POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

PORTABLE WIRELESS ECG MACHINE

NAME	REGISTRATION NO
1. AHMAD USAMAH BIN HADI	**08DEU20F2006**

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

POLITEKNIK

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NAME	REGISTRATION NO
1. AHMAD USAMAH BIN HADI	08DEU20F2006

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

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2021/2022

CONFIRMATION OF THE PROJECT

The project report titled "Portable wireless ecg machine " has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

Checked by:

Supervisor’s name :

Supervisor’s signature:

Date :

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date :

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

1. Signature :

Name : **AHMAD USAMAH BIN HADI**

Registration Number : **08DEU20F2006**

Date : 25 MAY 2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : PORTABLE WIRELESS ECG MACHINE

SESSION: SESI 2: 2022/2023

1. I, **1. AHMAD USAMAH BIN HADI, 08DEU20F2006**

is a final year student of **Diploma in Electrical Engineering, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan,40140 Shah Alam Selangor Darul Ehsan**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property there in is 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;

a) **AHMAD USAMAH**) .

(Identification card No: - 020706030999) ....……

)**AHMAD USAMAH BIN HADI**

In front of me, Click here to enter text. (Click here to enter text.)) .....……

As a project supervisor, on the date:) **NAAGAJOOTHI A/P ADIN NARAINA**

ACKNOWLEDGEMENTS

I've worked hard on this Project. However, without the kind support and assistance of many people and organisations, it would not have been feasible. I want to express my sincere gratitude to each and every one of them. I owe a great deal to Naagajoothi A/P Udin Naraina for their direction, ongoing oversight, and provision of the information required for the Project as well as their assistance in seeing it through to completion.

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My thanks and appreciations also go to my colleague in developing the Project and the people who have willingly helped me out with their abilities.

ABSTRACT

In our daily lives, machine can be so helpful because it makes human works becomes much easier. It doesn’t matter in what sector you working on, sometimes it teaches us about how to do something. Nowdays a lot of people don’t take their heart condition health seriously, its becoming much worse day by day. This project can help a lot of people also educate them. It is designed to with wireless and portable so you can bring them whenever you got to go on the road. You don’t need to worry about the wire if its broke because it doesn't have it. Applying our skills and knowledge to choose the finest option from the many choices available, we discovered that several excellent machines were offered at reasonable costs. Therefore, in order to choose the best product, a consumer must consider the essential criteria, the available features, and the budget.

ABSTRAK

Dalam kehidupan seharian kita, mesin boleh membantu kerana ia menjadikan kerja manusia menjadi lebih mudah. Tidak kira dalam sektor apa yang anda kerjakan, kadangkala ia mengajar kami tentang cara melakukan sesuatu.

Pada masa kini ramai orang tidak mengambil serius kesihatan keadaan jantung mereka, ia menjadi lebih teruk dari hari ke hari. Projek ini boleh membantu ramai orang juga mendidik mereka. Ia direka bentuk dengan wayarles dan mudah alih supaya anda boleh membawanya apabila anda perlu pergi di jalan raya. Anda tidak perlu risau tentang wayar jika ia putus kerana ia tidak mempunyainya. Menggunakan kemahiran dan pengetahuan kami untuk memilih pilihan terbaik daripada banyak pilihan yang ada, kami mendapati bahawa beberapa mesin yang sangat baik ditawarkan pada kos yang berpatutan. Oleh itu, untuk memilih produk yang terbaik, pengguna mesti mempertimbangkan kriteria penting, ciri
yang ada dan bajet.

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CHAPTER 1

1 INTRODUCTION

1.1 Introduction

A common medical tool for recording and observing the electric activities of the heart is an electronic cardiograph machine, sometimes known as a wireless portable ECG equipment. By putting theelectrodes and clips in particular places, this is accomplished. Despite the fact that the hefty, clinicalor hospital-based ECG machines use up to 12 leads/channels and an additional three pairs of limb and precordial leads, the portable models made for use at home only have two main leads. We discovered that there were some really nice machines available at reasonable prices after applying our expertise and knowledge to choose the best option from the several options. As a result, in order to make the best purchase selection, a consumer must consider the budget, the available features, and the important criteria. It also can save a lot of time and money to the individuals that's have a regular check up to the hospital. Other than that, this machine can give a lot of benefits to people and one of them is can help detect arrhythmias. Where the heart beats are slow, quick or irregular. Next, its also detect coronary heart disease where the heart's blood supply is blocked or interrupted by a build-up of fatty substances. Besides that, it also can give an early warning heart attacks, where the supply of blood to the heart is suddenly blocked. Last but not least, the ecg test is quick, painless and safe to the patient, they don't have to be afraid because it leaves no marks on body or scars.

1.2 Problem Statement

We can see that a lot of people don't care about their heart condition, so it is very dangerous right now because the Malaysians have zero concern about their heart, they thought that only old people have heart condition. Next, they don't have the knowledge about how to check their own read in ecg machine, it is very normal in our country. Last but not least, prevention of exacerbucation can slow the progression of heart failure.

1.2.1 Problem Identification\

Several issues have been observed at medical organizations that demand the completion of this project:

a) The traditional method of going to the hospital.

b) A lot of people cant read their own ecg graph.

1.3 Research Objectives

This project requires some theory to be practiced, allowing the patient to go deeper into health knowledge. There will be two approaches involved in finishing this project, which will be separated into two semesters:

a) Semester 1 - Make tools for programming the Arduino platform, a rough interface layout, and the system's precise details.

b) Semester 2 - To ensure a successful implementation, create and test the prototype, database, and client terminal system.

The main objective of this Project is to educate people about their heart condition and the health of their heart, is it okay to live their lives like they used to or they need to change their lifestyle. Other than that, it can prevent any harm things happen in the future because it will give us heads up on our condition. Lastly, it is also can save a lot of money without going to do a regular medical check up and you just can do it in your own house because when we need to go to hospital the cost of regular check up and the transportation are very expensive right now.

1.4 Scope of Research

The main focus of this project is that to give a ease to people about their state of heart condition and educate them about how to prevent heart disease from happen in the future. This project will save a lot of lives because it will help each one of them to measure heartbeat anomalies during daily activities. Its also can save a lot of your time because you don’t have to go to the hospital to do an annual check up or sudden accident that happened. Next, it is very suitable for old people because sometimes, they don’t have the energy to go to the hospital and it can be very helpful if this thing in their house. Other than that, this is a wireless machine, so you don’t have to worry about the wire because sometimes it can be broken and

need to be fix or replaced by a new one. Its also can be very small in weight and size, so its not so difficult to install in your house and very easy to carry around if you want to travel with the machine. A personal ecg machine wont be as accurate as a clinical and hospital grade machine. These machines are meant to enhance the information your doctor can use to manage your condition, but they are not a replacement for regular medical equipment in hospital.

1.5 Project Significance

A Portable wireless ecg machine is the product. After completing the full prototype, it is crucial to focus on the second semester's goals. The scheduled tasks and project milestones for this semester are listed in the Gantt chart [Appendix Al]. From fundamental design and data structure development to coding, testing, and report writing, the entire timeline is covered. The project's scope seems manageable for the author to complete on schedule given the possible results, and the time allotted will be used effectively to produce the entire work.

1.6 Chapter Summary

This project intends to improve Malaysians health conditions and it also wants to help to cut the budget. The projects is based on a lot of components but the mains are Arduino uno, heart rate monitor and Bluetooth module. Arduino programming is the project big foundation. The current machine is it has to go to the hospital to do the check up on the heart and it takes time to run the test because a lot of people are doing the test. The research objective is involving gaining the knowledge about its design and electrical characteristic. The project divided by two semesters, focusing on interface layout, Arduino programming and creating a prototype. The project main goals are to educate people about their heart, save a lot of budget and save a lot of time. The scope of the research includes the creation of portable wireless ecg machine that can be very small in weight and size, so its not so difficult to install in your house and very easy to carry around if you want to travel with the machine.

The project main focuses on software and hardware implementations using Bluetooth module and Arduino uno programming tool.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

Research on portable wireless ecg machines is now being conducted by a large number of scientists, engineers, and students. This is due to the fact that they learned about this system and started researching it. They view this endeavour as being crucial for future societal convenience.

2.2 A Specific Application

A standard skin electrodes placement for measuring cardiac potentials consists of electrodes placed on the right arm (RA), left arm (LA) and right leg (RL). This is referred to as the LEAD I configuration. The RA and LA connections are the inputs to the differential amplifier while the RL is the common or ground connection. The Finger Pad Electrodes act as the electrodes for the right arm (RA) and left arm (LA). A by-pass capacitor is connected from each electrode to a common line (RL)that is designated as ground. The capacitors serve as 60Hz filters.
.

Portable Wireless ECG Machine Application

The analog (audio) signal out from ECG card then applied to the PC sound card. A visual basic program has been written to examine and plot the ECG signal in order to extract the number of heart beats. The results have been decided upon; weather they are normal or abnormal. Figure 6demonstrates the proposed testing system. The plotted ECG signalas produced in the PC monitor.

2.3 Control System

The electronic circuit consists of the following main parts: Microcontroller, Liquid Crystal Display, Analog Circuits, Serial Communication, Access Control Circuits, Position Indicators, and Card Connector

2.3.1 Microcontroller

PIC16C74, 40 pin EPROM based 8-bit CMOS microcontroller of Microchip.

family is used for this application. The general features are 35 single word instructions, 4096 x 14 on-chip EPROM program memory, 192 x 8 general purpose registers, interrupt capability, eight levels deep hardware stack, power saving SLEEP mode, and wide operating-voltage range (2.5 to 6.0V)

2.4 Chapter Summary

The chapter goes over the elements of an electronic circuit that are employed in a specific application of my project, This chapter also focusing about literature review. In this chapter we have to listing a several journal about our project. Then, we have to find and investigate the method, objective , literature review and their project into the journal

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 Introduction

To realize this Project as a product that ready to use with safety characteristic, a very comprehensive plan is undertaking. A step by step procedure is done so that the Project can be completed in time. This include collecting data of patient and this project also can give facility to patient to go to their department.

Project Design and Overview.

As mentioned in the previous chapter, the designed controller is using a closed-loop system with Arduino as the main controller. The design of the controller circuit usingArduino realizes using Proteus Software and then convert to PCB circuit.

3.1.1 Block Diagram of the Project

Figure 3.2. Block Diagram of the project

3.1.2 Flowchart of the Project 2

The flow of the program will be simple and not complicated, it starts with when you start the machine and it will execute to next step which is the modulant is on. When the modulant it will go to the collecting data of our system. Next, it will save it in pi because we want to see the data. After that, it goes to the connectivity and if the system is still okay, it send the data and save it. Next, the machine will analysis the data of our heart rate then we will get the results if it is in a good condition or not

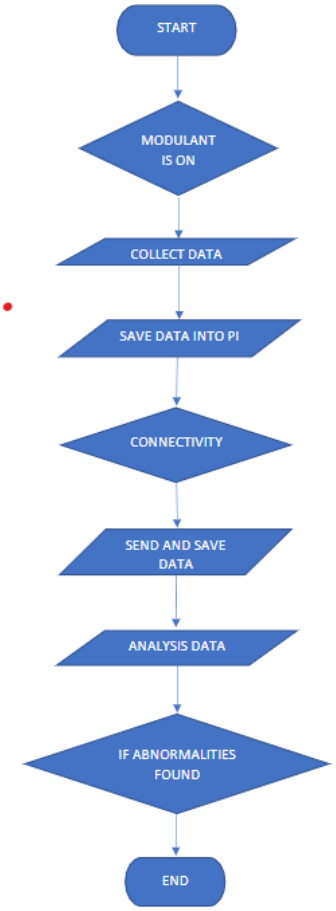


Figure 3.3: Flow chart of operation of the system

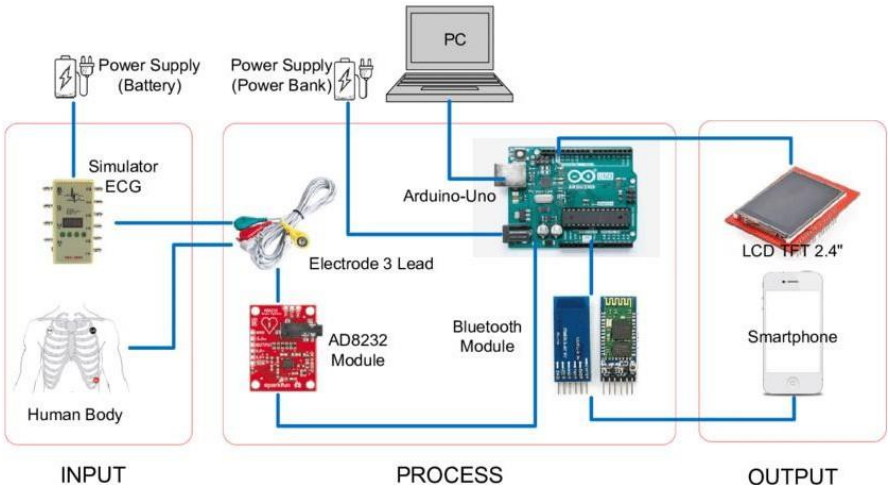
*Images may be subject to copyright

3.2 Project Hardware

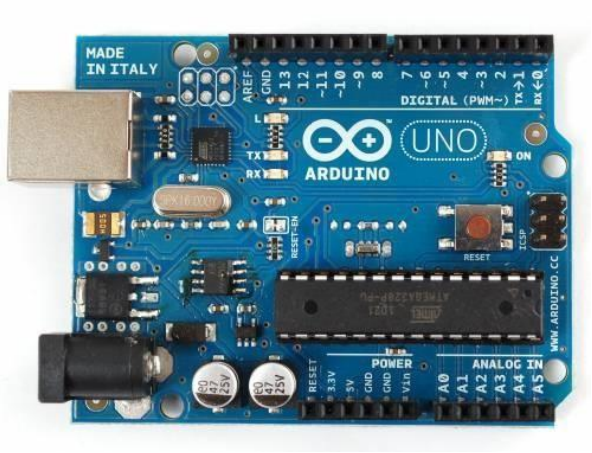
As mention in the previous chapter, the designed controller is using Arduino Uno. This microcontroller will control and give instruction to all the component in the circuit. Then, we use Bluetooth module to connect it with our phone because the result can be seen in it.

3.2.1 Schematic Circuit

Error! Reference source not found. shows the overall circuit diagram of this Project for scanning the card and insert the information into the card.



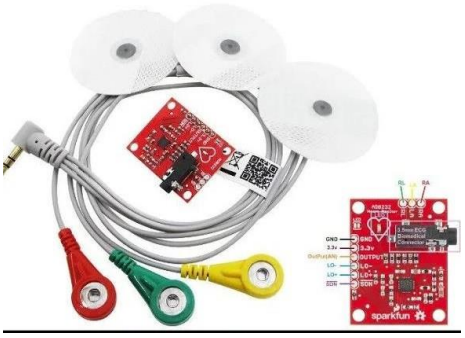
1. Arduino uno starter



Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs,a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header anda reset button. It contains everything needed to support the microcontroller; simplyconnect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

3.2.2.1 Component 1

1. Heart rate monitor



Measures your heart rate by measuring electrical signal in your blood. Based on these electrical signals,it measures the timing and strength of your heart

Component 2

1. Bluetooth module

Transmit and receives the data wirelessly by using two devices. The Bluetooth module can receive and transmits the data from a host system with the help of the host controller interface.

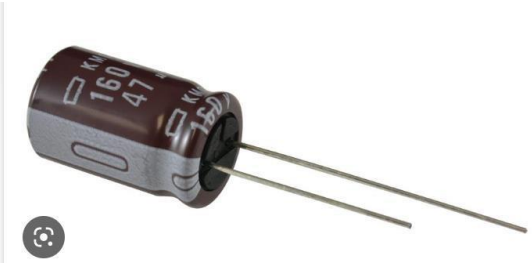
3.2.2.2 Component 3

1. Resistor

. Limits or regulates the flow of electrical current in a circuit. It can also be usedto provide a specific voltage for an active device.

3.2.2.3 Component 4

1. Capacitor



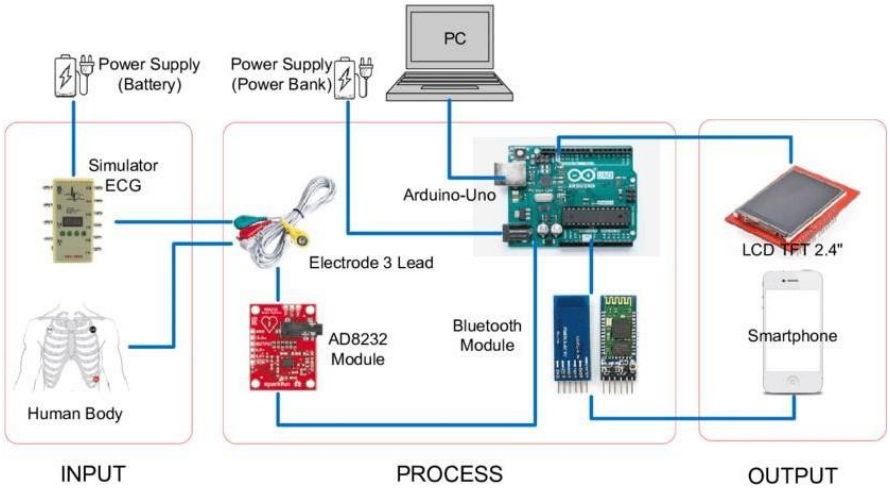
A device that stores electrical energy in an electric field by virtue of accumulating electric charges on two close surfaces insulated from eachother. It is a passive electronic component with two terminals

3.2.2.4 Component 5

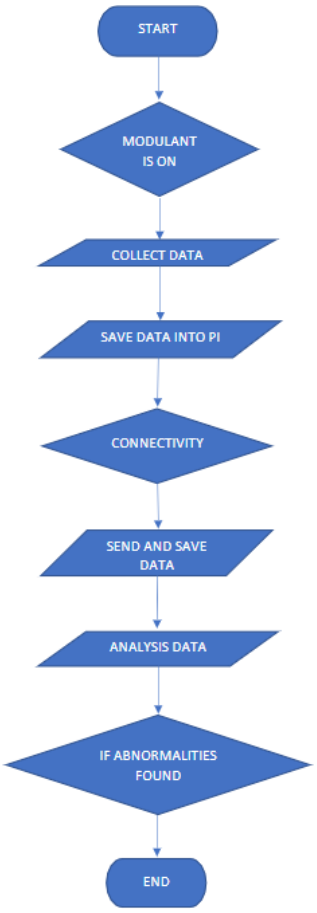
1. Step Down Module

A diode is a semiconductor device that essentially **acts as a one-way switch for current**. It allows current to flow easily in one direction, but severely restricts current from flowing in the opposite direction.

3.2.2 Circuit Operation



3.2.3 Flowchart of the System



3.2.4 Description of Flowchart

It shows that the flow of the project that I have been developed, if everything goes according to the plan as the chart, it will execute the coding. If not, it will exit to the starting point of the Bluetooth Electronic app.

3.2.5 Mechanical Design/Product Layout

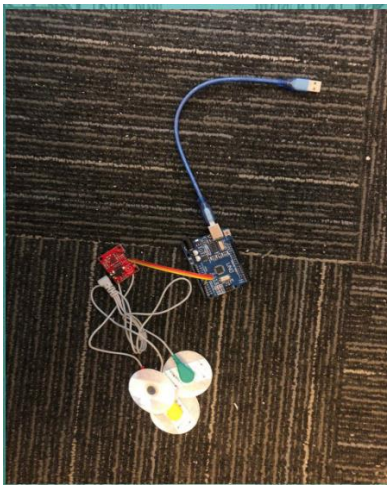


Figure 3.4. Design of the project

3.3 Sustainability Element in The Design Concept

This prototype main focus is to educate people about the health of their heart. That means, it will give a lot of benefits to their condition and can take early actions if anything happened. Nowdays, we can see that the peopleare not taking care of their heart condition seriously and 9 out of 10 people in Malaysia are having heart problems. So with this machine, it will give them the knowledge about their own heart condition. Next, it can save a lot of money and time to go to the hospital because this thing already have in your house and you can do it on your own. Its not to complicated to use like in the hospital because this machine is very friendly to use, you can bring it to a lot of places because it is portable and ypu don't need to worry about the wire because it is wireless. It makes so easy to pack and install around your house.

3.4 Chapter Summary

In this chapter we are doing research methodology, we have to find the way or the method that we use to make a project become real. Next, listing and description about the components that we use to make the project. We also have the flowchart and circuit for it.

CHAPTER 4

4 RESULTS AND DISCUSSION

4.1 Introduction

Because we don't have a sponsor, the majority of the basic materials and components utilised in this project were purchased with our own money. The projected cost comes to RM 129. Costs are within budget, and this job is far less expensive than others. For another six months, the development costs are still manageable. According to the research that was done, it is feasible and attainable.

4.2 Results and Analysis

4.2.1.1 Interface and Data Structure

Web apps were used to design and construct the interface. The interface design has two basic components, which the author refers to as the system menu and data modules.

a) System Menu

The system starts with the main menu which will lead to the front page of the app that I installed which is Bluetooth Electronic. Then you can connect the Bluetooth module on the ecg through the phone using the app. Next you have to choose the setting to use for the ecg machine.

4.3 Chapter Summary

Overall, the financial resources for the project were self-funded, and the cost projection was within the budget. The interface and data structure of the system were successfully designed and implemented, providing functionality for user.

CHAPTER 5

5 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This project is a success since it accomplishes the four aforementioned goals. The project can now be as large as the author wants it to be, and it is becoming increasingly obvious how applicable the subject is to engineering careers.

5.1.1.1 Relevance to the Goals

The first objective is to prevention of exacerbucation can slow the progression of heart failure.

The second objective aducte people about their heart condition.

The last objective is to prevent any harm things happen in the future.

5.2 Conclusion

In conclusion, this project was successful in accomplishing the four objectives described above. The introduction of the Portable ECG wireless machine has achieved the primary goal of decreasing time waste.

Overall, the project's performance in accomplishing these goals demonstrates its importance to engineering prospects. It highlights how technology and new solutions may be used to address difficulties in healthcare settings while also improving efficiency, and better resource management.

5.3 Chapter Summary

The project highlights the potential of technology and new solutions in tackling difficulties in healthcare facilities while encouraging efficiency, environmental sustainability, and improved resource management.

CHAPTER 6

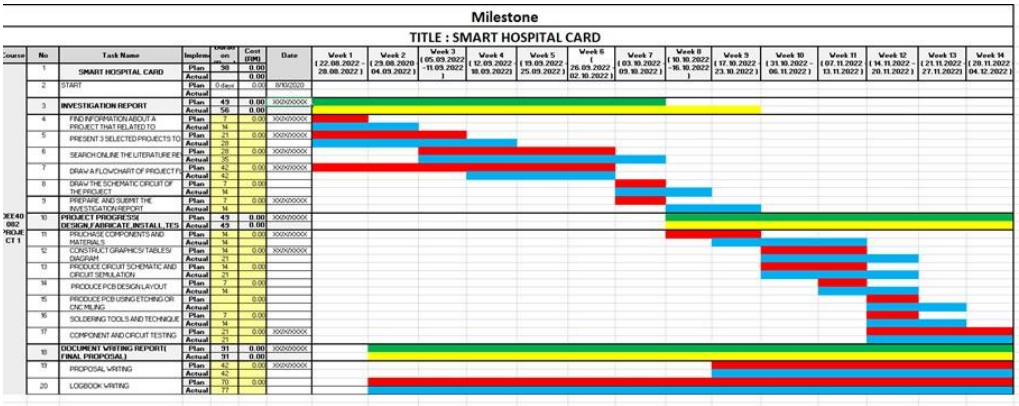
6 PROJECT MANAGEMENT AND COSTING

6.1 Introduction

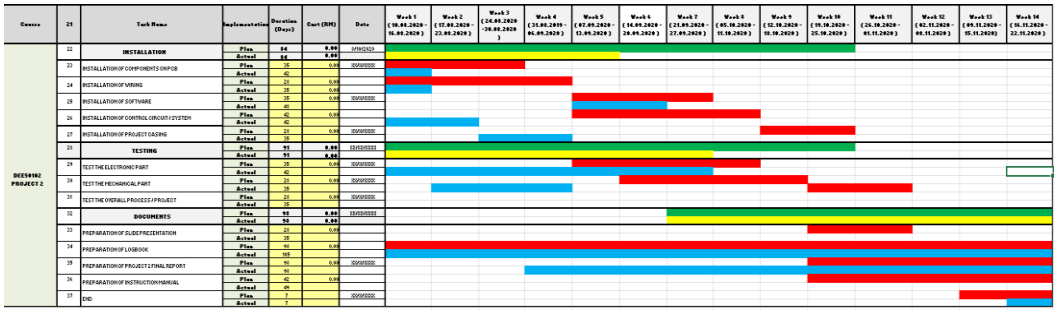
According to this budget cost, this project can be viewed as less expensive than other projects that cancost over a thousand ringgit. The overall budget estimate for implemention of this project is RM 350. The project cost is also consistent with one of the essential qualities of a competent project developer,which is having a cheap cost yet high quality project.

6.2 Gant Chart and Activities of the Projek

6.3 Semester 4



Semester 5



6.4 Cost and Budgeting

Hardware is one of the project's cost-involved components that must be purchased together with other materials for its execution. The majority of the hardware parts are purchased online. Before purchasing the component, a survey was conducted to evaluate pricing among a number of online retailers, including Shopee, Lazada, and RS Component. This approach will also make things simpler because it will save money and time.

No.	Component and materials	The unit price	Quantity	Total
1	Heart rate monitor ecg sensor	RM 29.90	1	RM 29.90
2	Bluetooth module	RM 11.00	1	RM 11.00
3	Arduino uno starter kit	RM 53.00	1	RM 53.00
4	Resistor	RM 1.00	18	RM 18.00
5	Capacitor	RM 1.70	5	RM 8.50
6	Diode	RM 0.30	3	RM 0.90
7	Unijunction transistor	RM1.90	1	RM 1.90
8	Npn transistor	RM 0.30	1	RM 0.30
9	Op-Amp	RM 0.90	6	RM 5.40
			Total :	**RM128.90**

Table 1: List of Components and Materials

6.5 Chapter Summary

In this chapter, we have to listing thing about project management and costing. In this section, we have to make a gant chart about project period and also we have to give listing about the budget and the price the component that we want to buy.

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- National health and nutrition examination survey