code scanning that was mentioned earlier has flaws in its way of executing it. In difficult times, passengers experience difficulties with the routine before boarding the bus. The registration system's use of QR code scanning was the main source of the issue. So the idea for designing and constructing an RFID bracelet registration system for bus passengers where the passive RFID tag is used in the system. The RFID tag detected from the bracelet is read by the RC522. The microcontroller, which is an Arduino Uno in this case, processes the data from the RFID tag. The passenger's information is then shown on the Adafruit.io website. If the RFID tag belongs to a pre-registered bus passenger, a green LED and a buzzer are activated, and the data is displayed on the Adafruit.io website to notify the passenger that they can board the bus. If the RFID tag does not belong to a pre-registered bus passenger, a red LED and a buzzer are activated, indicating that the data cannot be displayed because there is no pre-registered information available. The circuit comprises uncomplicated and cost-effective components that can be readily incorporated. The prototype's

functioning and execution are thoroughly examined, indicating that integrating this system into public buses would simplify the registration process going forward.

5.3 Suggestions for Future Work

The project design is solely focused on its suitability for implementation in the public bus service exclusively. Based on observations, the best recommendation for future projects is to enhance its flexibility to be applicable to a wider range of public transportation modes. To achieve this, the bracelet registration system's ecosystem should be optimized to function efficiently in various types of public transport, including trains and commuters. Strengthening the security of this system can be accomplished by incorporating a sensor into the RFID reader, capable of identifying unregistered passengers or those who pass through without tapping their RFID bracelet onto the reader. Moreover, to ensure passengers' privacy, the confirmation of successful registration can be displayed exclusively to the passengers and the transport conductor, while remaining concealed from others.

5.4 Chapter Summary

It focuses on the conclusion of the system design in this chapter and the suggestion for future analysis on this project. To know whether the purpose of the project is to be accomplished as desired, it is necessary to conclude the entire study. As well as for the recommendation. This is because the feedback will help to come up with new ideas for the next researchers. By changing the framework from previous research, they may create a new project.

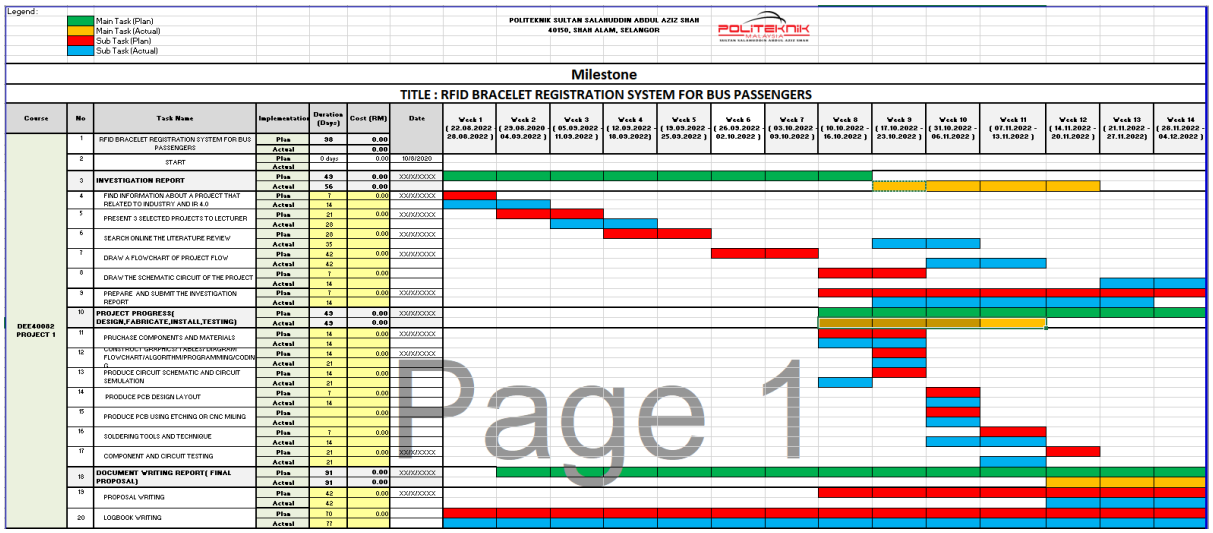
CHAPTER 6

6 PROJECT MANAGEMENT AND COSTING

6.1 Introduction

In order to include hardware expenses in its components, this endeavour comprises the cost of procuring materials and parts. We obtain the majority of our hardware components through online sources. should search around for the best deals before making some purchases, as at the Shopee online marketplace. Due to the time and money savings, this approach will also simplify things. First, the estimated total gross expenditure for the implementation of this project is RM 164.19, with an additional RM 14.70 for incidental charges. In contrast to other projects that may cost more than a thousand ringgit, this project is based on this budget expense. The total expense incurred to make this product after project implementation is only RM170.

6.2 Gant Chart and Activities of the Project.



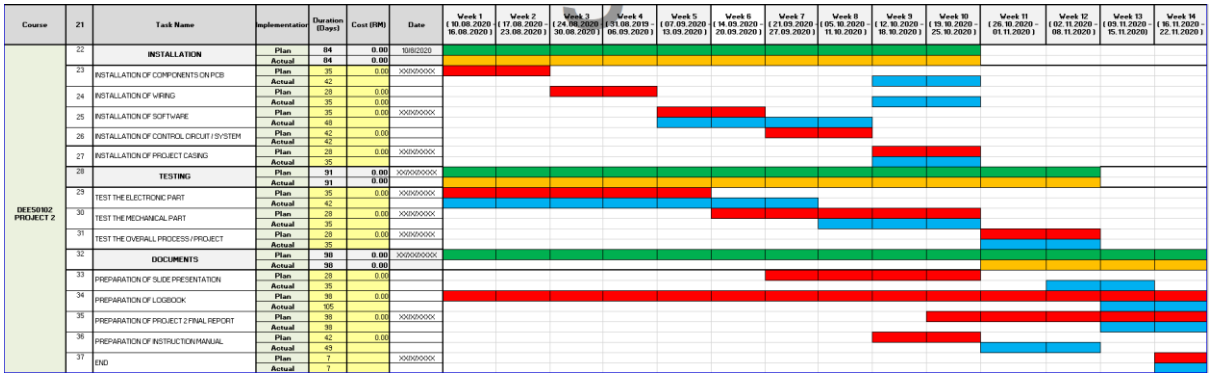
Legend :
Main Task (Plan)
Main Task (Actual)
Sub Task (Plan)
Sub Task (Actual)

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH
40150, SHAH ALAM, SELANGOR

Milestone

TITLE : RFID BRACELET REGISTRATION SYSTEM FOR BUS PASSENGERS

Course	No	Task Name	Implementation	Duration (Days)	Cost (RM)	Date	Week 1 (22.08.2022 - 28.08.2022)	Week 2 (29.08.2022 - 04.09.2022)	Week 3 (05.09.2022 - 11.09.2022)	Week 4 (12.09.2022 - 18.09.2022)	Week 5 (19.09.2022 - 25.09.2022)	Week 6 (26.09.2022 - 02.10.2022)	Week 7 (03.10.2022 - 09.10.2022)	Week 8 (10.10.2022 - 16.10.2022)	Week 9 (17.10.2022 - 23.10.2022)	Week 10 (31.10.2022 - 06.11.2022)	Week 11 (07.11.2022 - 13.11.2022)	Week 12 (14.11.2022 - 20.11.2022)	Week 13 (21.11.2022 - 27.11.2022)	Week 14 (28.11.2022 - 04.12.2022)
DEE40002 PROJECT 1	1	RFID BRACELET REGISTRATION SYSTEM FOR BUS PASSENGERS	Plan	98	0.00															
			Actual		0.00															
	2	START	Plan	0 days	0.00	10/8/2020														
			Actual																	
	3	INVESTIGATION REPORT	Plan	49	0.00	XX/XX/XXXX														
			Actual	56	0.00															
	4	FIND INFORMATION ABOUT A PROJECT THAT RELATED TO INDUSTRY AND IR 4.0	Plan	7	0.00	XX/XX/XXXX														
			Actual	14																
	5	PRESENT 3 SELECTED PROJECTS TO LECTURER	Plan	21	0.00	XX/XX/XXXX														
			Actual	28																
	6	SEARCH ONLINE THE LITERATURE REVIEW	Plan	28	0.00	XX/XX/XXXX														
			Actual	35																
	7	DRAW A FLOWCHART OF PROJECT FLOW	Plan	42	0.00	XX/XX/XXXX														
			Actual	42																
	8	DRAW THE SCHEMATIC CIRCUIT OF THE PROJECT	Plan	7	0.00															
			Actual	14																
	9	PREPARE AND SUBMIT THE INVESTIGATION REPORT	Plan	7	0.00	XX/XX/XXXX														
			Actual	14																
	10	PROJECT PROGRESS(DESIGN,FABRICATE,INSTALL,TESTING)	Plan	49	0.00	XX/XX/XXXX														
			Actual	49	0.00															
	11	PRUCHASE COMPONENTS AND MATERIALS	Plan	14	0.00	XX/XX/XXXX														
			Actual	14																
	12	CONSTRUCT SCHEMATIC DIAGRAM / FLOWCHART/ALGORITHM/PROGRAMMING/CODING	Plan	14	0.00	XX/XX/XXXX														
			Actual	21																
	13	PRODUCE CIRCUIT SCHEMATIC AND CIRCUIT SIMULATION	Plan	14	0.00															
			Actual	21																
	14	PRODUCE PCB DESIGN LAYOUT	Plan	7	0.00															
			Actual	14																
	15	PRODUCE PCB USING ETCHING OR CNC MILING	Plan		0.00															
			Actual																	
	16	SOLDERING TOOLS AND TECHNIQUE	Plan	7	0.00															
			Actual	14																
	17	COMPONENT AND CIRCUIT TESTING	Plan	21	0.00	XX/XX/XXXX														
			Actual	21																
	18	DOCUMENT WRITING REPORT(FINAL PROPOSAL)	Plan	91	0.00	XX/XX/XXXX														
			Actual	91	0.00															
	19	PROPOSAL WRITING	Plan	42	0.00	XX/XX/XXXX														
			Actual	42																
	20	LOGBOOK WRITING	Plan	70	0.00															
			Actual	77																



Course	21	Task Name	Implementation	Duration (Days)	Cost (RM)	Date	Week 1 (10.08.2020 - 16.08.2020)	Week 2 (17.08.2020 - 23.08.2020)	Week 3 (24.08.2020 - 30.08.2020)	Week 4 (31.08.2019 - 06.09.2020)	Week 5 (07.09.2020 - 13.09.2020)	Week 6 (14.09.2020 - 20.09.2020)	Week 7 (21.09.2020 - 27.09.2020)	Week 8 (05.10.2020 - 11.10.2020)	Week 9 (12.10.2020 - 18.10.2020)	Week 10 (19.10.2020 - 25.10.2020)	Week 11 (26.10.2020 - 01.11.2020)	Week 12 (02.11.2020 - 08.11.2020)	Week 13 (09.11.2020 - 15.11.2020)	Week 14 (16.11.2020 - 22.11.2020)
DEE50102 PROJECT 2	22	INSTALLATION	Plan	84	0.00	10/8/2020														
			Actual	84	0.00															
	23	INSTALLATION OF COMPONENTS ON PCB	Plan	35	0.00	XX/XX/XXXX														
			Actual	42																
	24	INSTALLATION OF WIRING	Plan	28	0.00															
			Actual	35	0.00															
	25	INSTALLATION OF SOFTWARE	Plan	35	0.00	XX/XX/XXXX														
			Actual	49																
	26	INSTALLATION OF CONTROL CIRCUIT / SYSTEM	Plan	42	0.00															
			Actual	42																
	27	INSTALLATION OF PROJECT CASING	Plan	28	0.00	XX/XX/XXXX														
			Actual	35																
	28	TESTING	Plan	91	0.00	XX/XX/XXXX														
			Actual	91	0.00															
	29	TEST THE ELECTRONIC PART	Plan	35	0.00	XX/XX/XXXX														
			Actual	42																
	30	TEST THE MECHANICAL PART	Plan	28	0.00	XX/XX/XXXX														
			Actual	35																
	31	TEST THE OVERALL PROCESS / PROJECT	Plan	28	0.00	XX/XX/XXXX														
			Actual	35																
	32	DOCUMENTS	Plan	98	0.00	XX/XX/XXXX														
			Actual	98	0.00															
	33	PREPARATION OF SLIDE PRESENTATION	Plan	28	0.00															
			Actual	35																
	34	PREPARATION OF LOGBOOK	Plan	98	0.00															
			Actual	105																
	35	PREPARATION OF PROJECT 2 FINAL REPORT	Plan	98	0.00	XX/XX/XXXX														
			Actual	98																
	36	PREPARATION OF INSTRUCTION MANUAL	Plan	42	0.00															
			Actual	49																
	37	END	Plan	7		XX/XX/XXXX														
			Actual	7																

6.3 Milestone

DESCRIPTION	DATE	CUMULATIVE PROJECT COMPLETION PERCENTAGE (%)
Completion of project planning.	11/12/2022	40%
Completion of model system	11/05/2023	100%
Completion of project implementation	-	-
Completion of project management and finance	5/11/2022	90%
Completion final proposal report and project presentation	11/12/2022	100%

6.4 Cost and Budgeting

This project involves the cost of purchasing components and materials throughout its implementation components involving cost hardware. Most of the hardware components we get from an online purchase. Before we buy the component, we surveyat several online shops to compare the prices such as Shopee and Lazada. This methodmakes it easier as well because it will save time and costs.

No.	Component and materials	The unit price	Quantity	Total
1	NodeMCU V2 Arduino Lua IoT ESP8266 ESP-12E ESP 12 WIFI Wi-Fi Module Bluetooth Board	RM 19.90	1	RM 19.90
2	SMD UNO R3 - Atmel ATMEGA 328P V3 + Cable	RM 31.90	1	RM 31.90
3	Arduino RFID RC522 Card Reader Module Set MFRC522	RM 11.99	1	RM 11.99
4	RC522 Token Key Tag	RM 2.50	5	RM 12.50
5	Dupont Jumper Wire Male to Male 40P Dupont Jumper Wire	RM 3.50	1	RM 3.50
6	Dupont Jumper Wire Male to Male 40P Dupont Jumper Wire	RM 3.50	1	RM 3.50
7	DC3-24V SFM-20B Active Piezoelectric Buzzer Long Continuous Beep Tone Buzzer	RM 2.40	1	RM 2.40
8	LED 3MM Light Emitting Diode Bulb DIY STEM RBT PROJECT	RM 1.20	2	RM 2.40
9	MB102 Solderless Breadboard	RM 3.90	2	RM 7.80
10	Plain Color Bracelet Silicone Rubber Wristband Bracelet	RM 1.20	5	RM 6
11	Resistor 1% 1/4W 120 to 510 Ohm 120 / 200 / 220 / 330 / 470 / 510 Ohm	RM 1.00	1 set	RM 1.00
12	WIREMAN Weatherproof Enclosure Box IP56	RM 8.00	1	RM 8.00

13	Other materials	RM 50	-	RM 50
			Total :	RM 160.49
	List of other costings			
1	Transportation			
2	Postage			RM19.60
3	Craft Work			
4	Internet			
5	Application			
			Total:	**RM 19.60**
			Overall total	**RM 180.9**

The overall gross budget estimate in the implementation of this project is RM 160.49 and other expenses is at RM 19.60 as shown in Table 1. According to this budget cost, this project compared to other to another project that can cost over a thousand ringgit. The cost of the project is also in line with one of the key features of a good project developer that is low cost but have a high-quality project.

6.5 Chapter summary

The table above contains all the information in this chapter on how much it cost to make this product. We need customers to install this product in their vehicles, so this chapter is crucial. The goal of this project is to develop a successful, inexpensive, high-quality project. Because it costs less than 1,000 Ringgit, mounting this component in a car is relatively affordable. Next, the project's concept was also created using the most up-to-date design. Therefore, even with the specified technology installed on every bus, the vehicle design still looks fantastic.

REFERENCES

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[2] Danijel Mijić, Ognjen Bjelica, Jelena Durutović, Miloš Ljubojević (2018). An Improved Version of Student Attendance Management System Based on RFID. *18th International Symposium INFOTEH-JAHORINA*

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[4] Mr Pratik M. Sonar, Mr Sourabh S. Walke, Prof. Raman R. Bane (2018). Student Smart Card. *Proceedings of the International Conference on Inventive Research in Computing Applications (ICIRCA 2018)*

[5] Atif Ali Khan, Adnan I. Elberjaoui Yakzan, Dr Maaruf Ali (2011). Radio Frequency Identification (RFID) Based Toll Collection System. *2011 Third International Conference on Computational Intelligence, Communication Systems and Networks.*

7 APPENDICES

APPENDIX A – DATASHEET

Arduino Uno

Summary

Microcontroller	ATmega2560
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	54 (of which 14 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	256 KB of which 8 KB used by bootloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz

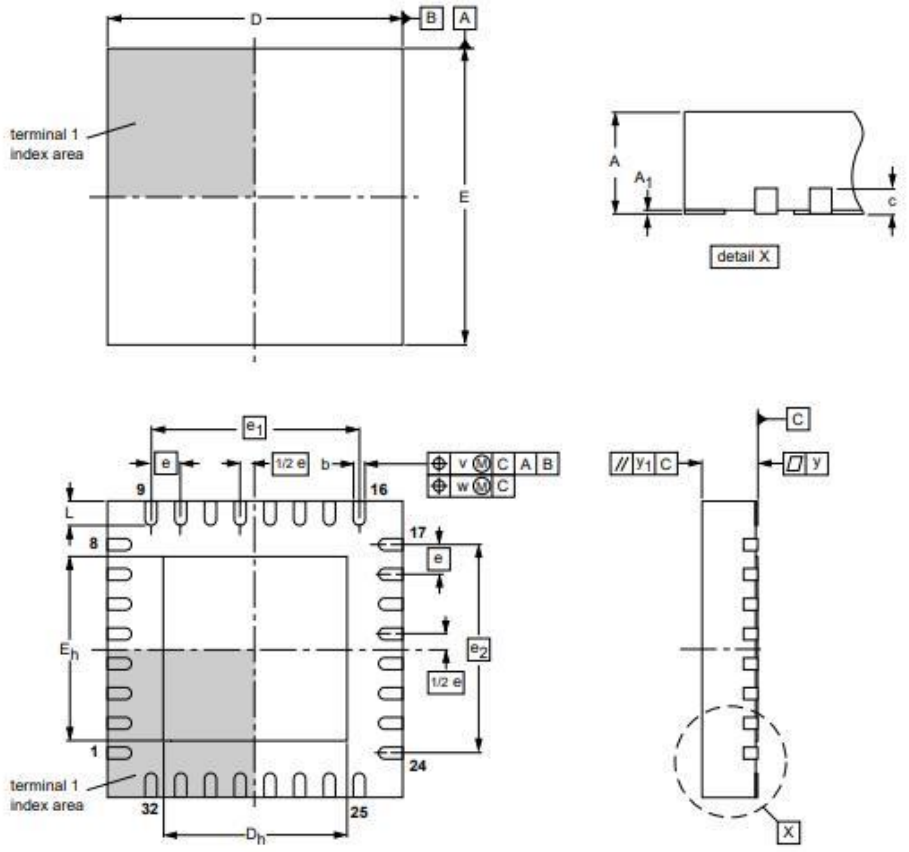
Power

The Arduino Mega can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

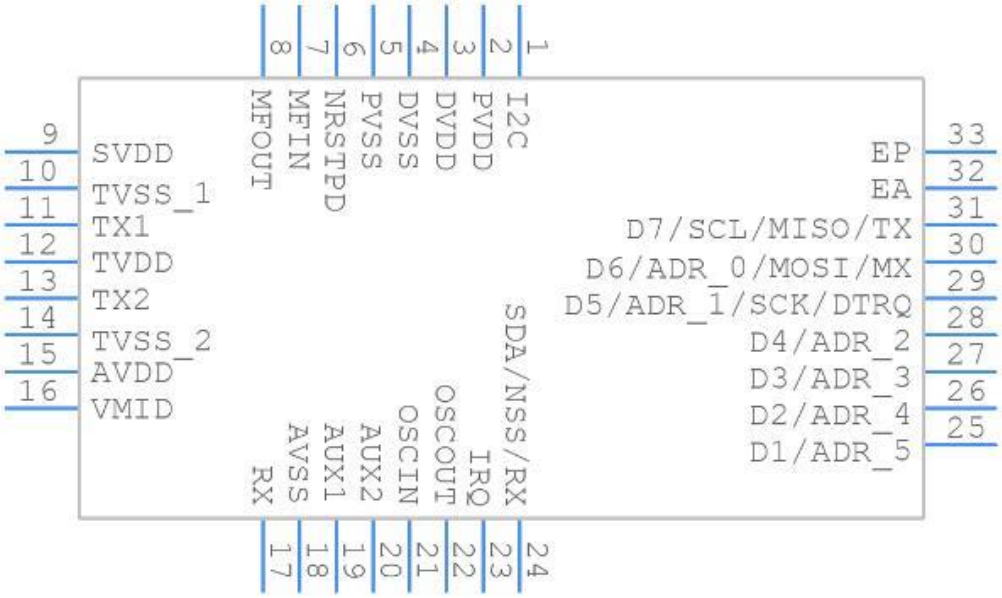


DIMENSIONS (mm are the original dimensions)

UNIT	A(1) max.	A_1	b	c	D(1)	D_h	E(1)	E_h	e	e_1	e_2	L	v	w	y	y_1
mm	1	0.05 0.00	0.30 0.18	0.2	5.1 4.9	3.25 2.95	5.1 4.9	3.25 2.95	0.5	3.5	3.5	0.5 0.3	0.1	0.05	0.05	0.1

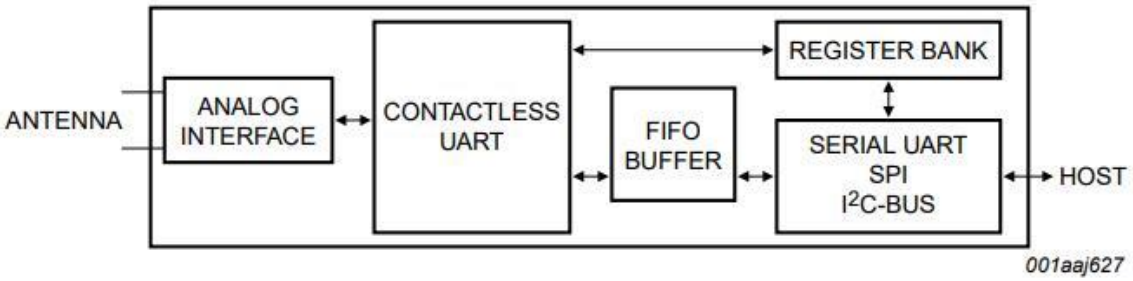
Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.



MFRC522 Specification

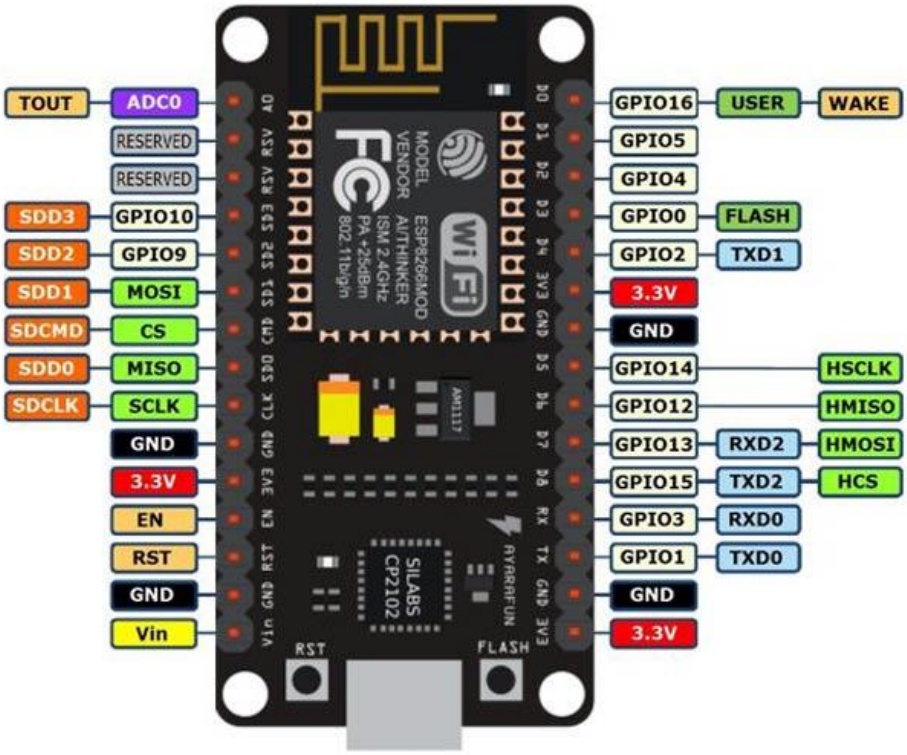
Manufacturer:	NXP Semiconductors
Operating Temperature-Max:	85 °C
Operating Temperature-Min:	-25 °C
Supply Voltage-Max:	3.6 V
Supply Voltage-Min:	2.5 V
Supply Voltage-Nom:	3.3 V
Terminal Pitch:	0.5 mm
Width:	5 mm



ESP8266

NodeMCU ESP8266 Specifications & Features

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1
- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz
- USB-TTL based on CP2102 is included onboard, Enabling Plug n Play
- PCB Antenna
- Small Sized module to fit smartly inside your IoT projects



NodeMCU Development Board Pinout Configuration

Pin Category	Name	Description
Power	Micro-USB, 3.3V, GND, Vin	**Micro-USB:** NodeMCU can be powered through the USB port **3.3V:** Regulated 3.3V can be supplied to this pin to power the board **GND:** Ground pins **Vin:** External Power Supply
Control Pins	**EN, RST**	The pin and the button resets the microcontroller
Analog Pin	A0	Used to measure analog voltage in the range of 0-3.3V
GPIO Pins	GPIO1 to GPIO16	NodeMCU has 16 general purpose input-output pins on its board
SPI Pins	SD1, CMD, SD0, CLK	NodeMCU has four pins available for SPI communication.
UART Pins	TXD0, RXD0, TXD2, RXD2	NodeMCU has two UART interfaces, UART0 (RXD0 & TXD0) and UART1 (RXD1 & TXD1). UART1 is used to upload the firmware/program.
I2C Pins		NodeMCU has I2C functionality support but due to the internal functionality of these pins, you have to find which pin is I2C.

BUZZER

Photo by ElectroPeak

Features

Color: Black

Alarm Diameter:22mm/0.86"

Alarm Height:10mm/0.39”

2 Mounting Holes distance:30mm/1.18"

2 Wires length:90mm/3.54"

Buzzer Type: Piezoelectric

Sound Pressure Level 95 dB

Rate Voltage: 12V DC

Operating Voltage: 3 - 24V

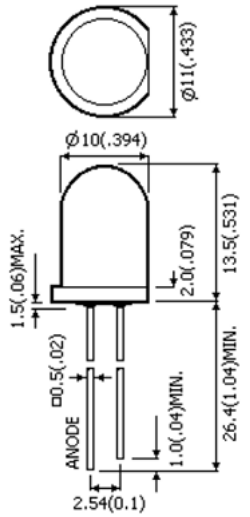
Max Current Rating 10mA

Frequency 3900±500Hz

Drive Method: Drive Circuit Built in Mounting Holes

LED

Dimensions:



Dimensions : Inches (Millimetres)
All tolerance shall be
±0.01 inch (0.25mm)

Electrical/Optical characteristics at T_A = 25°C

Parameter	Symbol	Min.	Type	Max.	Unit	Test
Luminous Intensity	IV	900	1,450	2,050	mcd	IF = 20mA
Viewing Angle	2θ½		20		Deg.	IF = 20mA
Peak Emission Wavelength	λp		660		nm	
Dominant Wavelength	λD		643		nm	IF = 20mA
Spectral Line Half-Width	Δλ		20		nm	
Forward Voltage	VF	1.7	1.85	2.5	V	IF = 20mA
Power Dissipation	Pd			85	mW	
Peak Forward Current (Duty1/10 @ 1kHz)	IF (Peak)			100	mA	
Recommended Operating Current	IF (Rec)		20		mA	

Absolute Maximum Ratings : (T_A = 25°C)

Reverse Voltage	: 5 Volt
Reverse Current	: 10μA (V_R = 5V)
Operating Temperature Range	: -40°C to +85°C
Storage Temperature Range	: -40°C to +100°C
Lead Soldering Temperature Range {1.6mm (1/16 inch) from body}	: 260°C For 5 Seconds

Reliability test For LED Lamps

Item	Test Conditions	Test Time/Cycle	Sample Size	Ac/Re
DC Operating Life	Temperature : 25°C IF : 20mA	1,000 Hrs.	76 Pcs.	0/1
High Temperature High Humidity	Temperature : 85°C 85%RH			
High Temperature Storage	Temperature : 100°C			
Low Temperature Storage	Temperature : -40°C			
Temperature Cycling	85°C~ 25°C~-35°C 15min~ 5min~ 15min	15 Cycles		
Thermal Shock	85°C~ 25°C~-10°C 5min~ 10sec ~ 5min			
Solder Heat	Temperature : 260°C ±5°C	10 Sec.		

APPENDIX B – PROGRAMMING

Arduino Uno Programming

```
#include <SPI.h>
#include <MFRC522.h>
#include "SoftwareSerial.h"
#include <TimeLib.h>

#define SS_PIN 10
#define RST_PIN 9

MFRC522 mfrc522(SS_PIN, RST_PIN);   // Create MFRC522 instance.

SoftwareSerial ser(2, 3); // RX, TX

int greenLedPin = 4; // Pin for the green LED
int redLedPin = 5; // Pin for the red LED
int buzzerPin = 6; // Pin for the buzzer
int count = 0; // declare a variable to store the number of IDs that were read

bool isBoarded = false; // variable to track if the user has boarded

void setup()
{
  setTime(23, 4, 0, 1, 1, 2022);
  Serial.begin(115200);   // Initiate a serial communication
  ser.begin(115200);
  SPI.begin();      // Initiate  SPI bus
  mfrc522.PCD_Init();   // Initiate MFRC522
  Serial.println("Put RFID Card to Scan...");
  Serial.println();
  pinMode(greenLedPin, OUTPUT);
  pinMode(redLedPin, OUTPUT);
  pinMode(buzzerPin, OUTPUT);
}

void loop()
{
  // Look for new cards
  if (!mfrc522.PICC_IsNewCardPresent())
  {
    // Turn off the green LED, red LED, and buzzer
    digitalWrite(greenLedPin, LOW);
    digitalWrite(redLedPin, LOW);
    noTone(buzzerPin);
    return;
```

```
  }
  // Select one of the cards
  if (!mfrc522.PICC_ReadCardSerial())
  {
    // Turn on the red LED and buzzer
    digitalWrite(greenLedPin, LOW);
    digitalWrite(redLedPin, HIGH);
    tone(buzzerPin, 1000, 200); // Buzz twice
    delay(100);
    noTone(buzzerPin);
    delay(100); // wait for 100ms before buzzing again
    tone(buzzerPin, 1000, 200); // Buzz twice
    delay(100);
    noTone(buzzerPin);
    digitalWrite(redLedPin, LOW);
    return;
  }
  // Show UID on serial monitor
  String content = "";
  byte letter;
  for (byte i = 0; i < mfrc522.uid.size; i++)
  {
    content.concat(String(mfrc522.uid.uidByte[i] < 0x10 ? " 0" : " "));
    content.concat(String(mfrc522.uid.uidByte[i], HEX));
  }
  Serial.println();
  Serial.print("User No./Name:    ");
  content.toUpperCase();
  if (content.substring(1) == "03 E3 16 20" ) //change here the UID of the
card/cards that you want to give access
  {
    // Turn on the green LED and buzzer
    digitalWrite(greenLedPin, HIGH);
    tone(buzzerPin, 1000, 200); // Buzz once

    unsigned long currentTimeSeconds = millis() / 1000;
    int hr = hour();
    int min = minute();
    int sec = second();

    String timeString = String(hr) + ":" + String(min) + ":" + String(sec);
    Serial.println("Fatimah, Adult");

    if (isBoarded)
    {
      String message = "Fatimah, Adult, Boarded off: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
```

```
      isBoarded = false;
    }
    else
    {
      String message = "Fatimah, Adult, Boarded on: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = true;
    }

    Serial.println();
    delay(1000);
  }
  else if (content.substring(1) ==  "03 D7 9F 9A" ) //change here the UID of
the card/cards that you want to give access
  {
    // Turn on the green LED and buzzer
    digitalWrite(greenLedPin, HIGH);
    tone(buzzerPin, 1000, 200); // Buzz once

    unsigned long currentTimeSeconds = millis() / 1000;
    int hr = hour();
    int min = minute();
    int sec = second();

    String timeString = String(hr) + ":" + String(min) + ":" + String(sec);
    Serial.println("Abu, Adult");

    if (isBoarded)
    {
      String message = "Abu, Adult, Boarded off: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = false;
    }
    else
    {
      String message = "Abu, Adult, Boarded on: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = true;
    }

    Serial.println();
    delay(1000);
  }
  else if (content.substring(1) == "63 0F 82 9A" ) //change here the UID of
the card/cards that you want to give access
```

```
  {
    // Turn on the green LED and buzzer
    digitalWrite(greenLedPin, HIGH);
    tone(buzzerPin, 1000, 200); // Buzz once

    unsigned long currentTimeSeconds = millis() / 1000;
    int hr = hour();
    int min = minute();
    int sec = second();

    String timeString = String(hr) + ":" + String(min) + ":" + String(sec);
    Serial.println("Shakira, Elderly");

    if (isBoarded)
    {
      String message = "Jalaludin, Elderly, Boarded off: SA02 W5331R, Time: "
+ timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = false;
    }
    else
    {
      String message = "Jalaludin, Elderly, Boarded on: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = true;
    }

    Serial.println();
    delay(1000);
  }
  else if (content.substring(1) == "D3 80 7F 9A" ) //change here the UID of
the card/cards that you want to give access
  {
    // Turn on the green LED and buzzer
    digitalWrite(greenLedPin, HIGH);
    tone(buzzerPin, 1000, 200); // Buzz once

    unsigned long currentTimeSeconds = millis() / 1000;
    int hr = hour();
    int min = minute();
    int sec = second();

    String timeString = String(hr) + ":" + String(min) + ":" + String(sec);
    Serial.println("Shakira, Elderly");

    if (isBoarded)
    {
```

```
      String message = "Shakira, Elderly, Boarded off: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = false;
    }
    else
    {
      String message = "Shakira, Elderly, Boarded on: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = true;
    }

    Serial.println();
    delay(1000);
  }
  else if (content.substring(1) == "C3 F4 7D 9A" ) //change here the UID of
the card/cards that you want to give access
  {
    // Turn on the green LED and buzzer
    digitalWrite(greenLedPin, HIGH);
    tone(buzzerPin, 1000, 200); // Buzz once

    unsigned long currentTimeSeconds = millis() / 1000;
    int hr = hour();
    int min = minute();
    int sec = second();

    String timeString = String(hr) + ":" + String(min) + ":" + String(sec);
    Serial.println("Amira, Teenager");

    if (isBoarded)
    {
      String message = "Amira, Teenager, Boarded off: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = false;
    }
    else
    {
      String message = "Amira, Teenager, Boarded on: SA02 W5331R, Time: " +
timeString;
      ser.write(message.c_str(), message.length());
      isBoarded = true;
    }

    Serial.println();
    delay(1000);
```

```
    }
}
```

ESP8266 Programming

```
#include <ESP8266WiFi.h>
#include "Adafruit_MQTT.h"
#include "Adafruit_MQTT_Client.h"
// WiFi parameters
#define WLAN_SSID       "Galaxy A51 1522"
#define WLAN_PASS       "something89"

// Adafruit IO
#define AIO_SERVER      "io.adafruit.com"
#define AIO_SERVERPORT  1883
#define AIO_USERNAME    "hazDEU20"
#define AIO_KEY         "aio_aLZX653fjAdZZiqlcf4RVcxSqd0a"  // Obtained from
account info on io.adafruit.com

// Create an ESP8266 WiFiClient class to connect to the MQTT server.
WiFiClient client;

// Setup the MQTT client class by passing in the WiFi client and MQTT server
and login details.
Adafruit_MQTT_Client mqtt(&client, AIO_SERVER, AIO_SERVERPORT, AIO_USERNAME,
AIO_KEY);

Adafruit_MQTT_Publish Attendance = Adafruit_MQTT_Publish(&mqtt, AIO_USERNAME
"/feeds/RFID BRACELET REGISTRATION SYSTEM");

String sentence;
/************************** Sketch Code ************************************/

void setup() {
  Serial.begin(115200);
  Serial.println(F("Adafruit IO Example"));

  // Connect to WiFi access point.
  Serial.println(); Serial.println();
  delay(10);
  Serial.print(F("Connecting to "));
  Serial.println(WLAN_SSID);

  WiFi.begin(WLAN_SSID, WLAN_PASS);
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(F("."));
  }
  Serial.println();

  Serial.println(F("WiFi connected"));
  Serial.println(F("IP address: "));
```

```
  Serial.println(WiFi.localIP());

  // connect to adafruit io
  connect();

}

// connect to adafruit io via MQTT
void connect() {
  Serial.print(F("Connecting to Adafruit IO... "));
  int8_t ret;
  while ((ret = mqtt.connect()) != 0) {
    switch (ret) {
      case 1: Serial.println(F("Wrong protocol")); break;
      case 2: Serial.println(F("ID rejected")); break;
      case 3: Serial.println(F("Server unavail")); break;
      case 4: Serial.println(F("Bad user/pass")); break;
      case 5: Serial.println(F("Not authed")); break;
      case 6: Serial.println(F("Failed to subscribe")); break;
      default: Serial.println(F("Connection failed")); break;
    }

    if(ret >= 0)
      mqtt.disconnect();

    Serial.println(F("Retrying connection..."));
    delay(5000);
  }
  Serial.println(F("Adafruit IO Connected!"));
}

void loop() {
  // ping adafruit io a few times to make sure we remain connected
  if(! mqtt.ping(3)) {
    // reconnect to adafruit io
    if(! mqtt.connected())
      connect();
  }
 if ( Serial.available() ) {
    sentence = Serial.readStringUntil('\n'); // read the serial input until a
newline character is received
    sentence.trim(); // remove any leading or trailing whitespace

    if (! Attendance.publish(sentence.c_str())) { // publish the sentence to
Adafruit IO
        Serial.println(F("Failed to publish sentence"));
    } else {
        Serial.println(F("Sentence published successfully!"));
```

```
    }
  }
}
```