HEALTHCARE SKIN PRESSURE DETECTOR

NURIN HANANIE BINTI REDZUAN

08DEU20F1023

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JABATAN KEJURUTERAAN ELEKTRIK (JKE)

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH (PSA)

JUN 2020

ENDORSEMENT

" I hereby acknowledge that I have read this report and I found out that its contents meets the requirements in terms of scope and quality for the award of the Diploma in Medical Electronics Engineering. "

Signature : **……………………………………………………..**

Name of Supervisor : MADAM WEE SOO LEE

Date : **……………………………………………………..**

DECLARATION

“ I hereby declare that the work in this report is my own except for quotation and summaries which have been duly acknowldeged. “

Signature : **……………………………………………**

Name : NURIN HANANIE BINTI REDZUAN

Registration No. : 08DEU20F1023

Date : **……………………………………………**

DEDICATION

TO MY PARENT:

EN. REDZUAN BIN MD ALI

PN. ZARMILA BINTI ZAINUL

For All Support, Patience, Care and Love

TO MY SIBLINGS:

MUHAMMAD AMMAR AJMAL BIN REDZUAN

MUHAMMAD ALI AMJAD ANAQI BINTI REDZUAN

For All Support and Love

TO MY SUPERVISOR:

MADAM WEE SOO LEE

For All Support, Motivation, Guidance And Idea

LOVELY FRIENDS:

For Their Help And Moral Support

ACKNOWLEDGEMENT

BISMILLAH HIRRAHMAN NIRRAHIM

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Lastly, I would like to thank you for all those supported me in any aspect during the completion of the project.

ABSTRACT

When you apply pressure to an artery, the artery is pushed against bone, which stops the bleeding. Firmly press on the artery that runs between the bleeding location and the heart. Apply strong pressure immediately to the bleeding site if there is severe bleeding. for more than 5 minutes to an artery When you apply pressure to an artery, the artery is pushed against bone, which stops the bleeding. Firmly press on the artery that runs between the bleeding location and the heart. Apply strong pressure immediately to the bleeding site if there is severe bleeding. for more than 5 minutes to an artery. Healthcare Skin Pressure Detector can measure amount of pressure applied to a site. With using Force Sensitive Resistor (FSR) and placed under fake skin/skin. And able to estimate the pounds of pressure applied. The sensor also can only detect pressure to approximately 20 lbs which isn't high enough when detecting pressure applied for artery bleeding stoppage. And this project concept to testing showcase how Arduino boards can create new healthcare simulation. Now days, people easy to get a minor bleeding at home or work place. In this way, people need to go to pharmacies or some clinic near they to stop the bleeding. So this device can stop the minor bleeding with 20lbs and not to high enough when detect pressure from the bleeding.

ABSTRAK

Apabila anda memberi tekanan pada arteri, arteri ditolak ke tulang, yang menghentikan pendarahan. Tekan dengan kuat pada arteri yang berjalan di antara lokasi pendarahan dan jantung. Sapukan tekanan kuat dengan segera ke tempat pendarahan jika terdapat pendarahan yang teruk. selama lebih daripada 5 minit ke arteri Apabila anda menggunakan tekanan pada arteri, arteri ditolak ke tulang, yang menghentikan pendarahan. Tekan dengan kuat pada arteri yang berjalan di antara lokasi pendarahan dan jantung. Sapukan tekanan kuat dengan segera ke tempat pendarahan jika terdapat pendarahan yang teruk. selama lebih daripada 5 minit ke arteri. Pengesan Tekanan Kulit Penjagaan Kesihatan boleh mengukur jumlah tekanan yang dikenakan pada tapak. Dengan menggunakan Force Sensitive Resistor (FSR) dan diletakkan di bawah kulit/kulit palsu. Dan dapat menganggarkan paun tekanan yang dikenakan. Penderia juga hanya boleh mengesan tekanan kepada kira-kira 20 paun yang tidak cukup tinggi apabila mengesan tekanan yang dikenakan untuk berhenti pendarahan arteri. Dan konsep projek ini untuk menguji mempamerkan cara papan Arduino boleh mencipta simulasi penjagaan kesihatan baharu. Kini, orang mudah mengalami pendarahan kecil di rumah atau tempat kerja. Dengan cara ini, orang ramai perlu pergi ke farmasi atau klinik berhampiran mereka untuk menghentikan pendarahan. Jadi peranti ini boleh menghentikan pendarahan kecil dengan 20 paun dan tidak cukup tinggi apabila mengesan tekanan daripada pendarahan.

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Many biomedical applications, such as medical diagnostics, fingertip pressure in an active exoskeleton, automated personal safety equipment, and rehabilitation, require accurate detection of force and/or pressure. This work describes a sensor patch and measuring approach that can be used to detect localised skin pressure, such as during surgery when a patient may be immobilised for a long time. Susceptible locations on the body may experience a localised rise of pressure while the patient is immobile. Capillary blood flow can be decreased or interrupted if pressure surpasses a threshold of around 30 mm Hg, depriving oxygen to tissue in the area. Reduced blood flow over time can lead to damage or, in the worst-case scenario, tissue death (necrosis). Because local temperature might be a sign of tissue damage, it's a good idea to measure both temperature and pressure to avoid injury. A flexible, wearable sensor patch for simultaneous monitoring of local skin pressure and temperature is detailed in this study as a novel addition. The described measuring techniques are suited for eventual implementation in a wire-free patch system. The findings show that data from several sensors can be aggregated and displayed to notify a caregiver to a condition that requires intervention. The following is a breakdown of the paper's structure: Section II gives an overview of the sensor patch design as well as background information on the application. Section III goes through the system design in detail, including the force and temperature sensors that were used. Section IV contains the measured results. The purpose of this concept project is to measure the amount of pressure delivered to a spot. For use in simulation training in the healthcare field. We can determine the pounds of pressure applied by placing a Force Sensitive Resistor (FSR) under artificial skin. Although the sensor can only detect pressure up to about 20 pounds, this is insufficient for detecting pressure applied to stop arterial bleeding. This proof-of-concept shows how Arduino boards can be used to make new healthcare simulation trainers, is also a sign of tissue damage, thus checking both temperature and pressure is a good idea for avoiding harm. A flexible, wearable sensor patch for simultaneous monitoring of local skin pressure and temperature is detailed in this study as a novel addition. The described measuring techniques are suited for eventual implementation in a wire-free patch system. The findings show that data from several sensors can be aggregated and displayed to notify a caregiver to a condition that requires intervention. The following is a breakdown of the paper's structure: Section II gives an overview of the sensor patch design as well as background information on the application. Section III goes through the system design in detail, including the force and temperature sensors that were used. Section IV contains the measured results. The purpose of this concept project is to measure the amount of pressure delivered to a spot. For use in simulation training in the healthcare field. We can determine the pounds of pressure applied by placing a Force Sensitive Resistor (FSR) under artificial skin. Although the sensor can only detect pressure up to about 20 pounds, this is insufficient for detecting pressure applied to stop arterial bleeding. This proof-of-concept shows how Arduino boards can be used to make new healthcare simulation trainers.

Figure 1.1 : Arterial Bleeding

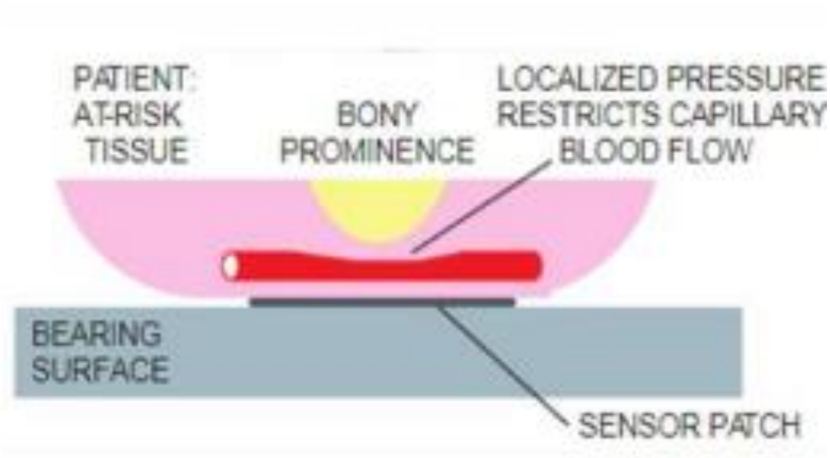


Figure 1.2 : App of patch in measurement of local pressure and temperature for at-risk tissue.

1.2 PROBLEM STATEMENT

Currently many accidents involved artery bleeding stoppage or some minor bleeding. And is difficult to stop the bleeding with some little emergency help because it will took a long time to stop the bleeding. It will cause the pounds of pressure applied or pressure detect from the bleeding. And it will took a long time to call hospital and ambulance to come to the place where it happened. If there is a traffic jam at somewhere or the same route to the place of accident it will took a long time and the bleeding can getting worse.

1.3 OBJECTIVE

- ✓ Create a new simulation for detecting pressure beneath the skin.
- ✓ To see if it can identify artery bleeding stoppage pressure.

- ✓ To demonstrate the use of Arduino boards in Force Sensitive Sensor (FSR).

1.4 SCOPE OF PROJECT

- ✓ People who with wounds that never stop bleeding.
- ✓ People who want to know how pressure that stop the bleeding.
- ✓ Appropriate for all ages.

1.5 IMPORTANCE OF RESEARCH

‘ Healthcare Skin Pressure Detector‘ will make a new medical items that can be use to stop artery bleeding stoppage and another bleeding. With the sensor detect pressure to approximately 20 lbs and not too high. This device can help hospital workers to stop something bleeding with, while waiting for patient turn to examined by a doctor or citizen. The required component, such as Force Sensitive Resistor, Arduino UNO, and Potentiometer are readily available and inexpensive. This ‘Healthcare Skin Pressure Detector’ is inexpensive and adaptable to any situation. And can bring it anywhere with the design:

- ✓ Detect pressure to approximately 20 lbs.
- ✓ Able to estimate the pounds of pressure applied.
- ✓ To stop artery bleeding.

CHAPTER 2

2.1 LITERATURE REVIEW

Nowadays, there is rapid development of high-performance smart materials, as well as Intelligent home and internet of things (IoT) technology; therefore, sensors technology has gradually stepped into people's lives and attracted widespread interest from researchers, especially in flexible pressure sensors. The flexible pressure sensors have a wide range of applications because they have excellent mechanical and electrical properties, such as high flexibility, high sensitivity, high resolution ratio, and rapid response, among others . Studies on flexible wearable sensor devices have been rapidly increasing in the last decade. Studies indicated that some conductive polymeric materials have the effect of piezoresistivity, however, it is difficult to achieve the effect of piezoresistivity for insulating polymeric materials .In recent years, new research result shows that conductive fillers make insulating polymeric material stransform into conductive materials. Therefore, the choice of materials has always been a core issue that experts are committed toexploring, especially conductive fillers. Gongetal. developed an ultra-thin sensing using agold film with a thickness of 1.64μm on a

polydimethylsiloxane (PDMS) elastomeric substrate bya casting method, which has 300% strain and fast response (<22 ms). However, the cost of goldfilm is high, which will pose negative effect on the cost of devices/systems. Generally, the initialconductive fillers belong to a metal-based system. Therefore, researchers are devoted to developingsuitable conductive fillers, and the carbon system attracts the attention of researchers owing to itsstable electrical performance, low cost, and rich variety; the characteristics of metal and carbon systemsare elaborated. Doshi and Thostenson fabricated a textile pressure sensor based oncarbon nanotubes (CNTs) using fiber/fiber contact and the formation of a sponge-like 7 piezoresistivenanocomposite between fibers that caused changes in electrical conductivity. Such piezoresistivesensors are highly sensitive to touching, and have a high electrical stability.E-skin flexible tactile sensors have been widely applied to sense the tactician and thermoceptionof human skin. E-skin can be attached to the surface of a human body or a robot as a garment, and canbe processed into various shapes to imitate the sensory function of human skin because of its featuresof light and softness, and then to achieve intelligence for robots and physiological status detection. t is highly important to enhance and develop performance evaluation indexes of sensors, such asresolution ratio, stability, repeatability, and especially the sensitivity of sensors. At present, developingtactile sensors with high resolution, high sensitivity, and rapid response for various applications isthe key research goal. In this section, we present a brief introduction of high performances of E-skintactile sensors.Sensitivity is one of the most important parameters of the pressure sensor, and determines themeasurement accuracy and validity of the sensor. Sphygmomanometer, Sensor, and Flexible Piezoelectric Pressure Sensor.

2.2 ABOUT MEASURE PRESSURE

Due to the reductions in localised pressures on bony prominences, the 30° laterally inclined and 30° head elevated positions (hereinafter referred to as the "rule of 30" unless otherwise specified) are frequently employed as a primary and secondary method of preventing pressure ulcers. The scientists did note, however, that some areas of the wound edge were thickened. Use of the rule of 30 placement may result in these thicker edges, which may also contribute to a delay in the healing process. Five elderly individuals who were bedridden and had pressure ulcers on their sacrum and coccyx were included in this investigation. A newly created sensor was used to measure the local pressure at the thickened and normal borders of the participants' wounds while they were positioned in accordance with the rule of 30. The findings demonstrated that the thickened edges' maximum and average pressures were substantially higher than those of the normal edges. Therefore, it is proposed that the phenomenon of thickening margins may be caused by increased pressure on various regions of the wound margin, which may subsequently delay the healing process. It might be wise to reevaluate the clinical application of the rule of 30 for individuals with pressure ulcers in the sacrum and coccyx. (Measuring the pressure applied to the skin surrounding pressure ulcers while patients are nursed in the 30° position).

2.3 SKIN PRESSURE SORES

Areas of the skin and underlying tissue that have been harmed by continuous pressure or friction are known as pressure sores. Anybody with limited movement, such as elderly persons or those who are confined to a bed or chair, is at risk of developing this sort of skin damage quickly.

Particularly vulnerable is the skin around bony regions like the elbows, heels, back of the skull, and tailbone (coccyx). If the insufficient blood supply is not corrected, the damaged tissue may perish. Pressure sores can be challenging to treat and might have dangerous side effects.

Grades of pressure sores

If you've been bedridden for long enough, the areas of skin that are constantly in contact with the mattress or chair will start to discolour. This shows that the skin is in danger of ulcerating.

Pressure sores are graded to four levels, including:

1. Grade I – skin discolouration, usually red, blue, purple or black
2. Grade II – some skin loss or damage involving the top-most skin layers
3. Grade III – necrosis (death) or damage to the skin patch, limited to the skin layers
4. Grade IV – necrosis (death) or damage to the skin patch and underlying structures, such as tendon, joint or bone.

COMPLICATIONS OF PRESSURE SORES

Pressure sores that are left untreated can result in a wide range of secondary disorders, such as:

1. Sepsis (bacteria entering the bloodstream)
2. Cellulitis (inflammation of body tissue, causing swelling and redness)
3. Bone and joint infections
4. Abscess (a collection of pus)
5. Cancer (squamous cell carcinoma).

PREVENTING PRESSURE SORES

It's crucial to be aware of the risk of pressure sores if you are confined to a bed or chair for an extended amount of time. You or your caregiver must relieve pressure, shorten the duration of pressure, and enhance skin quality in order to prevent skin injury. By distributing the pressure equally, pressure offloading surfaces like mattresses and wheelchair cushions may aid in giving pressure relief.

In order to avoid pressure sores and injuries, pressure injury monitoring devices that assess body motion, skin moisture content, and the pressure in between may be utilised. Pressure-sensing mats placed on beds or wheelchairs are an illustration of a gadget.

Create a plan that you, your caregiver, and any additional caregivers can adhere to. Changes in posture, assistive technology, routine skin care, a healthy diet, and lifestyle modifications are all part of this strategy.

If you have a high risk of developing pressure sores, a routine nursing assessment may be necessary. Early identification of pressure sores with several bedside devices may help promote preventive treatments as visual skin assessment can occasionally be incorrect.

DAILY SKIN CARE TO PREVENT PRESSURE SORES

Ways to prevent pressure injuries include:

1. Checking the skin at least daily for redness or signs of discolouration.
2. Keeping the skin at the right moisture level, as damage is more likely to occur if skin is either too dry or too moist.
3. Using moisturising products to keep skin supple and prevent dryness.
4. Never massaging bony areas because the skin is too delicate.

TREATMENT FOR PRESSURE SORES

There are a variety of treatments available to manage pressure sores and promote healing, depending on the severity of the pressure sore. These include:

1. Regular position changes
2. Special mattresses and beds that reduce pressure
3. Being aware of the importance of maintaining healthy diet and nutrition
4. Dressings to keep the sore moist and the surrounding skin dry. There is no advantage of one type of dressing over another.
5. Saline gauze dressing may be used if ointments or other dressings (for example foam dressings) are unavailable.
6. Light packing of any empty skin spaces with dressings to help prevent infection
7. Regular cleaning with appropriate solutions, depending on the stage of the sore
8. There is no advantage of one particular type of antiseptic (e.g. iodine) or antibiotic treatment over another
9. Specific drugs and chemicals applied to the area, if an infection persists
10. surgery to remove the damaged tissue that involves thorough debridement of the wound, the removal of underlying or exposed bone, and filling the empty space
11. operations to close the wound, using skin grafts if necessary

12. continuing supportive lifestyle habits such as eating a healthy and nutritious diet, as suggested by the nutritional staff.

WHO'S MOST AT RISK OF GETTING PRESSURE ULCERS

Anyone can get a pressure ulcer, but the following things can make them more likely to form:

1. Being over 70 – older people are more likely to have mobility problems and skin that's more easily damaged through dehydration and other factors.
2. Being confined to bed with illness or after surgery.
3. Inability to move some or all of the body (paralysis).
4. Obesity.
5. Urinary incontinence and bowel incontinence.
6. A poor diet.
7. Medical conditions that affect blood supply, make skin more fragile or cause movement problems – such as diabetes, peripheral arterial disease, kidney failure, heart failure, multiple sclerosis (ms) and parkinson's disease.

2.3.1 FORCE

A push or pull that an object experiences as a result of interacting with another item is known as a force. Every time two items interact, a force is exerted on each of the objects. The force is no longer felt by the two objects when the interaction ends. Only when there is interaction do forces actually exist.

The vector quantity of a force. A vector quantity is one that has both magnitude and direction, as was taught in a previous unit. You must specify both the magnitude (size or numerical number) and the direction of the force exerted on an object in order to completely describe it. As a result, 10 Newton does not adequately describe the force operating on an object. The force exerted on an item, however, is fully described by the expression 10 Newton, downhill, which includes both the force's magnitude (10 Newton) and its direction (downward).

It is customary to depict forces using diagrams in which a force is represented by an arrow because a force is a vector with a direction. Such vector diagrams are employed throughout the study of physics and were first introduced in an earlier chapter. The size and direction of the arrow both indicate the strength of the force and the direction in which it is acting. (These kind of diagrams are called free-body diagrams and are covered in more detail later in this session.) Additionally, as forces are vectors, the impact of one force on an item is frequently offset by the impact of another force. For example, the effect of a 20-Newton upward force acting upon a book is canceled by the effect of a 20-Newton downward force acting upon the book. In such instances, it is said that the two individual forces balance each other; there would be no unbalanced force acting upon the book.

Another scenario is one in which two of the individual vector forces cancel each other out (or "balance"), but there is still a third individual force that is not counterbalanced by another force. Consider a book moving from left to right across the rough surface of a table. Gravity's downward pull and the upward pull of the table holding the book work in opposing directions and counterbalance one another. However, there is no rightward force to counteract the leftward acting force of friction. In this instance, the book changes its state of motion due to an uneven force. The exact details of drawing free-body diagrams are discussed later. For now, the emphasis is upon the fact that a force is a vector quantity that has a direction. The importance of this fact will become clear as we analyze the individual forces acting upon an object later in this lesson.

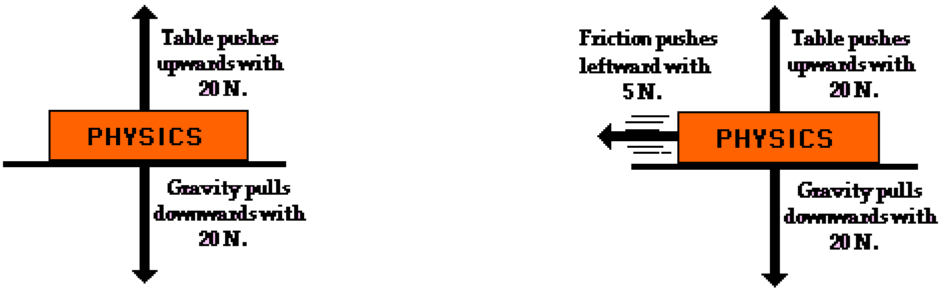


Figure 2.1 : Force is A Vector Quantity

2.3.2 BLYNK

Blynk is a platform that enables Internet-based control of devices like Arduino, Raspberry Pi, and others using IOS and Android apps. By simply dragging and dropping widgets, you may create a graphic interface for your project on a digital dashboard.

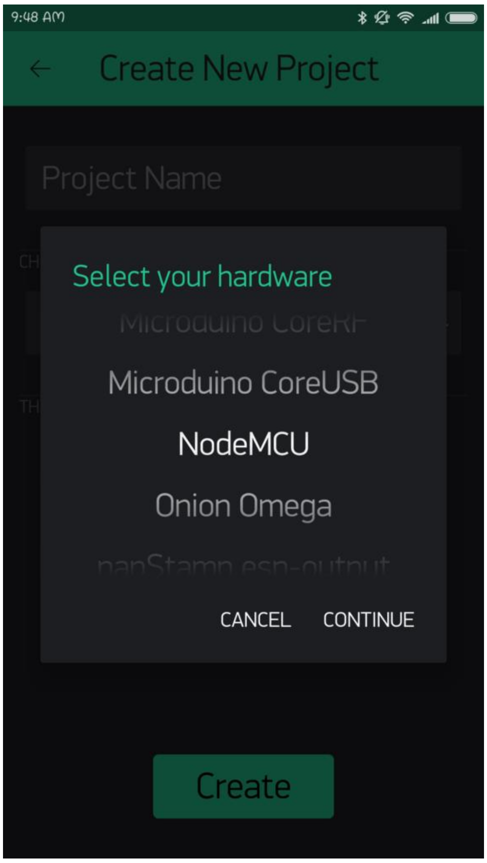
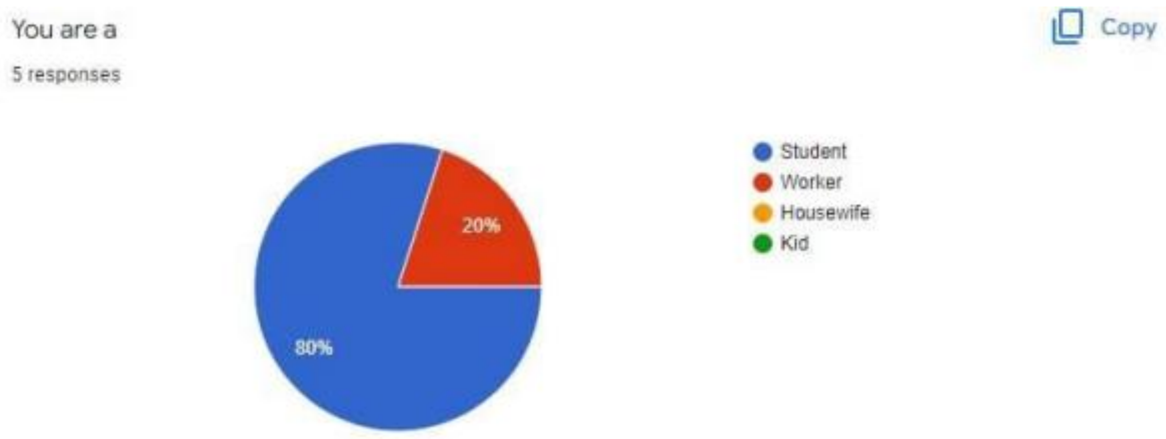


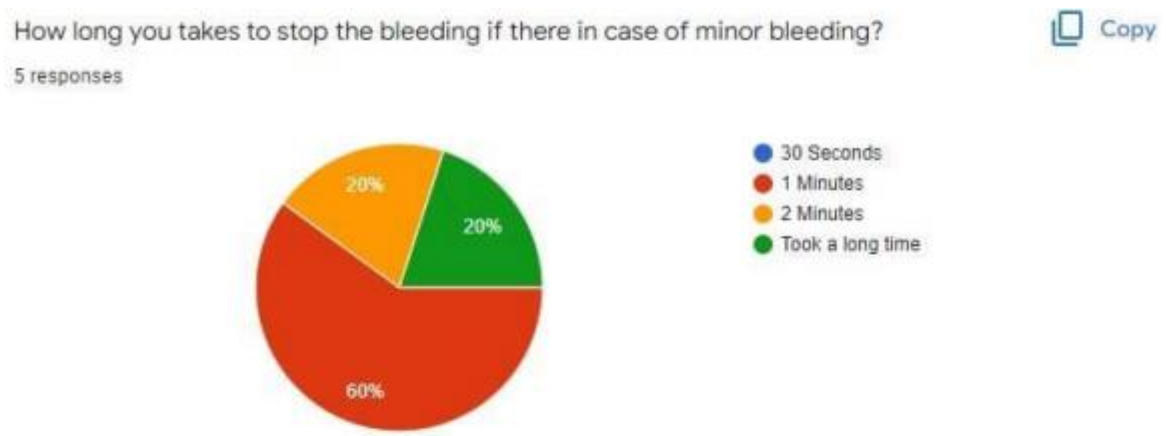
Figure 2.2 : “Blynk” Application at phone

2.4 ANALYSIS / MARKET ANALYSIS

Some question related about project, and this is the result:



Pie chart 2.1 : Category of people who answered my survey



Pie chart 2.2 : How long they take time to stop some minor bleeding

What do you think about this Healthcare Skin Pressure Detector effectness in life ?

5 responses

Pressure sores are areas of damage to the skin and the underlying tissue caused by constant pressure or friction. This type of skin damage can develop quickly to anyone with reduced mobility, such as older people or those confined to a bed or chair.

The skin over bony areas such as the heels, elbows, the back of the head and the tailbone (coccyx) is particularly at risk. The lack of enough blood flow can cause the affected tissue to die if left untreated. Pressure sores can be difficult to treat and can lead to serious complications.

Can help someone with minor bleeding or artery bleeding stoppage easily

Easily can help someone with minor bleeding

very helpful for humans to take care of the skin

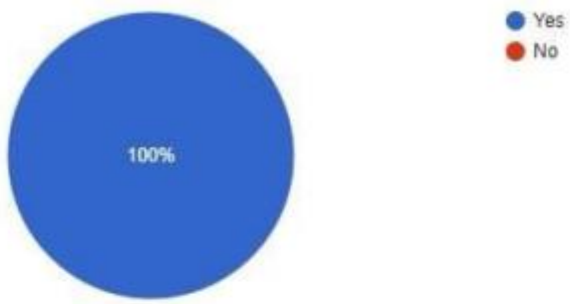
Can help more people related

Pie chart 2.3 : Their opinions are relevant about this project

What do you think of this project? Will this initiative lead to a better healthcare simulation trainer if it progresses?

Copy

5 responses



Pie chart 2.4 : Their opinion if this project created

What the range price that consumer would buy?

5 responses

- below RM 150
- under RM200
- under RM150
- affordable and not too expensive
- suitable and reasonable price

Pie chart 2.5 : Their opinion about the price

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Hardware Products that used in ‘Healthcare Skin Pressure Detetctor’. It consists of Arduino UNO, Force Sensitive Resistor, and Rotary potentiometer.\

3.2 FLOWCHART

The flow diagramm of methodology that has been used in this project is shown below. It consists of Force Sensitive Resistor (FRS), to the patient skin, absorb to the pressure applied, calculate by software (Arduino), the result will show high or low and result display on the phone Apps (Bylnk).

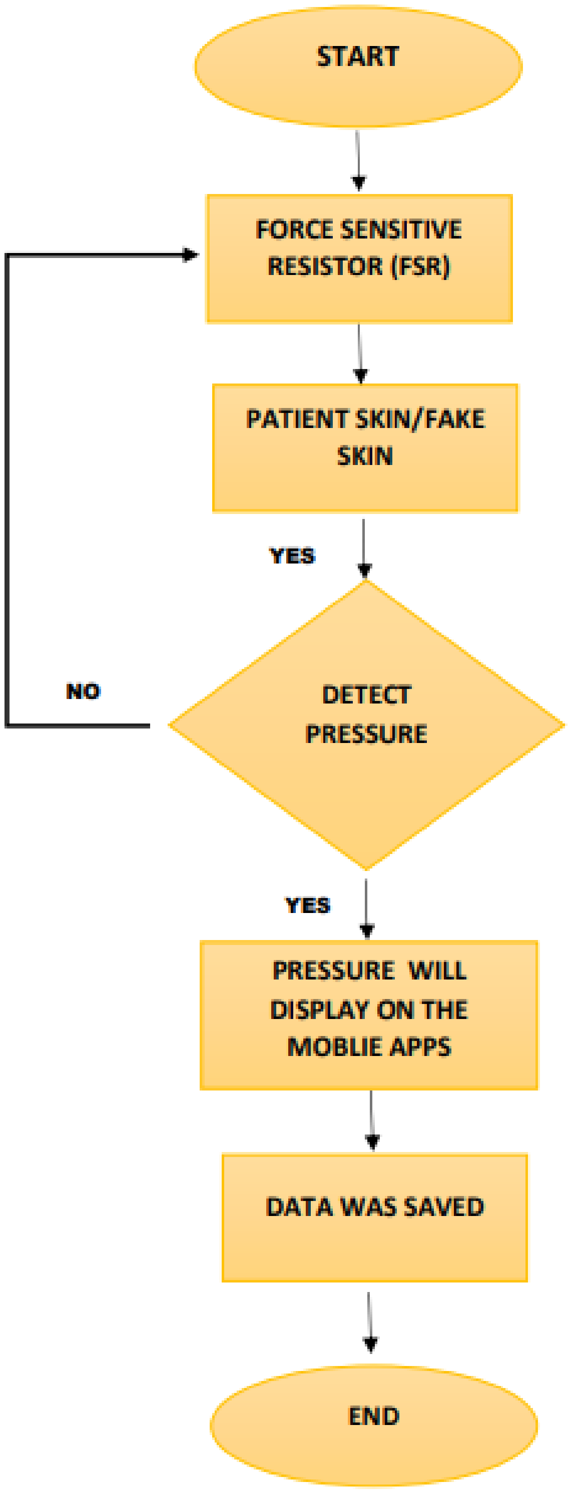


Figure 3.1 : Flowchart of Methodology

3.3 ARDUINO UNO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

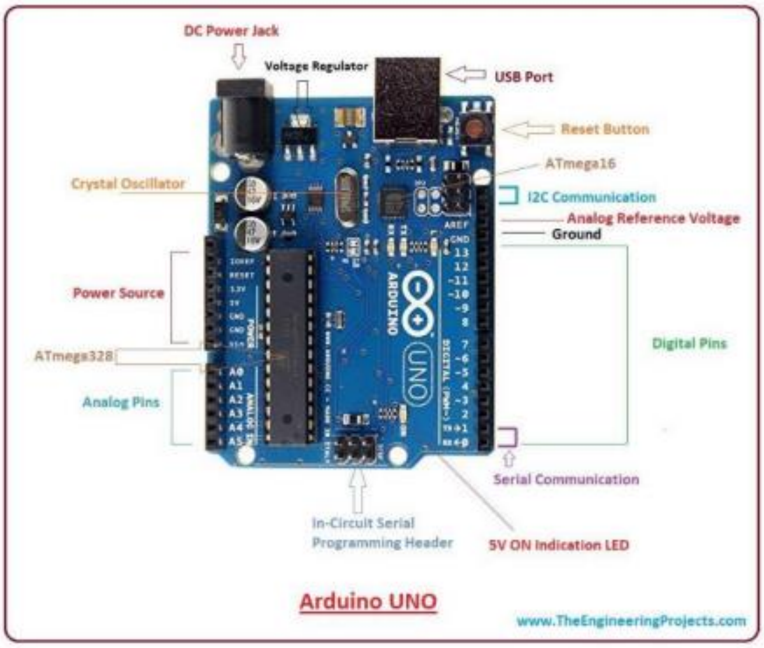


Figure 3.2 : Arduino UNO

3.3.1 FORCE SENSITIVE RESISTOR

A force sensitive resistor (FSR) is a material which changes its resistance when a force or pressure is applied. Conductive film is an example of such force resistance material. In other words, force sensitive resistor it's sensor that allow you to detect physical pressure, squeezing and weight.

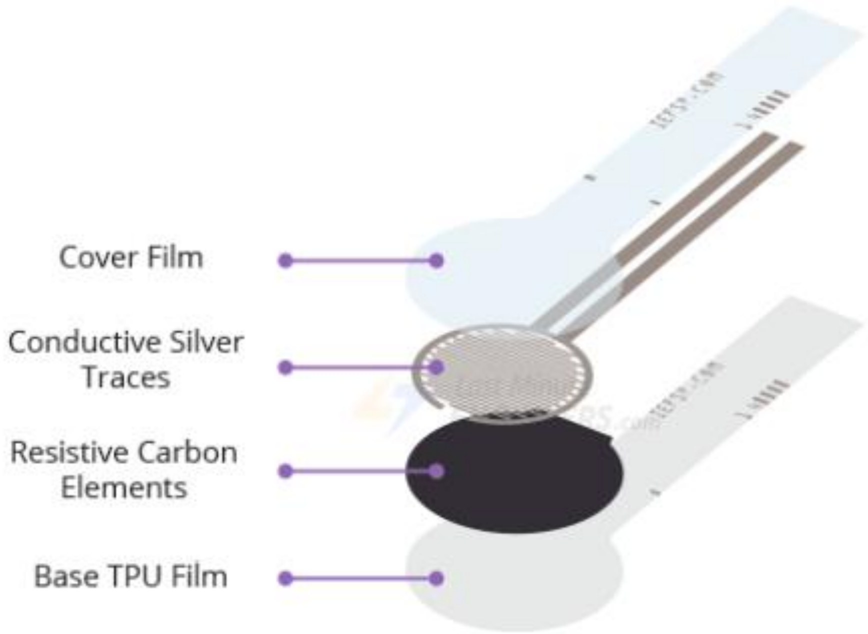


Figure 3.3 : Force Sensitive Resistor

3.3.2 ROTARY POTENTIOMETER

A rotary potentiometer is an adjustable electrical resistor that can be moved by means of a rotary motion. This allows control processes to be implemented in various electrical or electronic systems, for example for volume control in multimedia devices. The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name. Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment.

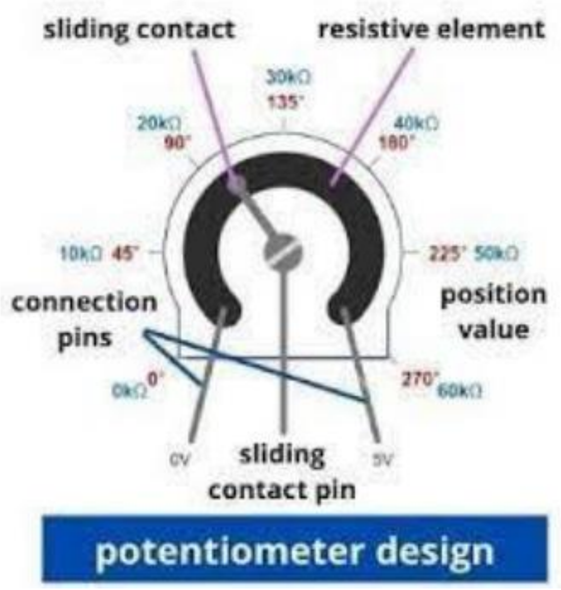


Figure 3.4 : Potentiometer Design

3.3.3 NodeMCU

A cheap open source IoT platform is NodeMCU. It originally included hardware based on the ESP-12 module and firmware that runs on Espressif Systems' ESP8266 Wi-Fi SoC. Support for the 32-bit ESP32 MCU was later added.

Figure 3.5 : NodeMCU

3.3.4 LCD DISPLAY

A flat-panel display or other electronically controlled optical device that makes use of polarizers and the light-modulating capabilities of liquid crystals is known as a liquid-crystal display. Liquid crystals don't directly emit light; instead, they create colour or monochromatic pictures using a backlight or reflector**.**

Figure 3.6 : LCD Display

3.3.5 CONNECTING WIRES

Connecting Wires . Means those wires that connect the leg wire of one electric blasting cap or with the leading wires, when blasting in series.

Figure 3.7 : Connecting Wires

3.3.6 PCB CONNECTORS

PCB connectors are located on the PCB and are often used to transfer power or signals from one PCB to another, as well as from another source inside the unit, to or from the PCB.

Figure 3.8 : PCB Connectors

3.4 PROJECT TESTING

Project testing is done by tested the “Healthcare Skin Pressure Detector” on subjects. The subjects were devided into group that related for the project.

3.5 STEP OF SOP (STANDARD OPERATING PROCEDURE)

1. Open hotspot.
2. Connect the project with hotspot.
3. Open “Blynk” apps in any device (Phone,Laptop).
4. After that, user need to connect project to power supply (Power bank).
5. The project will turn on and ready to detect pressure from subject.
6. User need to hold the place that have “Force Sensitive Resistor (FRS)”.

3.6 GANT CHART OF THE PROJECT IN FIRST SEMESTER

(PROJECT 1)

		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
NO	TASK NAME														
1	Finalize Main Project Title														
2	Identify the problem / Need Analysis														
3	Determine the innovation project model														
4	Literature Riview and Project Methodology														
5	Initial Proposal Submission														
6	Design schematic circuit / Flowchart														
7	Circuit Simulation														
8	Etching and Drilling (PCB)														
9	Presentation														
10	Final Proposal Submission														

Table 3.1: Gantt Chart of project for first semester

Table shows the Gantt Chart of project for first semester. It is a plan to conduct on this project. On week 1-7 the project progress was choosing title of project and make some research for project that want to choose. On week 4-8 project progress was determine the innovation project model and write the literature review/project methodology. On week 6-10 was write / submit initial proposal and design schematic circuit/flowchart. On week 8-12 was make simulation of circuit and etching/drill PCB board. And lastly, on week 12-14 was make presentation and submit the final proposal.

3.7 GANTT CHART OF THE PROJECT IN SECOND SEMESTER (PROJECT 2)

NO	TASK NAME	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
1	Buy and check for all component														
2	Drilling PCB Board														
3	Soldering PCB Board														
4	Check connection at PCB Board														
5	Make design for project casing														
6	Coding														
7	Make some survey form														
8	Update project progress at supervisor														
9	Project competition														
10	Log book														
11	Final report submission														

Table 3.2 : Gantt Chart of project for second semester

Table shows the Gantt Chart of project for second semester. It is a plan to conduct on this project. On week 1-5 the project progress was buy and check for component that use in project and drill the PCB Board. On week 6-11 project progress was solder th PCB Board and check the connection at PCB board after solder. On week 7-12 was make some design for casing project, make or check coding project and make some survey form. On week 13 was project competition under JKE at polytechic. On week 14 was final report submission. And lastly, on all week was update progress at supervisor and do logbook for all progress.

3.8 CODING

```
#include <LiquidCrystal_I2C.h>
#include <Wire.h>

// Template ID, Device Name and Auth Token are provided by the Blynk.Cloud
// See the Device Info tab, or Template settings
#define BLYNK_TEMPLATE_ID           "TMPLcuVxZrMh"
#define BLYNK_DEVICE_NAME           "Quickstart Device"
#define BLYNK_AUTH_TOKEN            "YThOdvwerKWzPA2rZzpPaQBKCBYuZlwv"


//LiquidCrystal_I2C lcd(0x27, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);  // Set the LCD I2C address
//LiquidCrystal_I2C lcd(0x3F, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);  //some address is different
LiquidCrystal_I2C lcd(0x27, 16, 2);


// Comment this out to disable prints and save space
#define BLYNK_PRINT Serial


#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

#define SW D7
```

```
#define SW D7

#define Buzz D8

#define L1x D4

#define L2x D5

#define L3x D6


char auth[] = BLYNK_AUTH_TOKEN;

float Sens1;

// Your WiFi credentials.

// Set password to "" for open networks.

char ssid[] = "SKIN";

char pass[] = "12345678";


int MDD=0;

int Rly1=0, Rly2=0, Rly3=0, Rly4=0, Rly5=0, Rly6=0,  Rly7=0,  Rly8=0;

int Val1=90, Val2=0, Val3=0, Val4=0, Val5=0, Val6=0,  Val7=0,  Val8=0;


int AL1=0,AL2=0,AL3=0;

int TM=0;

BlynkTimer timer;


int pos=0;

bool led_set[2];

long timer_start_set[2] = {0xFFFF, 0xFFFF};

long timer_stop_set[2] = {0xFFFF, 0xFFFF};

unsigned char weekday_set[2];
```

```
long rtc_sec;

unsigned char day_of_week;


bool led_status[2];

bool update_blynk_status[2];

bool led_timer_on_set[2];

float FORCE=0;


// This function is called every time the Virtual Pin 0 state changes



// This function is called every time the device is connected to the Blynk.Cloud

BLYNK_CONNECTED()

{

// Change Web Link Button message to "Congratulations!"

// Blynk.setProperty(V3, "offImageUrl", "https://static-image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations.png");

// Blynk.setProperty(V3, "onImageUrl", "https://static-image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations_pressed.png");

// Blynk.setProperty(V3, "url", "https://docs.blynk.io/en/getting-started/what-do-i-need-to-blynk/how-quickstart-device-was-made");

}


// This function sends Arduino's uptime every second to Virtual Pin 2.

void myTimerEvent()

{
```

```
// You can send any value at any time.

// Please don't send more that 10 values per second.

//

if (MDD==1){

Blynk.virtualWrite(V0, FORCE);

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("FORCE READING:");

lcd.setCursor(0, 1);

lcd.print(FORCE,2);

}

if (MDD==0){


lcd.clear();

lcd.setCursor(0, 0);

lcd.print("  STANDBY MODE");


}

}


BLYNK_WRITE(V4)

{

Rly1 = param.asInt(); // assigning incoming value from pin V1 to a variable


if (Rly1==1){

MDD=1;
```

```
Blynk.virtualWrite(V1, "ACTIVATED");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("START MEASUREMENT");
lcd.setCursor(0, 1);

//Blynk.logEvent("manual", String("MESSAGE"));
}
if (Rly1==0){
MDD=0;

Blynk.virtualWrite(V1, "OFF");

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("STANDBY MODE");
lcd.setCursor(0, 1);
```

```
//Blynk.logEvent("manual", String("MESSAGE"));
}

// process received value
}

BLYNK_WRITE(V7)
{
Rly7 = param.asInt(); // assigning incoming value from pin V1 to a variable

if (Rly7==1){
// waits 15ms for the servo to reach the position
}
// Blynk.logEvent("manual", String("MESSAGE"));


// process received value
}


BLYNK_WRITE(V2)
{
Rly2 = param.asInt(); // assigning incoming value from pin V1 to a variable

if (Rly2==1){
```

```
delay(500);

}

// process received value
}



BLYNK_WRITE(V5)
{
Rly5 = param.asInt(); // assigning incoming value from pin V1 to a variable

if (Rly5==1){

}
if (Rly5==0){

}

// process received value
}

BLYNK_WRITE(V6)
{
Rly6 = param.asInt(); // assigning incoming value from pin V1 to a variable
```

```
if (Rly6==1){

}
if (Rly6==0){

}

// process received value
}



BLYNK_WRITE(V1)
{
Val1 = param.asInt(); // assigning incoming value from pin V1 to a variable



Serial.print("");
Serial.println(Val1);

// process received value
}

BLYNK_WRITE(V9)
{
unsigned char week_day;
```

```
TimeInputParam t(param);

if (t.hasStartTime() && t.hasStopTime() )
{
timer_start_set[0] = (t.getStartHour() * 60 * 60) + (t.getStartMinute() * 60) + t.getStartSecond();
timer_stop_set[0] = (t.getStopHour() * 60 * 60) + (t.getStopMinute() * 60) + t.getStopSecond();

Serial.println(String("Start Time: ") +
t.getStartHour() + ":" +
t.getStartMinute() + ":" +
t.getStartSecond());

Serial.println(String("Stop Time: ") +
t.getStopHour() + ":" +
t.getStopMinute() + ":" +
t.getStopSecond());

for (int i = 1; i <= 7; i++)
{
if (t.isWeekdaySelected(i))
{
week_day |= (0x01 << (i-1));
Serial.println(String("Day ") + i + " is selected");
}
else
```

```
{
week_day &= (~(0x01 << (i-1)));
}
}

weekday_set[0] = week_day;
}
else
{
timer_start_set[0] = 0xFFFF;
timer_stop_set[0] = 0xFFFF;
}
}

//
##########################################################################################
#######################



void setup()
{
Wire.begin(D2,D1);



pinMode(Buzz,OUTPUT);
lcd.begin();
```

```
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Initializing..");
lcd.setCursor(0, 1);
lcd.print("pls wait");
delay(2500);

Serial.begin(9600);
digitalWrite(Buzz,HIGH);
delay(20);
digitalWrite(Buzz,LOW);
delay(20);
digitalWrite(Buzz,HIGH);
delay(20);
digitalWrite(Buzz,LOW);
delay(20);
digitalWrite(Buzz,HIGH);
delay(20);
digitalWrite(Buzz,LOW);
delay(20);

Blynk.begin(auth, ssid, pass);
// You can also specify server:
//Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
//Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);
```

```
// Setup a function to be called every second
timer.setInterval(500L, myTimerEvent);
/*
for (pos = 0; pos <= 180; pos += 1) { // goes from 0 degrees to 180 degrees
// in steps of 1 degree
myservo.write(pos);             // tell servo to go to position in variable 'pos'
delay(15);                      // waits 15ms for the servo to reach the position
}
for (pos = 180; pos >= 0; pos -= 1) { // goes from 180 degrees to 0 degrees
myservo.write(pos);             // tell servo to go to position in variable 'pos'
delay(15);                      // waits 15ms for the servo to reach the position
}
*/

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("  --READY--");
lcd.setCursor(0, 1);
}

void loop()
{
Blynk.run();
timer.run();
// You can inject your own code or combine it with other sketches.
// Check other examples on how to communicate with Blynk. Remember
```

```
// to avoid delay() function!

if (MDD==1){

Sens1 = analogRead(A0);          //read the value from the sensor

Sens1 = (5.0 * Sens1 * 100.0)/1024.0;  //convert the analog data to DC AC VOLTAGE

FORCE=500-Sens1;

}

}
```

3.8.1 SCHEMATIC CIRCUIT

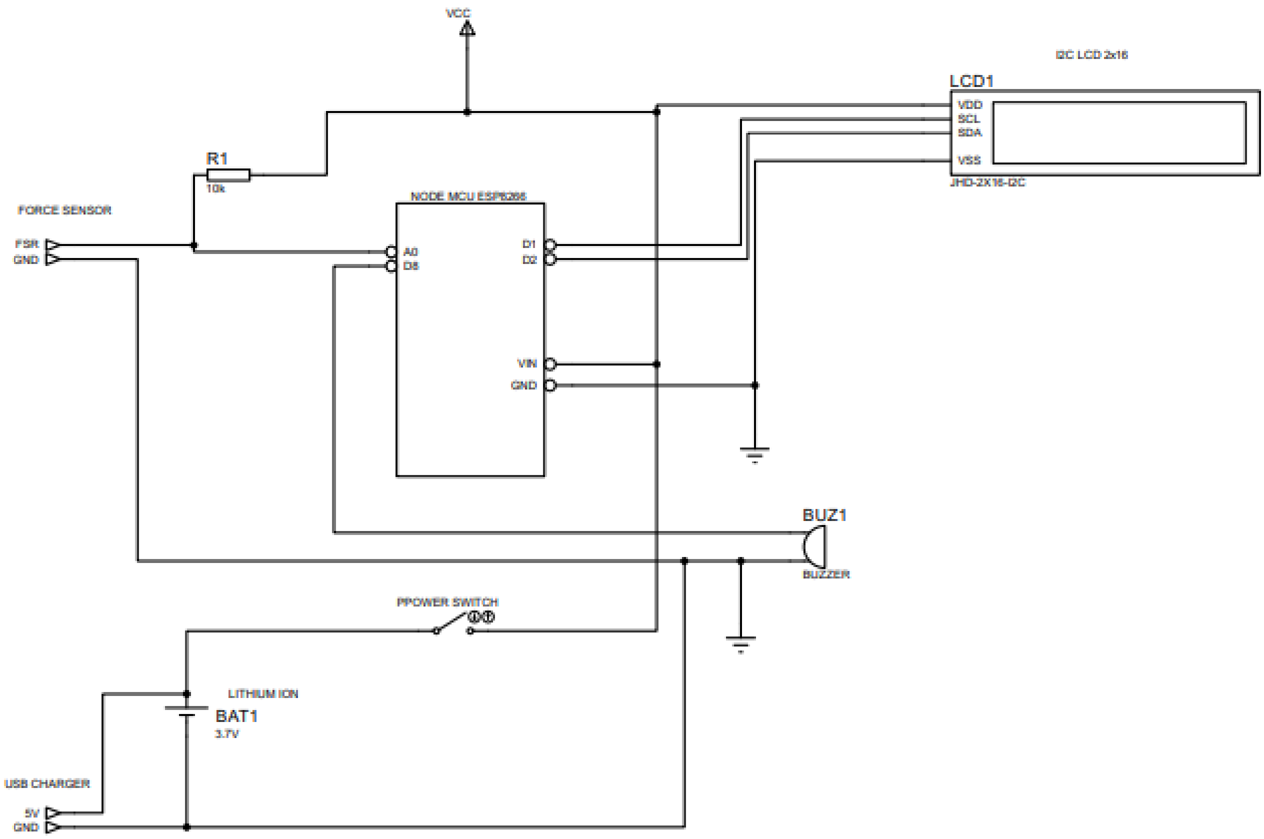


Figure 3.1 : Schematic Circuit

3.8.2 PCB DESIGN

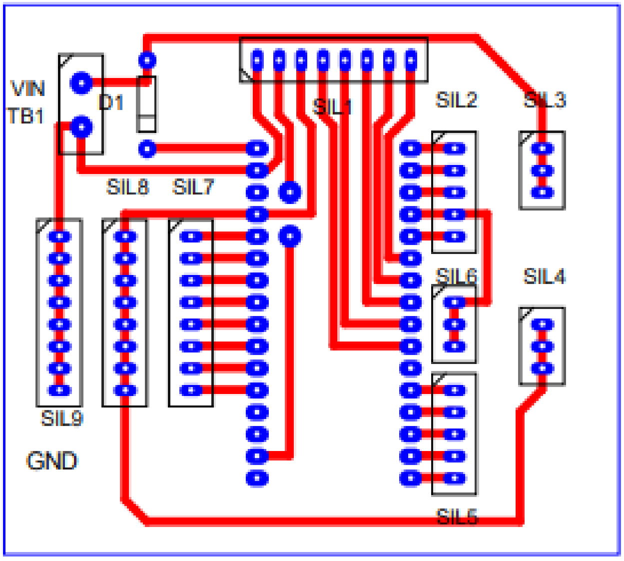


Figure 3.2 : PCB Design

3.8.3 PCB LAYOUT/PCB BOARD

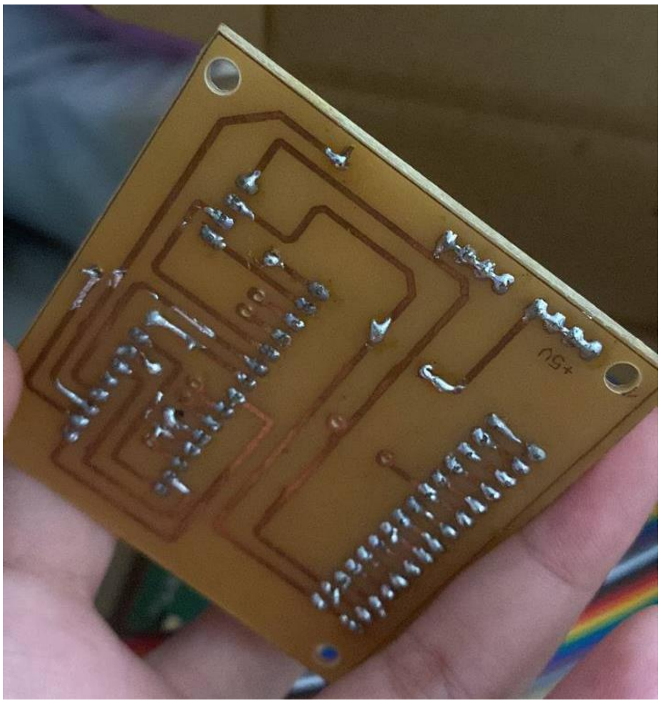


Figure 3.3 : PCB Layout/ PCB Board

CHAPTER 4

RESULT AND DISCUSSION

4.1 INTRODUCTION

This chapter will explain the project's findings and results. The evaluation of this product by users and medical professionals is also covered in this section. By doing this, the scope and goals of the research will be met. To ensure the project's success, every piece of data had been thoroughly analysed.

4.2 RESULT AND DISCUSSION

With so many accident and injuries involve the artery bleeding stoppage or minor bleeding. I sure if this product available on current in market or has been created. Healthcare Skin Pressure Detector will help many people with it. Or it will be at the hospital to help doctor to stop the artery bleeding stoppage or related with situation. It can use anytime with power supply and the size its not to big and suitable to be taken anywhere. With price that not to pricey and suitable and reasonable price, it will be help to people. When the sensor detect the pressure applied and the sensor detect 20 lbs and not to high enough when the sensor detecting pressure applied for artery bleeding stoppage. And this product can make a new healthcare simulation trainers. And this concept to testing how Arduino boards can function with pressure and make something new in the medical world.

4.3 ANALYSIS FROM PROJECT

This project was easy to build overall, although there were a few challenging steps, particularly the coding, PCB drill, find shop that can make a clear case, and soldering component at PCB board. And, use Google and a few video at Youtube to help learn how to make out those task correctly. It had aided in ability to comprehend more and generate quality work. This project had its up and down, but was able to finish it thank to all support and love from supervisor, friends, and family. And thank to all because always there for me.

4.4 PROJECT DESIGN

This project design is made to be compact, small and portable to allow the patient and the user to allow the user and patient to carry and hold around. And the cases project was clear and able the user or patient see the amount of pressure that have been measure from skin user and patients. This project also it is easy to charge the battery because of the convenience of charging using a cable that is compatible with a power bank or any charger that uses a USB and type C charger head. And also this project has a LCD display and been connect at apps call “Blynk” which able to present the results of skin pressure, where there can view the results at apps “Blynk” by open the apps. From apps “blynk” also present the graph that show how strong the pressure from skin detect.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

In conclusion, I created the 'Healthcare Skin Pressure Detector' to construct a new simulation for detecting or sensing pressure beneath the skin. The goal of this experiment is to investigate if it can detect arterial bleeding stoppage pressure. 'Healthcare Skin Pressure Detector' was created to show how Arduino boards may be used in Force Sensitive Sensors (FSR). A flexible, wearable sensor patch has been proposed for simultaneous monitoring of local skin pressure and temperature. The measurement techniques utilised in this study are ideal for application in a wireless patch system. The findings reveal that pressure and temperature values from various sensors may be integrated and displayed, providing information that can alert a caregiver to a condition that needs to be addressed.

5.2 RECOMMENDATION

As a recommendation for future, the place for measure pressure can be improve to make that secure and make that look safety to make that more better future. In addition, the design and that have been mention before is safety element of healthcare skin pressure detector also can be improve so that it will look more interesting in feature. This product are made up of moderate costing but good quality, so that the price would be affordable for user to buy to be use at their home. It functions also helpful to user and patient to.

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APPENDIX A

Bill of Materials:

Module and other requirements	Price
Arduino UNO	RM47.90
Breadboard	RM3.90
Jumper Wires	RM3.70
LED	RM0.60
Force Sensitive Resistor	RM30.00
Alligator Clips	RM2.60
Resistor 220Ω	RM3.00
LCD	RM12.90
Rotary Potentiometer	RM0.60
Resistor 10k	RM1.00
Fake Skin	RM4.99
Printed Circuit Board and Etching Requirement	RM20.00
NodeMCU	RM20.00
	RM151.20

Table 5.1 : Bill Of Materials

Result of project:

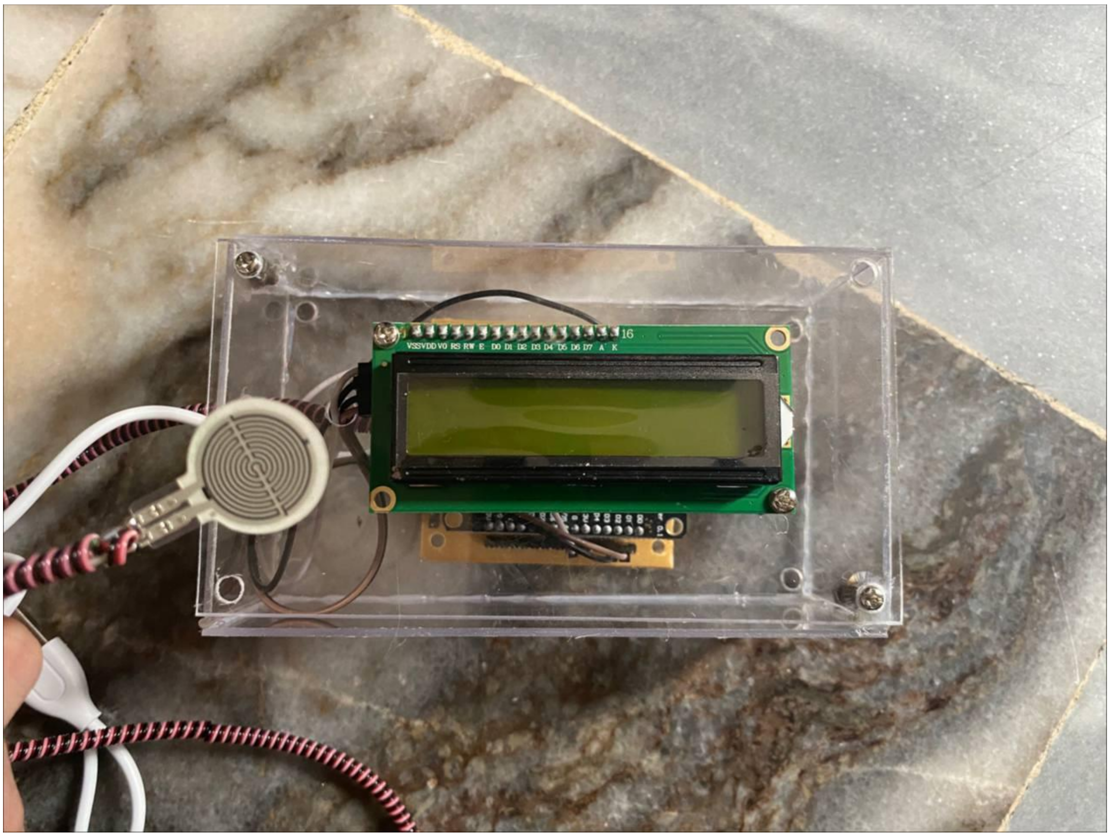

Figure 5.1 : Results Of Project