STRESS METER MINOR WITH THE TREATMENT VERSION

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JABATAN KEJURUTERAAN ELEKTRIK

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

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SESI 1 : 2022/2023

CONFIRMATION OF THE PROJECT
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explained to our source"

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TITLE : **STRESS METER MINOR WITH THE TREATMENT VERSION**

SESSION: **SESI 1 2022/2023**

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Made and in truth that is recognized by;

a) **Nurin Batrisyia Binti Abdul Rahim**	)	. ...………………………….
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As a project supervisor, on the date:) **Ts Puan Ilya Binti Ismail**

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ABSTRACT

The purpose of stress meter is to assess the level stress of human being. The stress can cause hair to fall, acne to break out and many other problems. These manifestations of stress can cause even more anxiety. This stress monitor lets you assess your emotional pain. Stress is a term that refers to the sum of the physical, mental, and emotional strains or tensions on a person. Due to that, it show the important for a stress meter to be develop in order to decrease the stress level. So this stress meter is to solve all the problems caused due to stress by checking the stress of an individual and taking care before any serious problem occurs. During high stress is due to an increase in the blood supply to the skin. This increases the permeability of the skin and hence the conductivity for electric current. This property of the skin is used. If the stress is very high, it gives visual indication through a light-emitting diode LED display along with warning beep. The gadget is small enough can be taken anywhere. The LM3915 is a monolithic integrated circuit that senses analog voltage levels and drives led bar display, providing a logarithmic 3db/step analog display. Here to measure the stress level, the touch pads of the stress meter sense the voltage variations across the touch pads and convey the same to the circuit. The circuit is very sensitive and detects even a minute voltage variation across the touch pads. This project there is a use of lm3915 bar display that can show the level of pressure we are at the maximum level or minimum level. The stress meter thus detects the resistance of skin which is according the stress level and gives a visual indications on a LED display and instruction to reduce the stress. The LED's on the stress meter can be observed as stress level indicators from zero to 5 stress level on scale of FIVE. The high stress of a person is indicated through a warning beep. The LED 1 glows by default when the circuit on. When the person touches the touch pad of the stress meter with his finger, it senses the skin resistance and hence the stress. On the scale of ten, stress level from 0 to 10 can be observed, where the LED 10 when on gives a warning beep for high stress indication.
Keyword- Stress Meter, LED, LM3915, LED bar display.

ABSTRAK

Tujuan meter tekanan adalah untuk menilai tahap tekanan manusia. Tekanan boleh menyebabkan rambut gugur, jerawat tumbuh dan banyak lagi masalah lain. Manifestasi tekanan ini boleh menyebabkan lebih banyak kebimbangan. Pemantau tekanan ini membolehkan anda menilai kesakitan emosi anda. Tekanan adalah istilah yang merujuk kepada jumlah ketegangan atau ketegangan fizikal, mental dan emosi pada seseorang. Disebabkan itu, ia menunjukkan pentingnya meter tekanan dibangunkan untuk mengurangkan tahap tekanan. Jadi meter tekanan ini adalah untuk menyelesaikan semua masalah yang disebabkan oleh tekanan dengan memeriksa tekanan seseorang individu dan menjaga sebelum sebarang masalah serius berlaku. Semasa tekanan tinggi adalah disebabkan oleh peningkatan bekalan darah ke kulit. Ini meningkatkan kebolehtelapan kulit dan seterusnya kekonduksian untuk arus elektrik. Sifat kulit ini digunakan. Jika tegasan adalah sangat tinggi, ia memberikan petunjuk visual melalui paparan LED diod pemancar cahaya bersama-sama dengan bip amaran. Gajet yang cukup kecil boleh dibawa ke mana-mana. LM3915 ialah litar bersepadu monolitik yang mengesan tahap voltan analog dan memacu paparan bar berteraskan, menyediakan paparan analog 3db/langkah logaritma. Di sini untuk mengukur tahap tegasan, pad sentuh meter tegasan merasakan variasi voltan merentasi pad sentuh dan menyampaikan perkara yang sama kepada litar. Litar ini sangat sensitif dan mengesan walaupun perubahan voltan seminit merentasi pad sentuh. Projek ini terdapat penggunaan paparan bar lm3915 yang boleh menunjukkan tahap tekanan kita berada pada tahap maksimum atau tahap minimum. Meter tekanan dengan itu mengesan rintangan kulit yang mengikut tahap tekanan dan memberikan petunjuk visual pada paparan LED dan arahan untuk mengurangkan tekanan. LED pada meter tegasan boleh diperhatikan sebagai penunjuk aras tegasan dari sifar hingga 5 aras tegasan pada skala LIMA. Tekanan tinggi seseorang ditunjukkan melalui bip amaran. LED 1 menyala secara lalai apabila litar dihidupkan. Apabila orang itu menyentuh pad sentuh meter tekanan dengan jarinya, ia merasakan rintangan kulit dan seterusnya tekanan. Pada skala sepuluh, tahap tegasan dari 0 hingga 10 boleh diperhatikan, di mana LED 10 apabila dihidupkan memberikan bunyi bip amaran untuk petunjuk tekanan tinggi.
Kata Kunci- Meter Tekanan, LED, LM3915, paparan bar LED.

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CHAPTER 1

1 INTRODUCTION

1.1   Introduction

Stress is the very common condition of every human being. Stress is nothing more than a socially acceptable form of mental illness. This Stress meter allows to assess the emotional pain. If the stress is very high, it gives visual indication on a LED display along with a beep.

This stress monitor lets assess level of stress. If the stress is very high, it gives visual indication through a light emitting diode LED display along with warning beep. The gadget is small enough to be worn around the wrist. The LM3915 is a monolithic integrated circuit that senses analog voltage levels and drives ten LED's, LCD's or vacuum fluorescent displays, providing a logarithmic 3db/step analog display. The gadget is based on the principle that the resistance of the skin varies in accordance with   emotional states. If the stress level is high the skin offers less resistance, and if the body is related the skin resistance is high.

During high stress is due to an increase in the blood supply to the skin. This increases the permeability of the skin and hence the conductivity for electric current. This property of the skin is used. Here to measure the stress level, the touch pads of the stress meter sense the voltage variations across the touch pads and convey the same to the circuit. The circuit is very sensitive and detects even a minute voltage variation across the touch pads.

In an article "Stress and Mind Control", 21/03/2008, Roberto Bonomi stated that "When we speak of the fabulous relaxation capacity that mind control gives us, the first thing that comes to our mind, is that we will be able to take off, the excesses of nervous tension, the stress; and this is a great benefit. Because suppose that you could measure stress in inches, and that you have stress zero when the meter is located in zero." Based on this project is aimed to give a visual indication of one's stress through a light-emitting diode display along with a warning light.

Based on a study of "Predictors of Academic Stress Among College Students" which has been implemented by Mehmet A. Karaman with his colleagues aims is to study the predictive factors of academic stress of college students. Three hundred and seven diploma students (179 males, 128 females) participated in the study. The results showed that female college students had higher academic stress than male college students. Bivariate correlations and multiple regression analyzes revealed that life satisfaction, locus of control, and gender were important predictors of academic stress. The data below show the mean value (mean), SD (measure of total variation) and "n" indicates the population size that has been stated below.

Descriptive Statistics Based on Academic Stress

Dependent Variable and Gender	M	SD	n
Frustrations			
Men	19.47	4.68	179
Women	19.03	4.65	128
Conflict			
Men	12.36	2.71	179
Women	12.19	2.90	128
Pressures			
Men	15.27	3.00	179
Women	16.38	2.76	128
Changes			
Men	8.64	2.84	179
Women	9.15	2.94	128
Self-imposed			
Men	21.41	3.87	179
Women	22.45	3.63	128
Physiological			
Men	31.73	10.31	179
Women	38.01	10.64	128
Emotional			
Men	11.67	3.93	179
Women	13.63	4.24	128
Behavioral			
Men	15.22	5.51	179
Women	18.19	5.67	128
Appraisal			
Men	9.45	1.77	179
Women	9.34	1.74	128

1.2 Background Research

Most students experience significant amounts of stress, and this stress can take a significant toll on health, happiness, and grades. That means teens are experiencing significant levels of chronic stress, and that they feel their levels of stress generally exceed their ability to cope effectively. Roughly 30% report feeling overwhelmed, depressed, or sad because of it. Stress can affect health-related behaviors like sleep patterns, diet, and exercise as well, taking a larger toll. Stress is a feeling that people have when they are struggling to cope with challenges related to finances, work, relationships, environment, and other situations. Moreover, stress is felt when an individual perceives a real or imagined challenge or threat to a their well-being. People often use the word stress interchangeably with anxiety, feeling anxious, fearful, nervous, overwhelmed, panic, or stressed-out. Stress is the body's natural defense against real or imagined danger. It flushes the body with hormones to prepare systems to evade or confront danger. This is known as the "fight-or-flight or freeze" response.

COVID-19 not only affects physical health, but greatly affects psychological health. Movement control orders cause unpredictable stress and psychological stress to populations around the world. The study aims to assess stress, anxiety and depression, and to study coping responses among the adult population during the COVID-19 Movement Control Order in Malaysia. The design of an online cross -sectional survey was carried out within 1st April - 30th April 2020. 716 participants were recruited through social media platform. These data were supplemented by Asma Perveen and colleagues from the Department of Psychology and Counseling who have conducted studies investigating the prevalence of depression, anxiety

and stress and coping responses among the adult population of Malaysia during the period of COVID-19 pandemic, movement control order, the results revealed that there was significant prevalence of score on DASS scale. The demographic tables shows that the age mean=33.07(range 18 to 69), male (n=188), female (n=523) prefer not say gender (n=5). The population sample was taken from (n=15) states of Malaysia. The higher number of participants were full time working (n=426) and students (n=29%). The data below shows evidence from the investigations they have made.

		n= 716	%	Mean (SD)
Age (18-69, in years)		-	-	33.07 (11.66)
Gnder	Male	188	26.3	
	Female	523	73	
	Prefer not to say	5	0.7	
States	Johor	47	6.6	
	Kedah	46	6.4	
	Kelantan	36	5.0	
	Melaka	12	1.7	
	Negeri Sembilan	29	4.1	
	Pahang	18	2.5	
	Perak	127	17.7	
	Perlis	7	1.0	
	Pulau Pinang	15	2.1	
	Sabah	28	3.9	
	Sarawak	16	2.2	
	Selangor	213	29.7	
	Terengganu	22	3.1	
	WP Kuala Lumpur	92	12.8	
	WP Putrajaya	8	1.1	
Occupation	Working Full Time	426	59.5	
	Working Part Time	30	4.2	
	Retired	18	2.5	
	Unemployed	18	2.5	
	Student	170	23.7	
	Housewife or Househusband	23	3.2	
	Intern	31	4.3	

Table 1. *Comparison of Depression, Anxiety and stress with coping response*

DASS and Coping Response	Stress	Anxiety	Depression
	(n=716)	n=716)	n=716)
	(mean=2.02)	(mean=1.71)	(mean=2.28)
	Normal =210	Normal =231	Normal =412
	Mild =369	Mild =198	Mild =160
	Moderate =68	Moderate =186	Moderate =94
	Severe=52	Severe=59	Severe=39
	Extreme =17	Extreme =42	Extreme =11

1.3 Problem Statement

Stress is a term that refers to the sum of the physical, mental, and emotional strains or tensions on a person. Feelings of stress in humans result from interactions between persons and their environment that are perceived as straining or exceeding their adaptive capacities and threatening their well-being. The element of perception indicates that human stress responses reflect differences in personality as well as differences in physical strength or health. This Stress meter allows to assess level of stress. Stress meter is based on the principle that the resistance of the skin varies in accordance with emotional states. Resistance varies inversely proportional to the stress.

Stress is a global issue that to date is still discussed by researchers around the world. Stress-related studies also continue to receive attention from researchers in Malaysia. This is because stress can cause some adverse effects to the individual who experiences it such as affecting relationships with supervisors, peers and family members and producing behaviors that can affect image and harmony in an institution such as oppressing others. Individuals who experience stress also show lower academic performance compared to individuals who are able to control stress within themselves. A cross-sectional study was conducted on 506 students between the ages of 18 and 24 years from four public universities in the Klang Valley, Malaysia. Analysis showed among all students, 139.15 student had moderate, and 49 had severe or extremely severe depression; 172 had moderate, and 146.74 had severe or extremely severe anxiety; and 94.12 had moderate and 25.80 had severe or extremely severe stress scores based on the DASS-21 inventory.

The Royal Malaysian Police (PDRM) recorded 631 suicide cases during 2020 and 468 cases in the period from January to May 2021. For 2019, a total of 609 suicides were recorded and an average of two suicides occurred daily from 2019 to May 2021. Bukit Aman Criminal Investigation Department director, Datuk Seri Abd Jalil Hassan, said during the period 2019 to May 2021, a total of 281 men and 1,427 women were reported to have committed suicide. "Most of the victims involved are between 15 to 22 years old, which is a total of 872 people and for the victims aged between 19 to 40 years old is a total of 668 people. "Johor recorded the highest number of cases in 2019 and 2020 which was 101 cases while Selangor recorded the highest number of cases from January 2021 to May 2021 which was 117 cases," he said in a statement today. The three main causes of suicide were the victims facing family problems, emotional and financial stress. "The most common suicides based on statistics are hanging 75.1 per cent, building 13.6 per cent and drinking poison 5.7 per cent.

The stress can cause hair to fall, acne to breakout and the must serious people that will cause a tendency to commit suicide. These manifestations of stress can cause even more anxiety. Due to that, it show the important for a stress meter to be develop in order to decrease the stress level. So this stress meter is to solve all the problems caused due to stress by checking the stress of an individual and taking care before any serious problem occurs.

1.4 Research Objectives

- To build a device that can detect user stress level across the touch pad that can sense the voltage variations and convey the same to the circuit
- .To develop a program that allows to gave the audio and instruction to reduce the level of stress.

1.5   Scope of Research

According to American Psychological Association (APA), there are 3 different types stress — acute stress, episodic acute stress, and chronic stress. The 3 types of stress each have their own characteristics, symptoms, duration, and treatment approaches. Acute pressure is usually brief. It is a common and frequent stress among students especially. Acute stress is most often caused by reactive thinking. Negative thoughts dominate a situation or event that has recently occurred, or a situation, event or request that will come in the near future. For example, if we have recently been involved in an argument, we will likely experience acute stress associated with recurring negative thoughts about the quarrel. Or easier to understand is the situation of students who may experience acute stress that is about the next job deadline and the addition of work at one time. However, often when the stress caused by thinking is reduced or removed, the stress will be reduced as well eventually. Subsequently, episodic acute stress is common for people who regularly experience acute stress, or whose life is constantly triggered by stress. Individuals who frequently experience acute stress often live chaotic and crisis lives. They are always in a hurry or feel stressed. They carry a lot of responsibilities, and usually can't stay organized with so many time demands. These individuals are always in the grip of an acute stress load. this pressure is heavier than normal acute pressure. The last is chronic stress is the most dangerous type of stress. If chronic stress is not treated for a long period of time, it can significantly damage your physical health and is often irreversible as well as worsen your mental health. For example, long -term poverty, repeated abuse in any form, unemployment, dysfunctional families, poor work environments, substance abuse or unhappy marriages can cause significant chronic stress. Chronic stress can also occur when an individual feels hopeless, unable to escape the source of stress, and desperate to find a solution. Chronic stress can be caused by unpleasant experiences in childhood or traumatic experiences later in life. So from the above description, the stress meter only allows to reduce acute stress only, this is because the stress is most suitable to be associated with students who are stressed due to too much work to be completed and a short period of time. So this project allows students to know the level of acute stress in which range. This stress meter can detect the level of stress through skin resistance between the ages of 20 to 30 because at this age range the skin easily shows strong sensitivity. The project will be tested on the most stressed students to find out their respective stress levels and the number of students to be tested is only 30 people. Next the project focuses on sem 4 classes DEP4C and DEP4A. In this project there is a use of lm3915 bar display that can show the level of pressure we are at the maximum level or minimum level.

1.6   Project Significance

Based on a search about this project I am currently running, there are previous projects that uses skin resistance to determine pressure felt by someone. The project was implemented by K.Prannoy Koundinya his colleagues, the name of their project is "STRESS METER USING SKIN RESISTANCE AND MUSCLE STRENGTH".   The project a purpose to detect a person's stress level through muscles and skin, this is because in their report, they have mentioned that a person's muscle tension varies with their stress level - the greater the pressure, the greater the likelihood of a muscle is to produce a synchronous wrinkle effect. At the same time, the skin offers some resistance to current and voltage. In a relaxed state they offer more resistance and higher their pressure offers less resistance. This resistance changes with the emotional state body. Although this is almost invisible, the electrodes record the change. The similarities of my project with the project narrated above have similarities in the concept of detecting a person's stress level through their skin resistance. But I don't use muscles as a medium to track a person's stress level. And also, this project of mine, is not only able to track a person's stress level, but also works to reduce stress by giving simple treatments like exercises that can lower stress, play soothing songs and so on. This shows there is a difference between my own projects and the projects they have run.

1.7   Chapter Summary

This chapter contains all of the procedures for our project, including the problem statement, study objectives, and study scope. Stress meter using skin resistance is a basic model to determine the stress of a person. This device can be further developed to design equipment like lie detectors; skin response meters; skin resistance meters; fitness meters;griposcopes etc. There fore this model, if further developed can be used in medical field, forensic department and it even helps in improving the body fitness . This concept came to me via the internet, and it has now evolved into a human need. There's also background research on our topic in there.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Stress is a term that refers to the amount of physical, mental and emotional stress or strain on a person. Feelings of stress in humans stem from interactions between people and their environment that are perceived as straining or exceeding their adaptive capacity and threatening their well -being. The perceptual element suggests that human stress responses reflect differences in personality as well as differences in physical strength or health. The project focuses on a person's stress can be determined by sensing skin resistance of the person. Skin resistance changes emotions body condition. The grip of the person used on the probe carries led bar display to shine accordingly from pin1to pin10 .Therefore the stress level the person can be determined by the oscillation of the led point upwards and come down

2.2 Stress Meter Using Skin Resistance and Muscle Strength. (Literature Review Topic 1)

In this project the stress of a person can be determined by sensing the skin resistance and muscle strength of that person. Two probes are used to sense the grip of that person. Skin resistance changes the emotional state of the body. The grip of the person that is applied on the probe leads the LEDs to glow accordingly from pin1to pin10 .Hence the stress levels of that person can be determined by the oscillations of the LED dot up and down. .It is a very simple process and can be used as a lie detector ,skin response meter etc. This resistance changes with the emotional state of the body. Though this is barely perceptible, the electrodes register the change that is detected by LM3914 for which the LED dot oscillates up and down in this way the stress meter detects the stress. Stress meter using skin resistance and muscle strength is a basic model to determine the stress of a person. This device can be further developed to design equipment like lie detectors; skin response meters; skin resistance meters; fitness meters; griposcopes etc. there fore this model, if further developed can be used in medical field, forensic department and it even helps in improving the body fitness. This article supported by K.PRANNOY KOUNDINYA, SHILPA ANBALAGAN, " STRESS METER USING SKIN RESISTANCE AND MUSCLE STRENGTH".

2.21 Previous Research Skin (Subtopic Literature Review Topic 1)

The skin is the outer covering of the body. In humans, it is the largest organ of the integumentary system made up of multiple layers of ectodermal tissue, and guards the underlying muscles, bones, ligaments and internal organs. Human skin is similar to that of most other mammals except that it is not protected by a pelt and appears hairless though in fact nearly all human skin is covered with hair follicles. There are two general types of skin, hairy and glabrous skin. Skin offers some resistance to current and voltage. At relaxed state they offer more resistance and at higher stress they offer less resistance. This resistance changes with the emotional state of the body. Though this is barely perceptible, the electrodes register the change that is detected by LM3914 for which the LED dot oscillates up and down in this way the stress meter detects the stress.

Skin is composed of three primary layers:
  * The epidermis, which provides waterproofing and serves as a barrier to infection.
  * The dermis, which serves as a location for the appendages of skin.
  * The hypodermis (subcutaneous adipose layer)
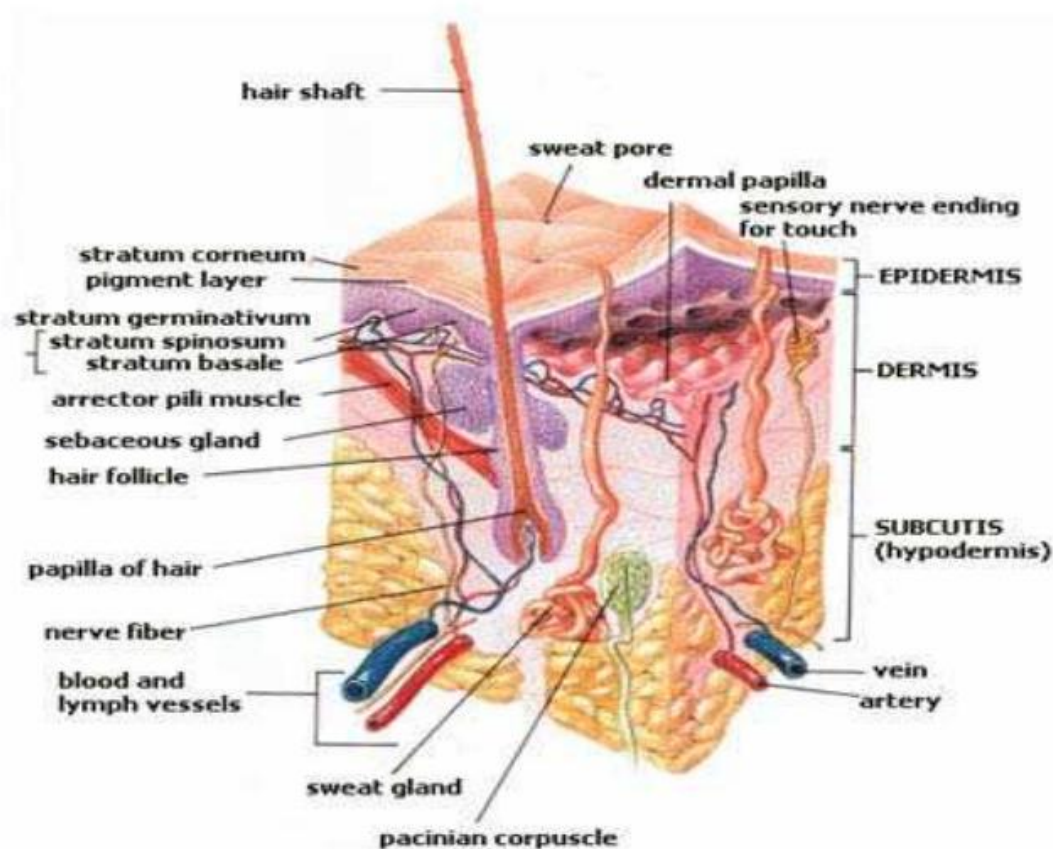
Muscle is the contractile tissue of animals and is derived from the mesodermal layer of embryonic germ cells. Muscle cells contain contractile filaments that move past each other and change the size of the cell. They are classified as skeletal, cardiac, or smooth muscles. Their function is to produce force and cause motion. Muscles can cause either locomotion of the organism itself or movement of internal organs. Cardiac and smooth muscle contraction occurs without conscious thought and is necessary for survival.

Muscle strength is what happens when the nervous system communicates a message to the muscle fibers to contract so as to produce force. Often the force produced by a muscle contraction is against resistance. This is possible due to the integration of the muscle with the other tissues and structures of other associated body systems - especially the bones (skeletal system) or, in the cases of facial muscles, the skin (integumentary system), and also the nerves (nervous system). Muscle tension changes with individual persons stress level – the greater the stress, the more likely the muscles are to produce a synchronous twitching effect. At the same time, skin offers some resistance to current and voltage.

Structure of a Skeletal Muscle

Bone

Perimysium

Blood vessel

Muscle fiber

Fascicle

Tendon Epimysium Endomysium
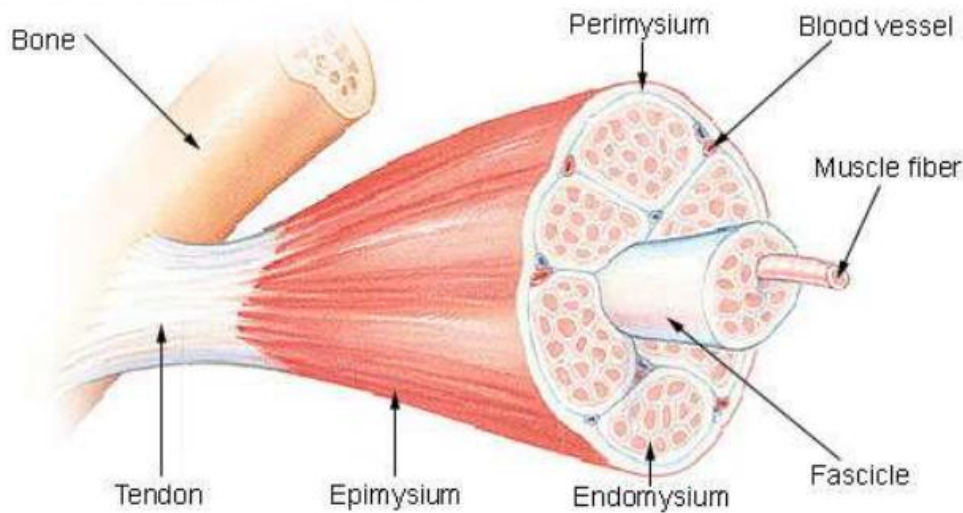
2.3 Emotional Stress Indicator (ESI) Kit. (Literature Review Topic 2)

From galvanic skin response theory, resistance varies inversely proportional to the stress. Stress level is high when the resistance of skin is less. In the relaxed state, the resistance offered by the skin is as high as 2 mega-ohms or more, which reduces to 500 kilo-ohms or less when the emotional stress is too high. The reduction in skin resistance is caused by an increased blood flow and permeability followed by the physiological changes during high stress. This increases the electrical conductivity of the skin. In this work, the relation between skin resistance and stress level is studied to analyze the skin galvanic response (GSR) towards stress. With development of a portable Emotional Stress Indicator (ESI) kit which small scale and battery operated, it can help the users that facing with stress condition to manage their stress level and to gain acceptance as a method of stress management in the workplace.

Use a non-linear system identification technique known as principal dynamic modes (PDM) to predict the activation level. Then the sensors are fabricated using o-rings and wire that both of it are covered with aluminium tape and self-locking strap. Emotional Stress indicator is designed for observing stress level.Resistance of skin varies in accordance with stress. At the stage of high stress, conductivity of electricity through the skin increases.This small voltage is amplified using signal amplifier. BC 548 is main component of signal amplifier .LED's and buzzer are used for indicating the stress levels.IC LM3915 can drive up to 10 LED's one by one in the dot/bar mode for each increment of 150mV in the input. LED 1 glows while input of IC receives 150mV, LED 10 glows when the voltage rises to 1.5V and a piezo buzzer PZ1 beeps when the stress level is very high.It helps to find out the level of tension faced by a person , for checking blood pressure, for improving mental clarity and it can also be used as a lie detector and moisture level monitor.

After knowing the subject is stressed, various exercises can be done like,breathing exercises or yoga to maintain emotional stress. Rhythmic breathing exercises can help control heart rate. The stress is expected to diminish subject's feelings of well-being, balance and enhanced energy will increases. ESI circuit is very sensitive and shows the response during a sudden moment of stress. This device is ideal to sense small currents in low input current applications. The circuit is simply and portable. And it is cost less circuit. From the experimental results, it shows that the heart rate and blood pressure reading are rise up while the skin temperature is decreasing. All this parameters show that the subject in the stress state. The ESI kit shows the same results. This article supported by AZIAN AZAMIMI, ABDULLAH, UMIDA HAFSAH, HASSAN, "DESIGN AND DEVELOPMENT OF AN EMOTIONAL STRESS INDICATOR". Published in: 2014 International Conference on

Communication and Network Technologies in IEEE Access. Date of Conference: 18-19 December 2014 and date added to IEEE Xplore: 19 March 2015. Next, ISBN information: Electronic ISBN:978-1-4799-6266-2, and DOI: 10.1109/CNT.2014.7062747.

In the system validation, 20 subjects (10=men and 10=women) have considered to be test. The stroop color word test and mental arithmetic task in visual basic window environment are used for inducing stress. Before starting the task, 3 minute resting state were performed by the participant with the closed eyes. In this experiment, the entire stimulus was presented on the computer screen, which one second for each 120 word in stroop color test and 3 minutes arithmetic subtraction in noise environment. In the stroop color test, the subject should verbally answer the color of the word but not the word and the subject ask to pronounce it loudly. While in the mental arithmetic task, the subjects are ask to carry out the arithmetic subtraction of 6 from 600 as soon as possible within 3 minute. The data collection of heart rate, blood pressure, skin temperature and LED/LCD display from the circuit are performed after the resting state, during perform the task and immediately after the task finished. This experiment protocol can be displayed as Fig. 7.
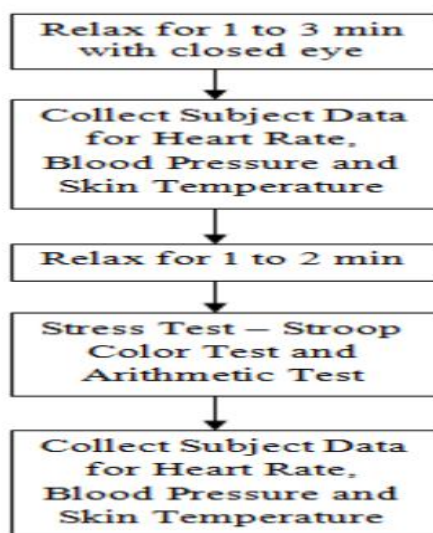

Figure 7.   Flowchart of Experimental Protocol

2.3.1 Research Background

Nowadays, there are many researches related to the stress have been conducted. A number of physiological markers of stress have been identified, including electro dermal activity, heart rate (HR), various indices of heart rate variability (HRV), blood pressure (BP), muscle tension, and respiration. Other than that, some biological markers that are known to change with changes in the stress level of the person, such as the blood composition, respiration and hormonal changes. proposed measurement of heart rate variability using compact microwave radar for stress monitoring. A novel method for non-contact monitoring of stress-induced autonomic activation through the back of a chair, using compact 24 GHz microwave radar had developed has been studied by Satoshi Suzuki and his colleagues.

Sanjay Kumar and colleagues proposed auditory noise in detection of the human stress response. In this study, the age of subjects were selected at average of 29 years old and none of subjects suffered from hearing disorders. Throughout the recording procedure, subjects were asked to perform a cognitive task such as word test (mental fatigue, perception and attention test) or English grammar correction. The noise stimuli selected are shown in Table 1.

The stimuli were produced based on evidences in references. The white noise was created and recorded on an audio CD and was calibrated according to the desired sound levels. The desired levels of stimuli were measured using an integrated impulse sound level meter of (CEL 383 from Lucas CEL Instrument Ltd England), located close to the subject's head. The stimuli were presented to the subjects through two speakers kept 2.5 meters from the participant. The experimental setup was kept fixed for all the experiments. The participant was allowed to adjust to the stimuli for 30 seconds before the signals were recorded

Table 1 - Auditory Stimuli

No.	Stimulus	Level dB (a)
[A1]	Silence (baseline condition)	40-52
[A2.1]	Continuous white noise	65
[A2.2]	Continuous white noise	75
[A2.3]	Continuous white noise	85
[A2.4]	Continuous white noise	90

Syahrull Hi-Fi Syam b Ahmad Jamil and colleagues is conducted a research in determination of stress index. Four differents types of simulation will undergo constantly in order to make sure the subjects are really under stress during the measurement processes which are hearing test, cognitive test, emotion test and environment test. The collected data from ECG are analysis using Power Spectral technique, Wavelet Transform (WT) is technique for EEG diagnosis while Wavelet-Independant Component Analysis (WICA) is technique for EMG diagnosis. Then Artificial Intelligence is use to determine the stress index which there are two types of approaches are use in order to interpret and elaborate stress index. The approaches are qualitative approach and quantitative approach.

2.3.2 Microcontroller

In this project, PIC16F877A is used. PIC16 family is the third family of PIC microcontroller. The family of PIC16 offer with six variants ranging from 3.5K-14 Kbytes of flash memory, up to 256 bytes of RAM and a mix of peripherals including EUSART, CCP and onboard analog comparators. These devices are well suited for designers with applications that need more code space or I/O than 14-pin variants supply, and are looking to increase system performance and code efficiency by employing hardware motor control and communications capability. The variation skin resistance in form of analog voltage will covert to the digital (ADC) using PIC16F877A.

LCD is important device to act as the interface to the PIC16F877A. The user interacts with the unit through a display/keyboard combination. A backlit LCD character display will be used at it offers effective communication of words at a minimal cost and easy of programming for characters. Light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices, and are increasingly used for lighting. The LED is based on the semiconductor diode. In this project, LED is used to show the stress level.

2.3.3 Hardware

The design can be divided into three parts which starting from sensor, microcontroller, LED and LCD to display the stress level indicator. Then, the Printed Circuit Board (PCB) will be developed based on that design. The circuit simulation will be done in Proteus software. Proteus is software for microprocessor simulation, schematic capture, and printed circuit board (PCB) design. A sensor is a device that measures a physical quantity and converts it into a signal, which able to read by an observer or by an instrument. A good sensor obeys the following rules are sensitive to the measured property only, insensitive to any other property likely to be encountered in its application and does not influence the measured property. In this project, touch pads sensor is proposed but since the application of touch sensor is limited based on how much pressure you press to the pad, it no longer flexible to use in this project. Then, dry electrodes are decided to be used. The dry sensors are developed using aluminium tape with straps as shown in Fig. 2. Aluminium characteristics have relatively high electrical and thermal conductivity.

Figure 2.   Aluminium Dry Sensor

Figure 3 shows the developed ESI kit where it consists of skin resistance sensor to detect the range value for resistance of skin. The data will send to the circuit for interpret the data and display on the LCD display and show the level of stress by LED. While the piezo-vibrator will give vibration to the user to make sure the users alert the light on of LED. Piezo-vibrator will only vibrate if the user reach high stress level and red LED will light on.
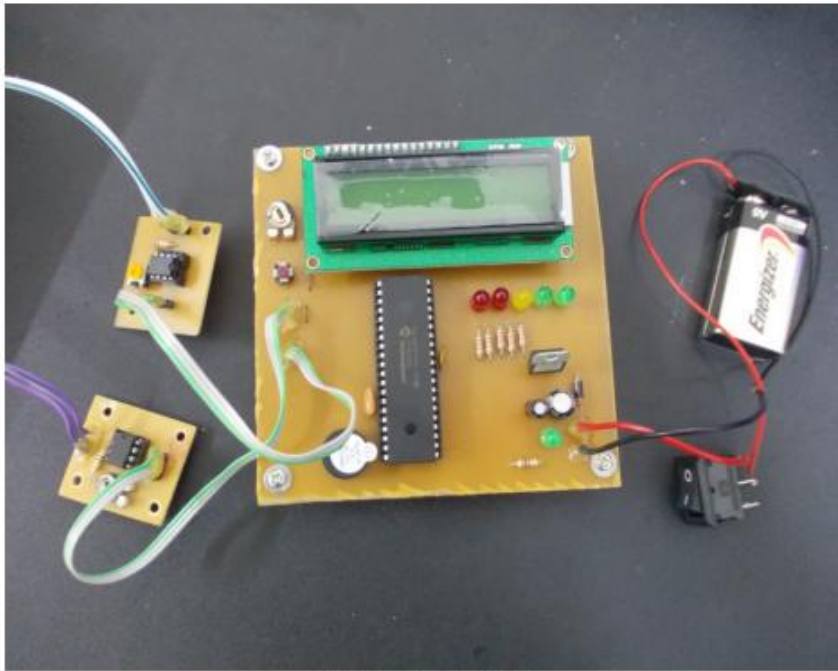
Figure 3.   ESI kit

Next, figure 4 shows the circuit for skin resistance sensor. The variation of skin resistance is converting to voltage and the input signal is amplified by LM358N. According to Figure 5, when the switch is on, the current from a 9V battery will be supplied to the circuit and flow through the diode first before go through to the voltage regulator. The function of diode is to prevent a counter current into the circuit and damage the circuit. When the current reaches at the voltage regulator, the voltage will be reduce to 5V to enable the IC to be functioning. When IC is accepting 5V, the IC will operate in accordance with programming coded. LCD will be lighten up and display the output while the temperature and skin sensor is an input which is resistance value that measure on the skin resistance will be sent to the IC to be processed and displayed at LED and LCD screen. Skin sensors will detect changes in the skin resistance while the temperature sensor will detect the skin temperature and directly send any changes from the sensor through the IC to interpret the data on the LED and LCD. In this circuit, there are five level stresses which are calm, normal, intermediate, stress and high stress. For the high stress, the LED5 will be light up and follow by the buzzer sound.
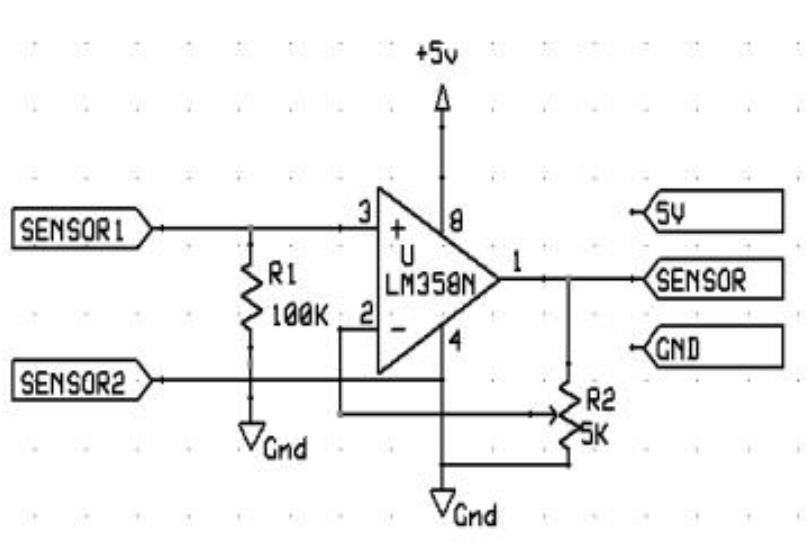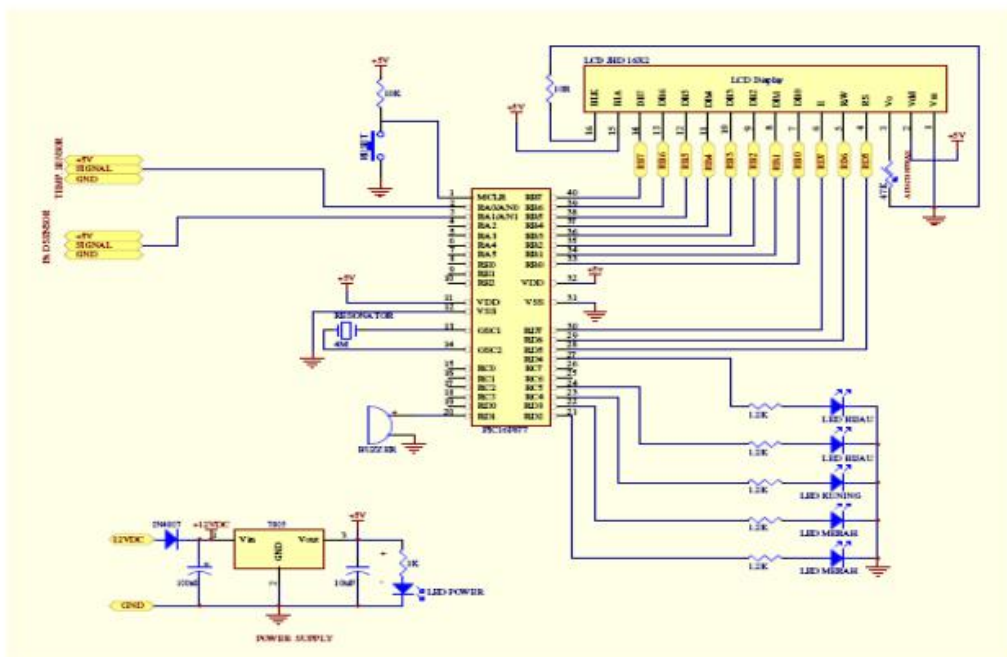
Figure 4. Sensor schematic diagram

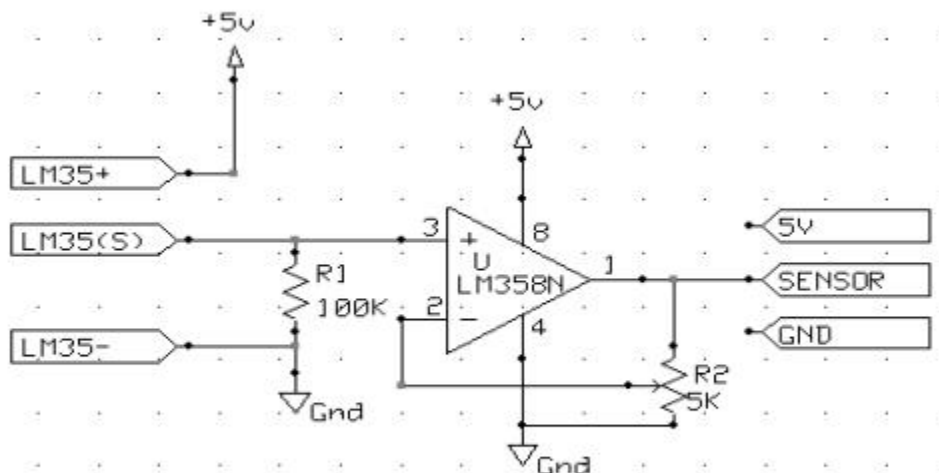Figure 5. PIC main board schematic diagram

Figure 6. Temperature sensor schematic diagram

Figure 6 shows the schematic diagram for temperature sensor. Various studies have correlated the temperature degrees with the various mental states of our stress responses such as low temperatures correlate to mental states of anger and fear, while the highest temperatures indicate sleepiness and mental peace. Finger temperature decreased under assumed stress conditions and increased under assumed relaxation conditions. Not everyone reacts to stress through dramatically colder hands and feet. Hand temperature is just one simple and effective way to measure stress levels. There is no normal temperature but a range over which temperature fluctuates and changes. With using the temperature sensor, measurement of skin resistance can be verified.

2.3.4 Programming

Programming is the artificial coded that designed to interact with hardware. The purpose of programming is to create a set of instructions that computers use to perform specific operations or to exhibit desired behaviors. The process of designing, writing, testing, debugging, and maintaining the source code of programming will do in MPLAB. The entire program will be written by using MPLAB IDE software and will embedded to PIC16F877A using PICkit 2 v2.40. An analog to digital converter is a device, which converts a continuous quantity to a discrete digital number. Typically, an ADC is an electronic device that converts an input analog voltage or current to a digital number proportional to the magnitude of the voltage or current. An ADC may provide an isolated measurement. ADC used in quantization of time varying signals by turning them into a sequence of digital samples. In this project, the voltage from sensor will convert to analog by using ADC.

2.4 Chapter Summary

This chapter more focuses about literature review with the discussion and explanation of the problem statement by providing citations that discussed on the same issues. This all information is based according to APA (American Psychological Association) style from reference in build this project section.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

To realize this Project as a ready -to -use product with security features, a very comprehensive plan is being implemented. A step -by -step procedure is done so that the Project can be completed within the stipulated time. This includes collecting pressure level data according to the DASS scale, designing mechanical parts, circuit design testing and verification. These manifestations of stress can cause even more anxiety. Due to that, it show the important for a stress meter to be develop in order to decrease the stress level. So this stress meter is to solve all the problems caused due to stress by checking the stress of an individual and taking care before any serious problem occurs. So this project allows students to know the level of acute stress in which range

3.2 Project Design and Overview.

As mention 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 using Arduino realizes using Proteus Software and then convert to PCB circuit. Each LED in stress meter operates with 3db difference from the previous one, and a jumper is provided to allow to or bar mode. This project is an essential part of the expandable analyser and one meter circuit is used for each frequency band. There are many other uses for a simple LED meter. They are ideal as power meters on amplifiers, can be used with (mixers including the high quality mixer) preamps and any other application where it is important to know the signal level. LM3915 3db/step display is suited for signals with wide dynamic range, such as audio level, power, light intensity or vibration. Audio applications include average or peak level indicators, power meters and 38 signal strength meters. Replacing conventional meters with an LED bar graph results in a faster responding, more rugged display with high visibility that retains the ease of interpretation of an analog display.
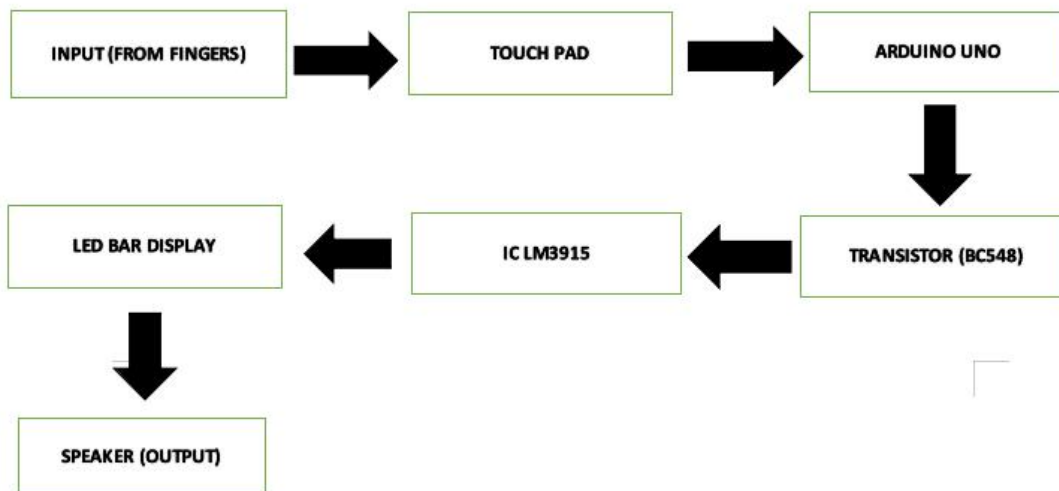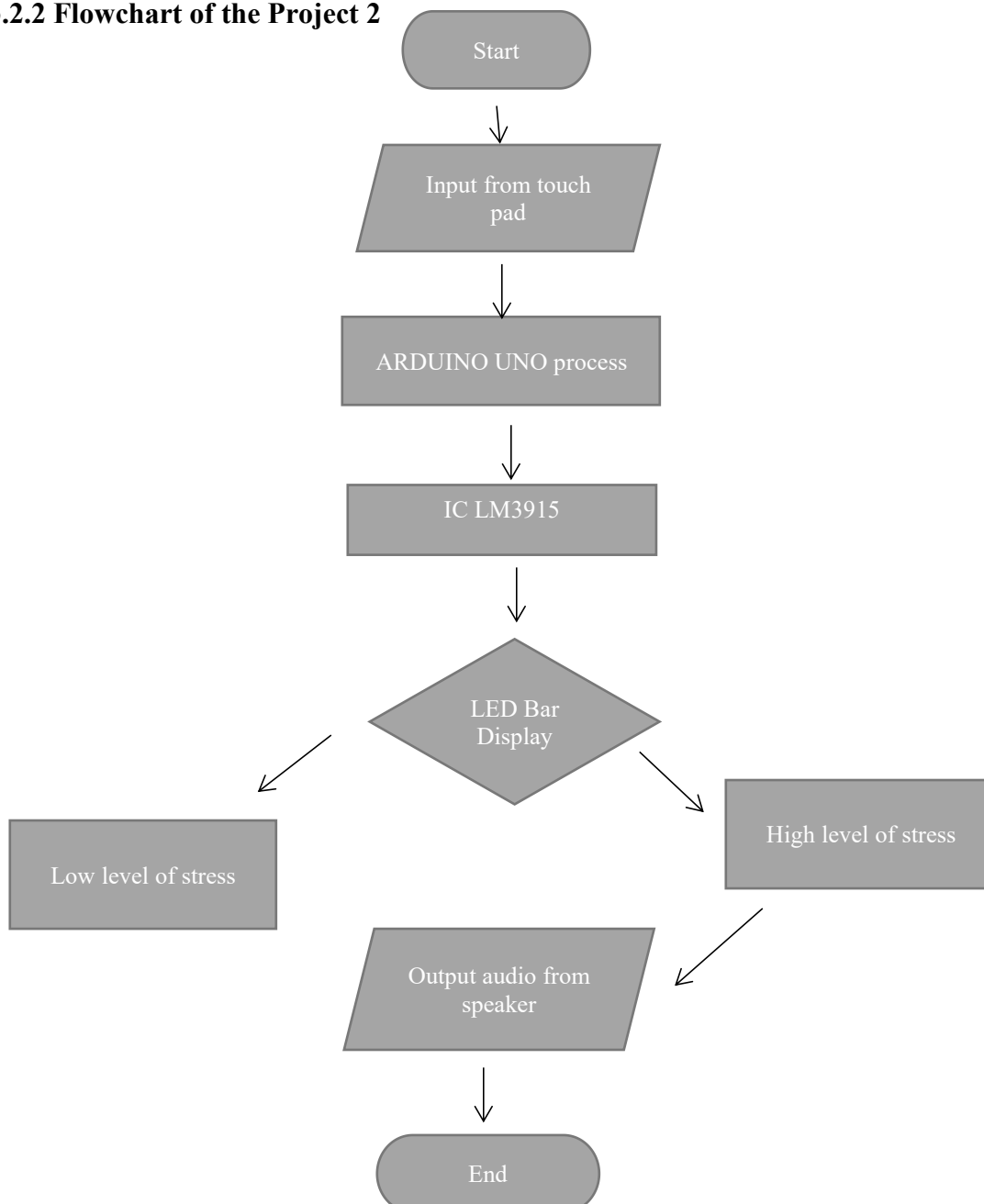
NURIN BATRISYIA
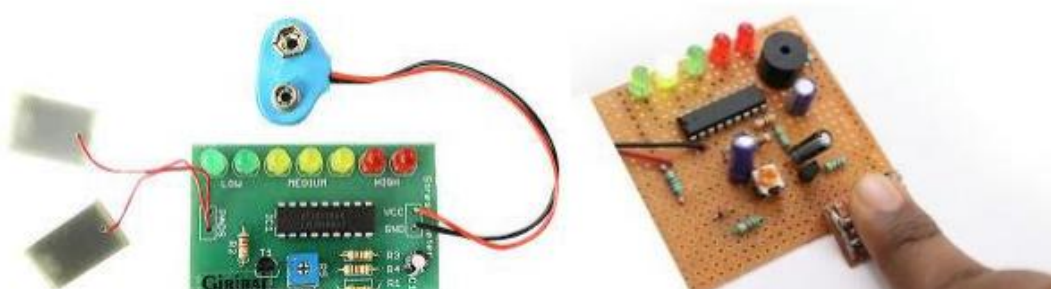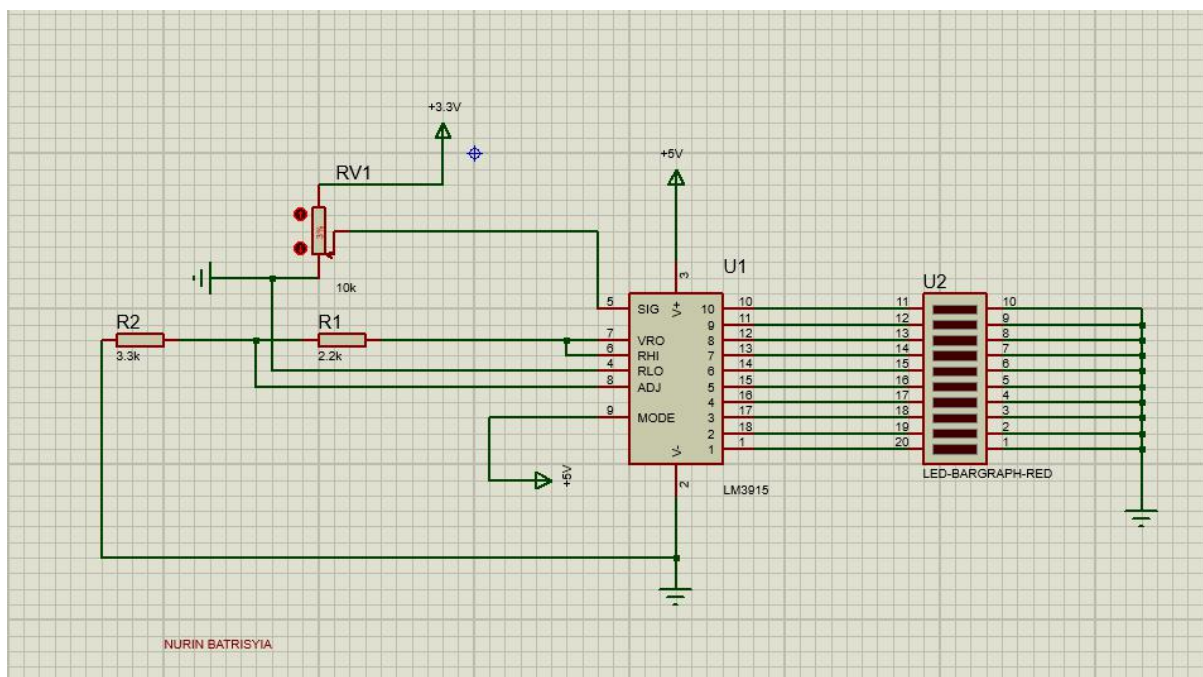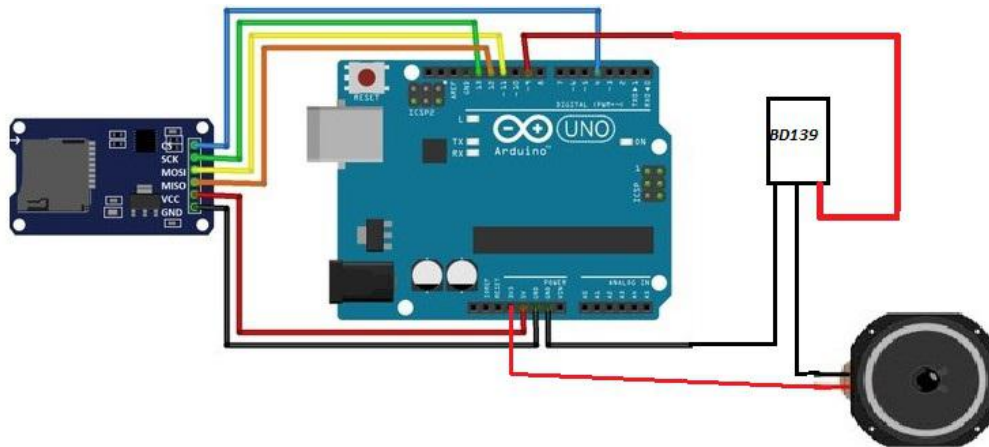
3.2.1 Block Diagram of the Project

Figure below shows a block diagram of the Stress Indicator device. The touch pads of the stress meter sense the voltage variations across the touch pads and convey it to the signal amplifier, followed by LED bar display for visual indication and warning beep. The circuit is very sensitive and detects even a minute voltage variation across the touch pads.

a. Touch pad - detects the changes on the skin resistance.
b. Arduino Uno - the Arduino has a pwm gpio. This allows the data stream to output an audio signal easily as a pwm signal. This is due to the audio output as pwm, which is then routed to the transistor.
c. Transistor BC548 - the transistor, after some gain, inserts the signal into the speaker, and finally, allows the audio to be heard.
d. IC LM3915 - is use to sense the analogue voltage level at pin 5 obtain from the transistor.
e. Led Bar Display - indicated the level of pain produce from the galvanic skin response.
f. Speaker - outputs the audio, which is read from solid state device as bitstream. Inputted to DAC and from DAC output analog signal enters the amplifier and finally the speaker outputs it.

```
┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│ INPUT (FROM FINGERS) │ ──▶  │      TOUCH PAD      │ ──▶  │    ARDUINO UNO      │
└─────────────────────┘      └─────────────────────┘      └─────────────────────┘
                                                                     │
                                                                     ▼
┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│   LED BAR DISPLAY   │ ◀──  │     IC LM3915       │ ◀──  │ TRANSISTOR (BC548)  │
└─────────────────────┘      └─────────────────────┘      └─────────────────────┘
         │
         ▼
┌─────────────────────┐
│  SPEAKER (OUTPUT)   │
└─────────────────────┘
```

3.2.2 Flowchart of the Project 2

```
                    ( Start )
                        │
                        ▼
              / Input from touch /
              /      pad        /
                        │
                        ▼
              [ ARDUINO UNO process ]
                        │
                        ▼
              [     IC LM3915      ]
                        │
                        ▼
                   < LED Bar >
                   < Display >
                  /          \
                 ▼            ▼
      [ Low level of stress ]  [ High level of stress ]
                 \            /
              / Output audio from /
              /      speaker     /
                        │
                        ▼
                    (  End  )
```
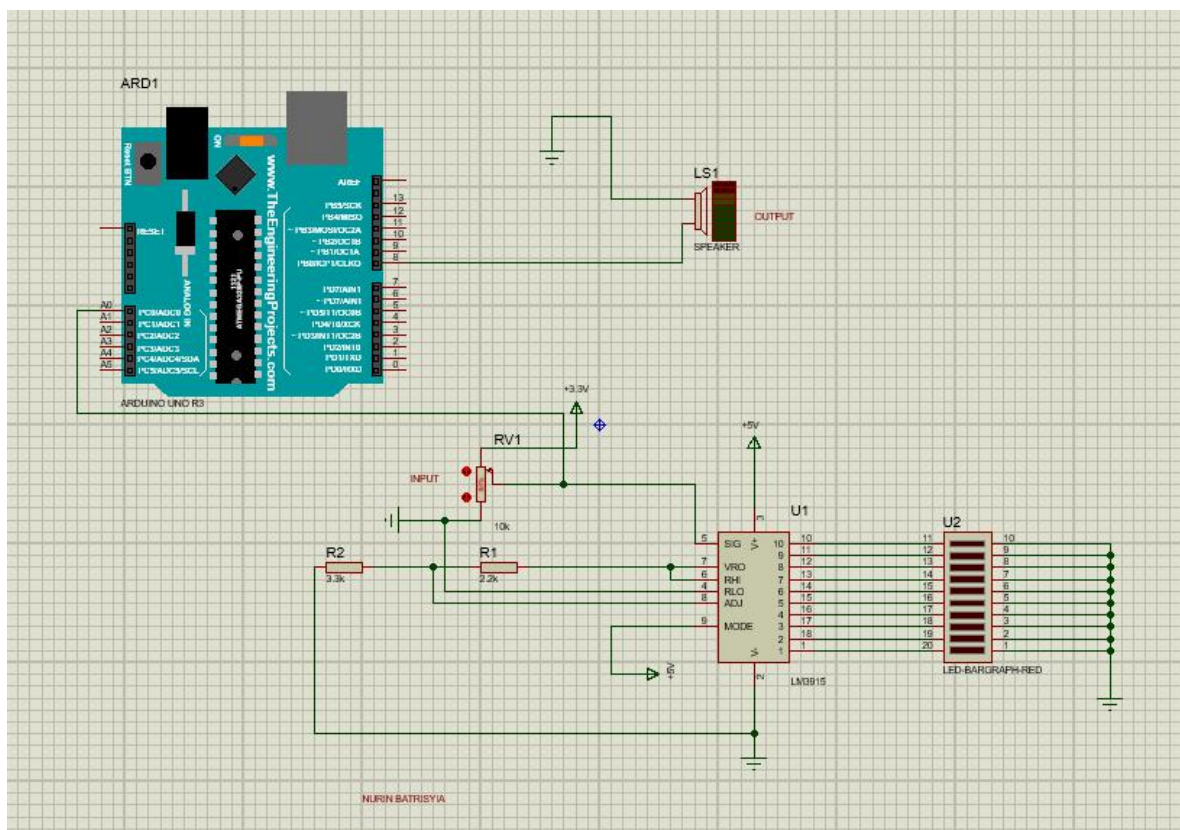
3.2.3 Project Description

The majority of operations these days are automated, various forms of projects created for mutual progress. Stress is the very common condition of every human being. Stress is nothing more than a socially acceptable form of mental illness. This Stress meter allows to assess the emotional pain. If the stress is very high, it gives visual indication on a LED display along with a beep. This stress monitor lets assess level of stress. If the stress is very high, it gives visual indication through a light emitting diode LED display along with warning beep. The gadget is small enough to be worn around the wrist. The LM3915 is a monolithic integrated circuit that senses analog voltage levels and drives ten LED's, LCD's or vacuum fluorescent displays, providing a logarithmic 3db/step analog display. The gadget is based on the principle that the resistance of the skin varies in accordance with emotional states. If the stress level is high the skin offers less resistance, and if the body is related the skin resistance is high. COVID-19 not only affects physical health, but greatly affects psychological health. Movement control orders cause unpredictable stress and psychological stress to populations around the world. During high stress is due to an increase in the blood supply to the skin. This increases the permeability of the skin and hence the conductivity for electric current. This property of the skin is used. Here to measure the stress level, the touch pads of the stress meter sense the voltage variations across the touch pads and convey the same to the circuit. The circuit is very sensitive and detects even a minute voltage variation across the touch pads.

3.3 Project Hardware
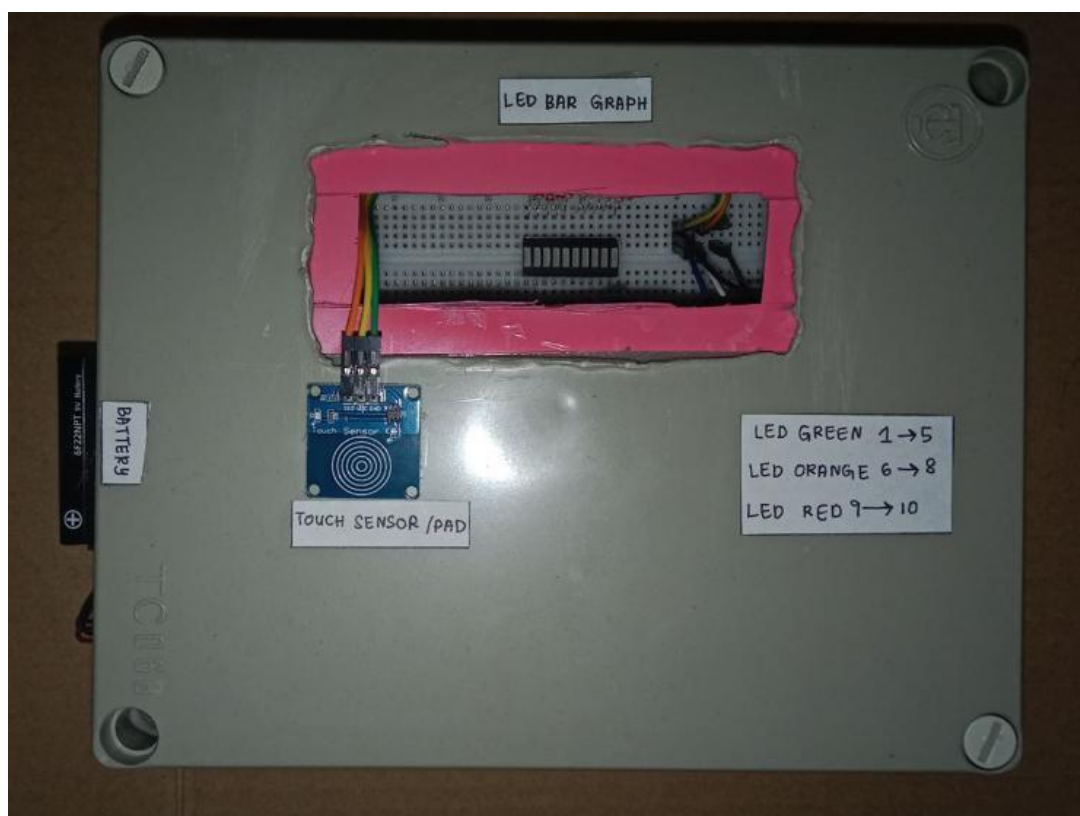
As mention in the previous chapter, the designed controller is using Arduino Uno. Then, the LED Bar Display will light up when it reaches the resistance of IC LM3915 this is because the IC contains an adjustable voltage reference and an accurate ten -step voltage divider. This circuit operates starting from the POT-HG which is also known as (active viarible resistor) that allows to change the resistance during simulation run-time. The variable resistor is a category of resistor that has the ability to change tis resistance measuring capacity. And so on will be connected to LM3915 that can integrated circuit that detects analog voltage levels and drives ten LEDs, one pin converts the disply from a bar graph to a moving point drive. Next, the LED bar display is an LED indicator in which a series of individual LEDs are arranged in a row on a device. The led will light up and the pressure level will be indicated based on how many led bars are lit. This component is needed to indicate the pressure level at which the lamp is flashing. Having 10 led and the top led represents the highest pressure level. LED Bar Graph is an LED array, which is used to connect with electronic circuit or microcontroller. It's easy to connect LED bar graph with the circuit like as connecting 10 individual LEDs with 10 output pins. When the led bar is lit at maximum level, the micro-controller will give instructions to output audio through speakers connected to the circuit, this is because this project not only tells us where our pressure level is but it will also output a way that can reduce our pressure through pre -compiled audio.

3.3.1 Schematic Circuit

3.3.2 Description of Main Component

The main component for this project are important to make sure the project will be created. POT-HG can allows to change the resistance during simulation run-time and is the starting point for this project to be carried out. The LM3915 IC contains an adjustable voltage reference and an accurate ten -step voltage divider and detects analog voltage levels and drives ten LED Bar Display that are connected together. This LED Bar Display component is needed to indicate the pressure level at which the lamp is flashing. When stress in the high level, the led is light up at the high range and audio will be output.

3.3.2.1 Component 1
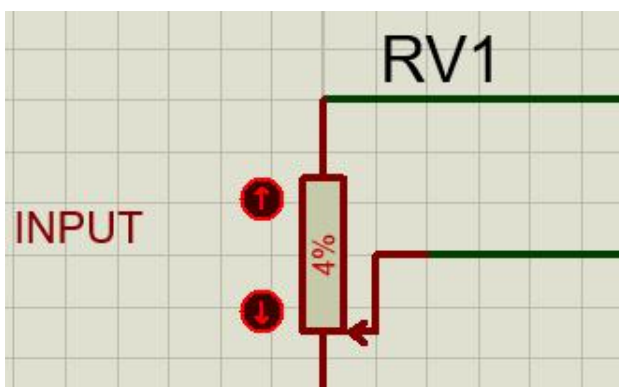
Resistance is the very basic part of any circuit that can create a hindrance in the flow of current in the circuitry each material has a certain value of resistance and resistance or ohmmeter is used for finding the value of resistance. POT-HG is the only active variable resistor that allows to change the resistance during simulation run-time. The variable resistor is a category of resistor that has the ability to change tis resistance measuring capacity. It is an electromechanical device that consists of a slider having resistance components to vary the resistance. If it is linked in such a way that there is a larger resistance is given then less value of current passes and in case of a small value of resistance high current passes. Through varying, the resistance of circuitry can also be used as a volts control device of any circuit. It is called a potentiometer when working as a voltage or potential divider. When working as a variable resistor called a rheostat. There is a certain type of variable resistance that operates electronically way named a digital potentiometer. A potentiometer is a three-terminal resistor with a sliding contact that forms an adjustable volt-age divider.If only two terminals are used (one side and the wiper), it acts as a variable resistor orrheostat.Potentiometers are commonly used to control electrical devices such as volume controls onaudio equipment. Potentiometers operated by a mechanism can be used as position transducers.

3.3.2.2 Component 2
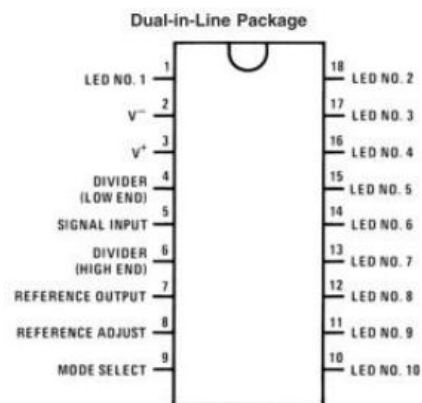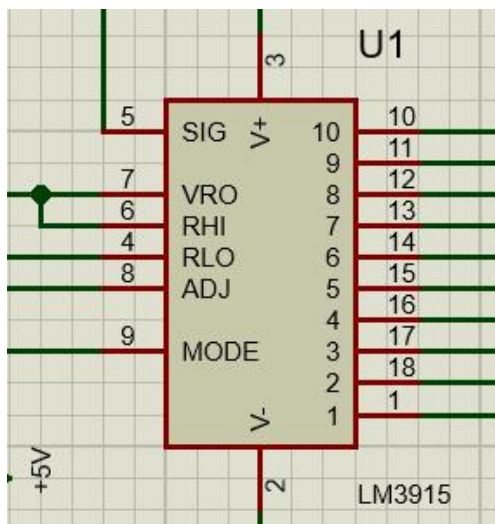
The LM3915 is an amonolytic integrated circuit that detects analog voltage levels and drives ten LEDs, LCDs or vacuum fluorescent displays, providing a 3 dB/step analog display. One pin converts the disply from a bar graph to a moving point drive. The LED current drive is controlled and pro- grammatically, eliminating the need for a current limiting resistor. The entire display system can operate from a single supply as low as 3V or as high as 25V. The IC contains an adjustable voltage reference and an accurate ten -step voltage divider. The high impedance input buffer receives the signal down to ground and up to within 1.5V of the positive supply. Furthermore, it does not require protection against the Â´s35V input. The input buffer drives 10 individual comparators referred to the accuracy divider. Accuracy is usually better than 1 dB. The LM3915 3 dB/step display is suitable for signals with a wide dynamic range, such as audio level, power, light intensity or vibration. Audio applications include average or peak level indicators, power meters and RF signal strength meters. Replacing conventional meters with LED bar graphs results in a faster, more rugged responsive display with high visibility that maintains the ease of interpretation of analog displays. LM3915 is very easy to use. A 1.2V full scale meter requires only one additional resistor to ten LEDs. Another resistor programs full scale anywhere from 1.2V to 12Vindependent supply voltage. LED brightness is easily controlled with one pot. The LM3915 is very versatile. The output can drive LCD, vacuum fluorescent and incandescent bulbs as well as LEDs in any color. Multiple devices can be bounced for point or bar mode displays with a range of 60 or 90 dB. LM3915s can also be bounced with LM3914s for linear/log display or with LM3916s for extended range VU meters. The LM3915 is a monolithic integrated circuit that senses analog voltage levels and drives 10 LEDs, providing a linear analog display. A single pin changes the display from a moving dot to a bar graph. Current drive to the LEDs is regulated and programmable, eliminating the need for resistors. This feature is one that allows operation of the whole system from less than 3V.

3.3.2.3 Component 3
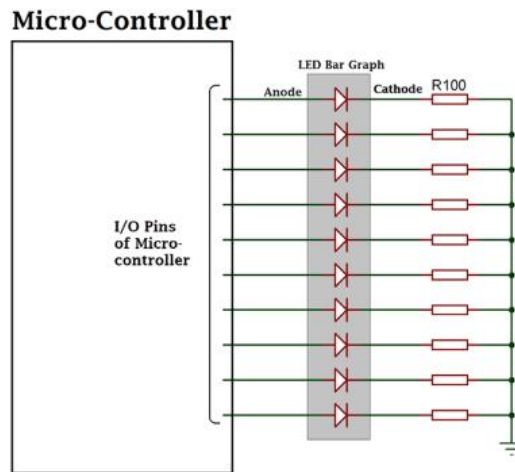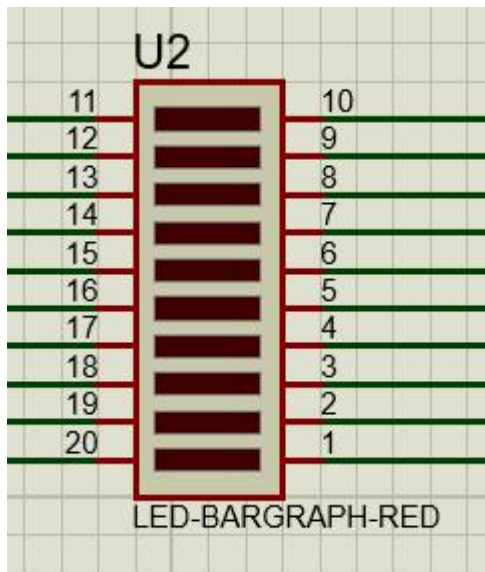
The LED bar display is an LED indicator in which a series of individual LEDs are arranged in a row on a device. Bar displays are used, for example, to show users the progress of a specific process, or to provide a quantitative indication of the reading quality (5 of 10 LEDs = 50%). This component is needed to indicate the pressure level at which the lamp is flashing. Having 10 led and the top led represents the highest pressure level. LED Bar Graph is an LED array, which is used to connect with electronic circuit or microcontroller. It's easy to connect LED bar graph with the circuit like as connecting 10 individual LEDs with 10 output pins. Generally we can use the LED bar graph as a Battery level Indicator, Audio equipment, and Industrial Control panels. There are many other applications of LED bar graphs.

The LED bar graph with the microcontroller or connecting to an electronic circuit is must be the LED Bar Graph connected with the Micro-controller. When connecting to the Micro-controller you just have to connect the Anode pins of the LED Bar graph and ground the Cathode pins using a resistor in between as shown in the image below. Then Upload the code and drive the LED Bar Graph accordingly. Next, use the LED Bar graph in the Circuit then it is possible to connect the Bar with the LM3915 Dot Display/Bar Driver. The LM3915 is used to drive this LED Bar Graph display. The circuit diagram given below will help understand the connection.

3.3.3 Circuit Operation

The LED Bar Display will light up when it reaches the resistance of IC LM3915 this is because the IC contains an adjustable voltage reference and an accurate ten -step voltage divider. This circuit operates starting from the POT-HG which is also known as (active viarible resistor) that allows to change the resistance during simulation run-time. The variable resistor is a category of resistor that has the ability to change tis resistance measuring capacity. And so on will be connected to LM3915 that can integrated circuit that detects analog voltage levels and drives ten LEDs, one pin converts the disply from a bar graph to a moving point drive. Next, the LED bar display is an LED indicator in which a series of individual LEDs are arranged in a row on a device. The led will light up and the pressure level will be indicated based on how many led bars are lit. This component is needed to indicate the pressure level at which the lamp is flashing. Having 10 led and the top led represents the highest pressure level. LED Bar Graph is an LED array, which is used to connect with electronic circuit or microcontroller. It's easy to connect LED bar graph with the circuit like as connecting 10 individual LEDs with 10 output pins. When the led bar is lit at maximum level, the micro-controller will give instructions to output audio through speakers connected to the circuit, this is because this project not only tells us where our pressure level is but it will also output a way that can reduce our pressure through pre -compiled audio.

3.4 Project Software
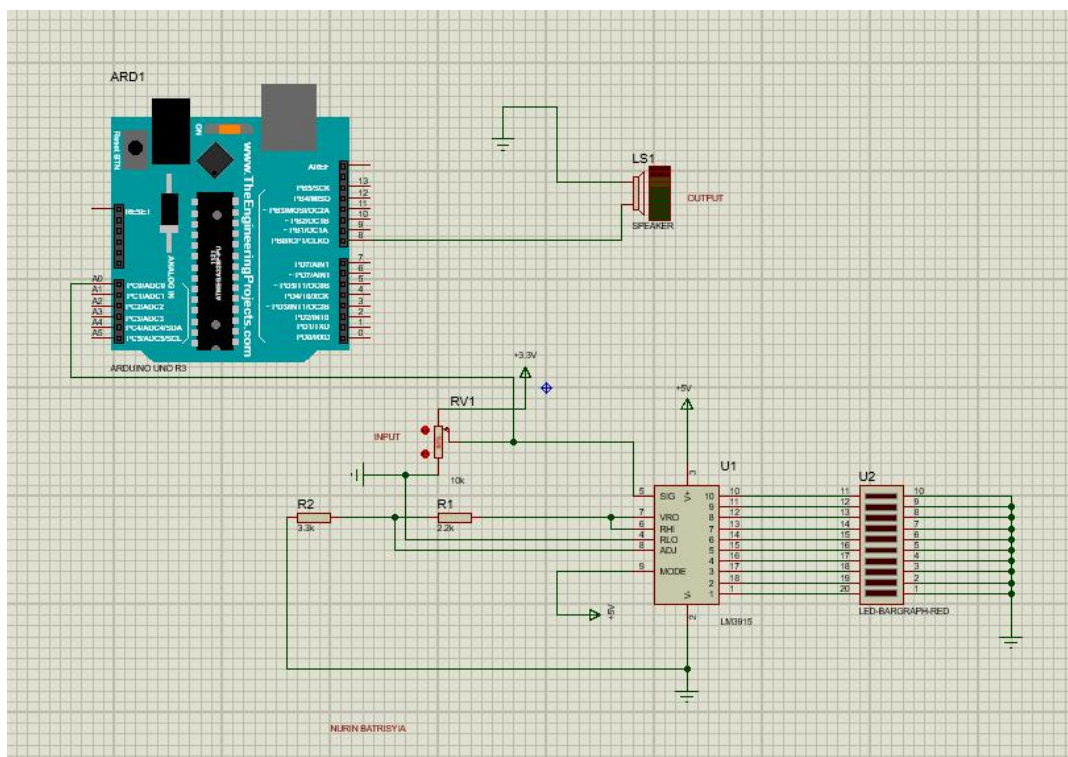
```
1  const int BARGRAPHSIZE = 10;
2  const int POTINPUT = A0;
3
4  int barPins[] = {
5   2,3,4,5,6,7,8,9,10,11
6  };
7
8  int potValue = 0;
9
10 void setup() {
11   Serial.begin(9600);
12   for(int barSegment = 0; barSegment < BARGRAPHSIZE; barSegment++) {
13     pinMode(2, INPUT);
14     pinMode (barPins[barSegment], OUTPUT);
15     digitalWrite (barPins[barSegment], LOW );
16   }
17 }
18
19 void loop() {
20
21   potValue = analogRead(POTINPUT);
22   int barLevel = map(potValue, 0, 1023, 0, BARGRAPHSIZE);
23
24   for(int barSegment = 0; barSegment < BARGRAPHSIZE;
25   barSegment++){
26     if (digitalRead(2) == HIGH);
27     //if (barSegment < barLevel)
28     {
29       digitalWrite(barPins[barSegment], HIGH);
30       delay(500);
31     }
```

```
Done compiling.

Sketch uses 2150 bytes (6%) of program storage space. Maximum is 32256 bytes.
Global variables use 204 bytes (9%) of dynamic memory, leaving 1844 bytes for local variables. Maximum is 2048 bytes.

1
```

3.4.1 Flowchart of the System
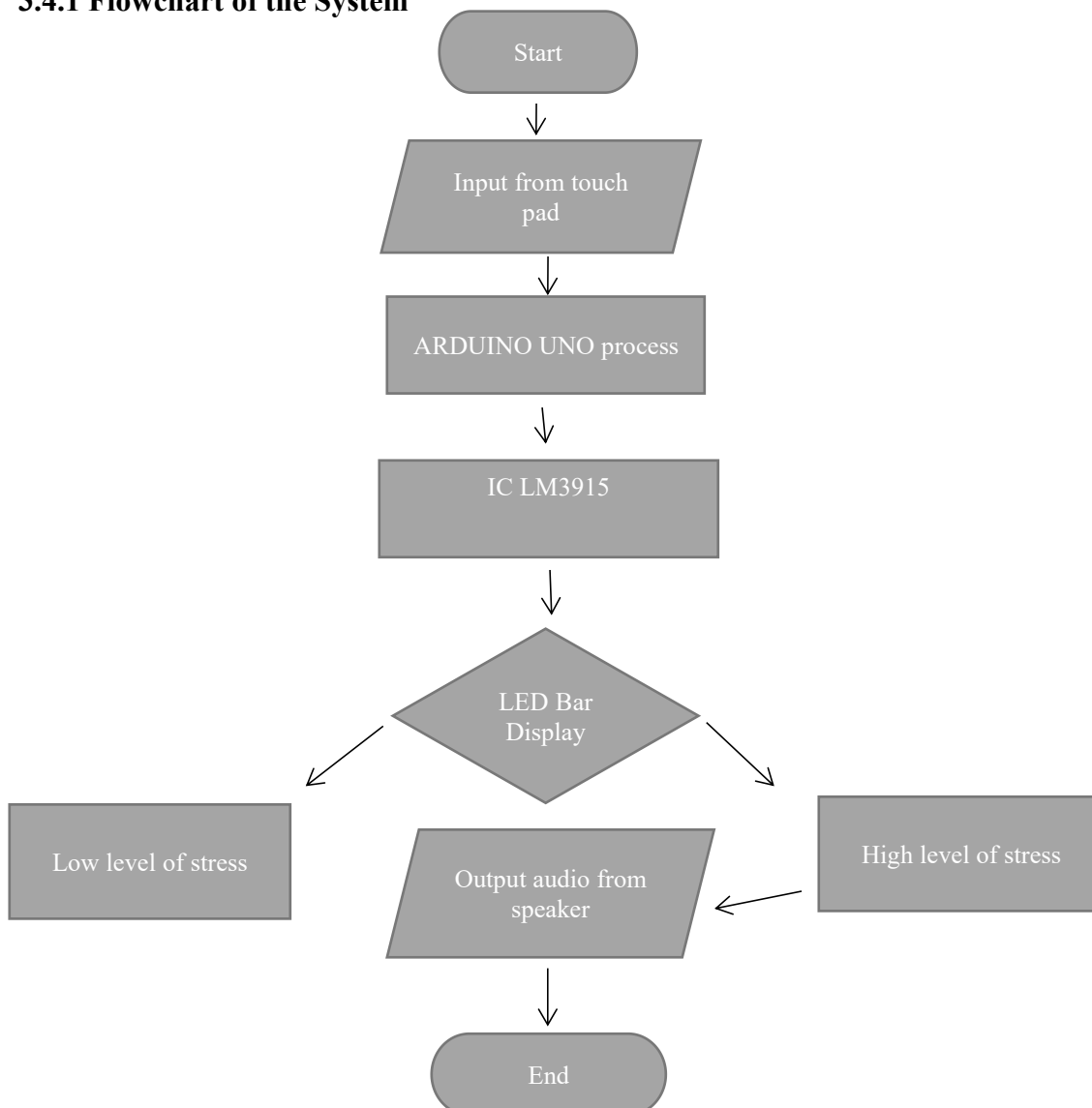
3.4.2 Description of Flowchart

This indicates that the first step is the delivery of input from touch pad detects the changes on the skin resistance. LED bar display is an LED indicator in which a series of individual LEDs are arranged in a row on a device. The led will light up and the pressure level will be indicated based on how many led bars are lit. When the led bar is lit at maximum level, the micro-controller will give instructions to output audio through speakers connected to the circuit, this is because this project not only tells us where our pressure level is but it will also output a way that can reduce our pressure through pre -compiled audio, if the pressure level result is below a low level, no audio can be output, and the pressure level is at a safe level.

3.5 Prototype Development

The gadget is small enough can be taken anywhere. The LM3915 is a monolithic integrated circuit that senses analog voltage levels and drives led bar display, providing a logarithmic 3db/step analog display. Here to measure the stress level, the touch pads of the stress meter sense the voltage variations across the touch pads and convey the same to the circuit. The circuit is very sensitive and detects even a minute voltage variation across the touch pads. This project there is a use of lm3915 bar display that can show the level of pressure we are at the maximum level or minimum level. The stress meter thus detects the resistance of skin which is according the stress level and gives a visual indications on a LED display and instruction to reduce the stress.

3.5.1 Mechanical Design/Product Layout
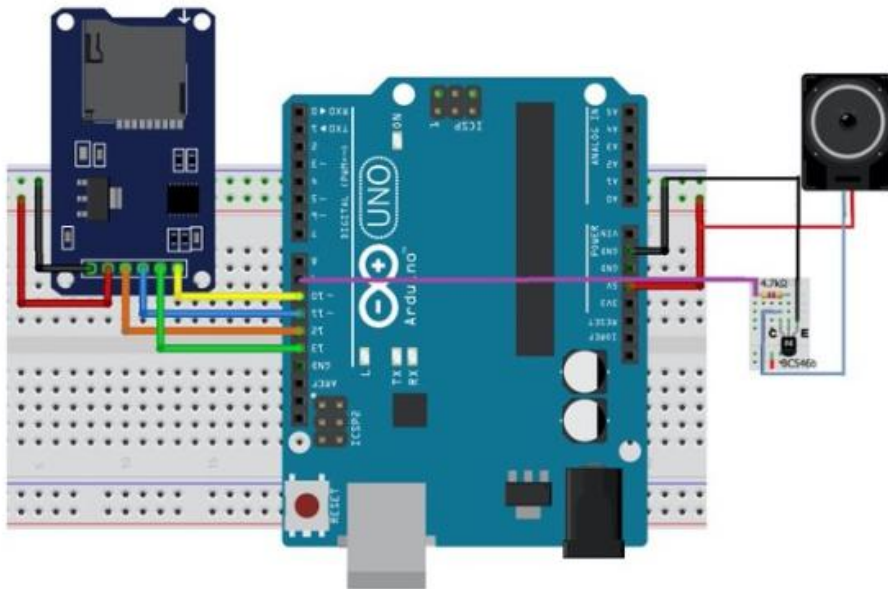
3.6 Sustainability Element in The Design Concept

Stress meter can be further developed to design equipment like lie detectors; skin response meters; skin resistance meters; fitness meters; grip scopes etc. therefore this model, if further developed can be used in medical field, forensic department and it even helps in improving the body fitness.

It is economical and a low budget project, not a complex circuit and the components are easily available in the market and replaceable. Noise pulse do not have any effect on the circuit. LED's can withstand the voltage even if no resistors are connected across. It can be used easily to regularly check one's stress level. The advantages in this project, that are simple circuitry, easy to use, easy to transport, less power consumption and desired output.

3.7 Chapter Summary

This chapter explains how the project will running and what the component are use. Block diagram and the flowchart are make for explain the process for detected stress meter level. The schematic diagram shows project to complete.

CHAPTER 4

# 4   RESULTS AND DISCUSSION

4.1 Introduction

Stress is a term that refers to the sum of the physical, mental, and emotional strains or tensions on a person. Feelings of stress in humans result from interactions between persons and their environment that are perceived as straining or exceeding their adaptive capacities and threatening their well-being. The element of perception indicates that human stress responses reflect differences in personality as well as differences in physical strength or health. This Stress meter allows to assess level of stress. Stress meter is based on the principle that the resistance of the skin varies in accordance with emotional states. Resistance varies inversely proportional to the stress.

The purpose in this project are to build a device that can detect user stress level across the touch pad that can sense the voltage variations and convey the same to the circuit and at the same time that can allows to gave the audio and instruction to reduce the level of stress. This project is not at all able to detect the level of stress, it can reduce stress as well at the same time.

4.2 Results and Analysis

Human skin is similar to that of most other mammals except that it is not protected by a pelt and appears hairless though in fact nearly all human skin is covered with hair follicles. There are two general types of skin, hairy and glabrous skin. Skin offers some resistance to current and voltage. At relaxed state they offer more resistance and at higher stress they offer less resistance. This resistance changes with the emotional state of the body. Though this is barely perceptible, the electrodes register the change that is detected by LM3914 for which the LED dot oscillates up and down in this way the stress meter detects the stress.
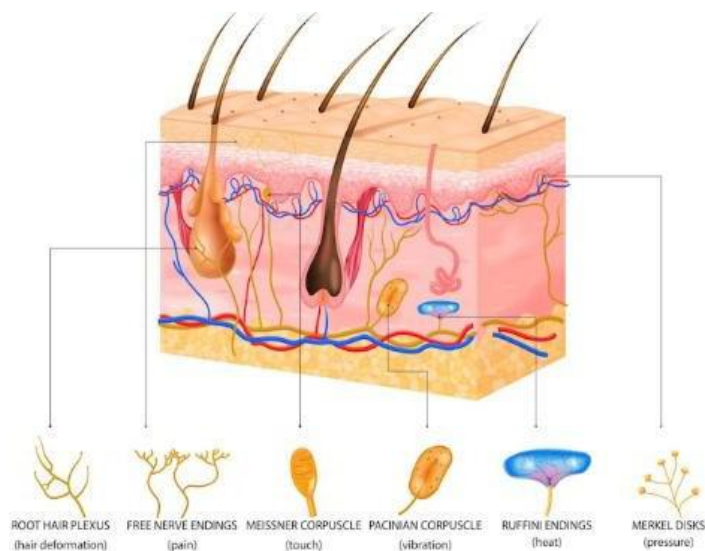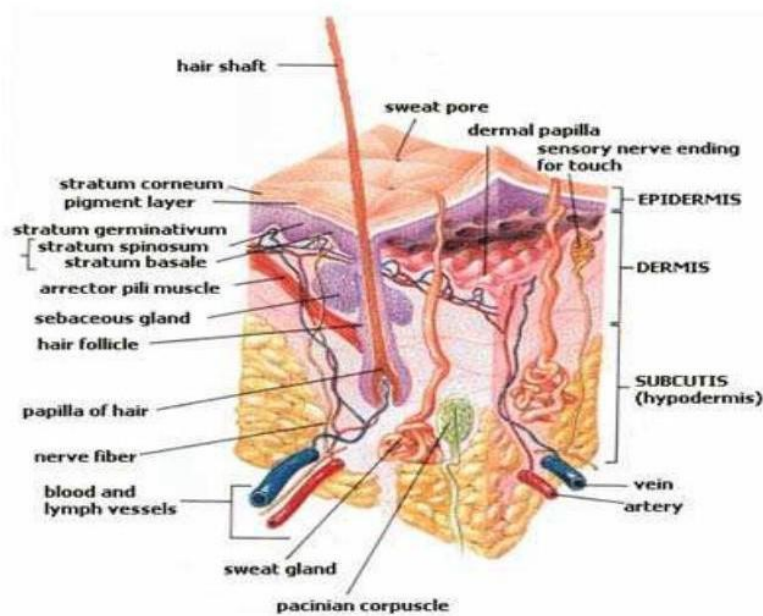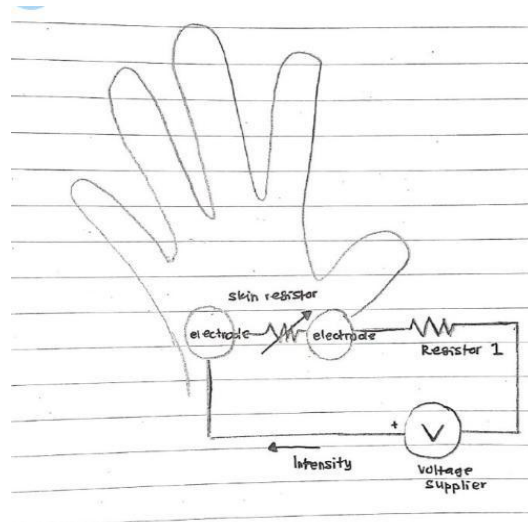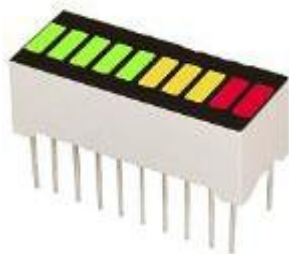
The body has resistance to current flow. More than 99% of the body's resistance to electric current flow is at the skin. Resistance is measured in ohms. The skin resistance can be effectively bypassed if there is skin breakdown from high voltage. The skin acts like an electrical device such as a capacitor in that it allows more current to flow if a voltage is changing rapidly. A rapidly changing voltage will be applied to the palm and fingers of one's hand if it is holding a metal tool that suddenly touches a voltage source. This project use a 10 volt battery and one led represents 1 volt, and the overall total for the lit led is 10 volts. Next to detect the tester's stress level 1 volt from finger resistance represent 1 lit of led bar graph.

During the develop project, the problem faced is of not being able to run the project when making the connection to the PCB board, and repeated several times. The result remains the same, this project can't run properly. So to solve this problem decided not to solder the project. Only make connections on the breadboard.
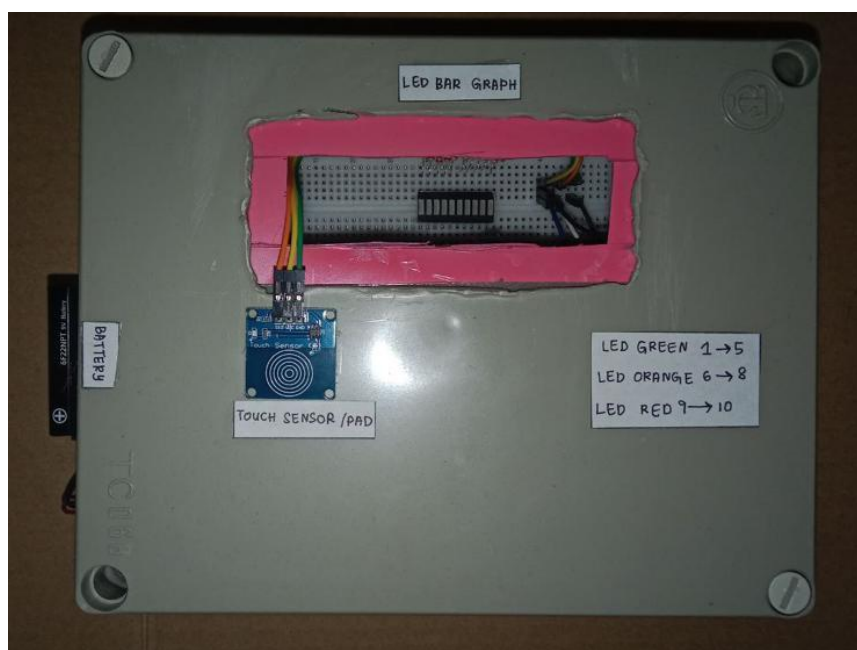
The picture below shows that this project can work well. When the finger comes into contact with the touch sensor, the led will light up in line with the voltage that has been detected and finally the led bar graph will light up, and there you will see your stress level according to the color of the lit led.
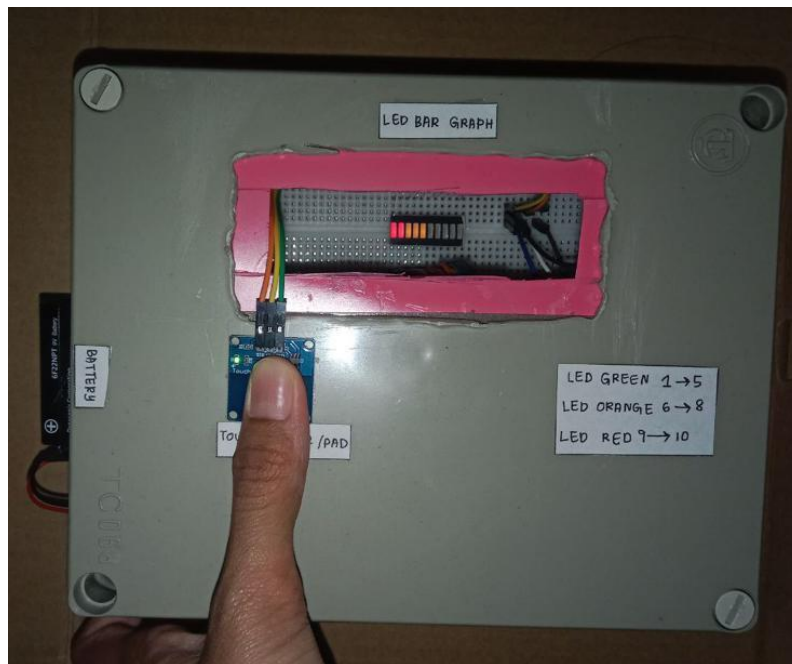
This stress meter can detect the level of stress through skin resistance between the ages of 20 to 30 because at this age range the skin easily shows strong sensitivity. The project will be tested on the most stressed students to find out their respective stress levels and the number of students to be tested is only 15 people. Next the project focuses on semester 5 class DEP5C. In this project there is a use of lm3915 bar display that can show the level of pressure we are at the maximum level or minimum level. To test the level of stress for volunteers, two method are used,namely testing while the volunteer is relax and testing after the volunteer answer a math question.

Staying relaxed for two minutes
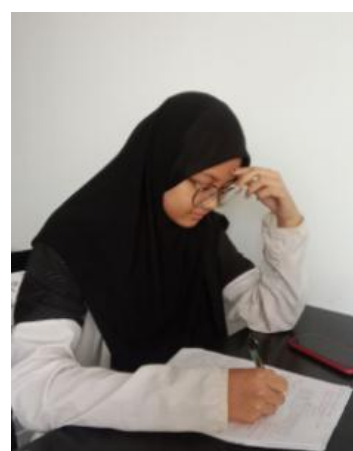
Doing mathematical quiz in ten minutes

This is the example of the question:

Question:

Let the bottom of the embankment (O) be x feet from the bottom of the ladder and y feet from the top of the ladder. As the bottom of the ladder moves toward the embankment, determine the rate at which the top of the ladder is moving.

Solution:

Law of cosines: $x^2 + y^2 \quad 2xy \cos 120^o = 400$

$x^2 + y^2 \quad 2xy\left(\dfrac{1}{2}\right) = 400$

$y^2 + xy + (x^2 \quad 400) = 0$

$y = \dfrac{x + \sqrt{x^2 \quad 4(x^2 \quad 400)}}{2}$

$y = \dfrac{x}{2} + \dfrac{\sqrt{1600 \quad 3x^2}}{2}$

$\dfrac{dy}{dx} = \dfrac{1}{2} \quad \dfrac{3}{2\sqrt{1600 \quad 3x^2}}$

$\dfrac{dy}{dx} = \left(\dfrac{1}{2} \quad \dfrac{3}{2\sqrt{1600 \quad 3x^2}}\right)\dfrac{dx}{dt}$

Since $\dfrac{dx}{dt} = -1$ when $x = 4$,

$\dfrac{dx}{dt}\Big|_{x=4} = \left(\dfrac{1}{2} \quad \dfrac{3}{2\sqrt{1600 \quad 3(4)^2}}\right)(\quad 1)\dfrac{dx}{dt}$

$\approx 0.6523 \; ^{ft}/_s$

∴ t e ladder is moving at t e rate of $0.6523 \; ^{ft}/_s$ at t e given instant

Q31	Math 27
	Integration by Parts

Question:

Evaluate $\int x^3 e^{x^2}\, dx$

Solution:

$\int x^3 e^{x^2}\, dx = \int \dfrac{x^3 e^u}{2x}\, du$
$\qquad$ | Let $u = x^2$
$\qquad\qquad du = 2xdx$ |

$= \dfrac{1}{2}\int x^2 e^u du = \dfrac{1}{2}\int u e^u du$

$= \dfrac{1}{2}(vw \quad \int w dv)$
$\qquad$ | let $v = u \qquad dw = e^u du$
$\qquad\quad dv = du \qquad w = e^u$ |

$= \dfrac{1}{2}(vw \quad \int w dv)$

$= \dfrac{1}{2}(ue^u \quad \int e^u du)$

$= \dfrac{1}{2}(ue^u \quad e^u) + C$

$= \boxed{\dfrac{1}{2}(x^2 e^{x^2} \quad e^{x^2}) + C}$

Found that the volunteers' stress levels were in good condition when they relaxed for a few minutes, but the volunteers' stress level returned to high when the volunteers answered the math questions given for 10 minutes. This proved that the volunteer was under bad stress, and after the volunteer listened to some songs that had been played, the volunteer traced back his stress level, and the results found that the volunteer's stress level was in a good state again.
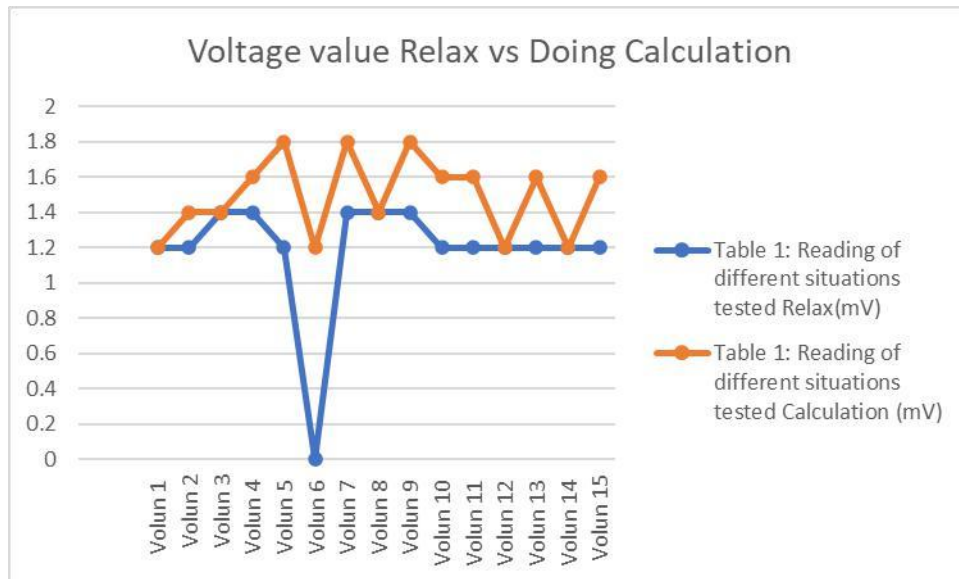

The result after volunteers answer the math questions for 10 minutes.

The result after volunteers listen to some of the songs that have been played.

All the volunteers have to undergo the following situations:

i-Staying relaxed for two minutes

ii-Doing mathematical quiz in ten minutes

Voltage value Relax vs Doing Calculation

The result shows all the volunteers successfully finished the task given. The result also shows that four reading obtained were not affected by the test situation. While the other participants showing the increasing of the LED bar graphs level. This partially prove that the designed prototype able to detect skin resistance in different two situations (relax and doing calculation). It also includes an initial threshold between being stressed and being relaxed.

However, the audio that should lower the stress level did not operate properly resulting the stress level maintain at the detected level. When it is found that the volunteer's stress level is at a high level. Audio automatically will be released to calm volunteers. It's a way to make the volunteer's stress level back to normal. The audio that will be released is based on the audio that can win. The main purpose of this project is not only to detect the stress level of volunteers but more of a project that can help volunteers live a healthy life successfully to reduce stress levels. And from the results that can be unraveled, this project has succeeded in lowering the level of stress of volunteers and this project can be further improved so that it can be a warm welcome in the market.

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4.3 Discussion

The stress meter only allows to reduce acute stress only, this is because the stress is most suitable to be associated with students who are stressed due to too much work to be completed and a short period of time. So this project allows students to know the level of acute stress in which range. Acute pressure is usually brief. It is a common and frequent stress among students especially. Acute stress is most often caused by reactive thinking. Negative thoughts dominate a situation or event that has recently occurred, or a situation, event or request that will come in the near future. Forexample, if we have recently been involved in an argument, we will likely experience acute stress associated with recurring negative thoughts about the quarrel. Or easier to understand is the situation of students who may experience acute stress that is about the next job deadline and the addition of work at one time. However, often when the stress caused by thinking is reduced or removed, the stress will be reduced as well eventually.

4.4 Chapter Summary

The stress meter has successfully detected whether there is an effort or a situation different from relaxing with a success rate. It was observed that the participants who had done several trials before, obtained the highest difference; the average can be higher if the user gets used to the device.

CHAPTER 5

5   CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Stress meter can be further developed to design equipment like lie detectors; skin response meters; skin resistance meters; fitness meters; grip scopes etc. Therefore this model, if further developed can be used in medical field, forensic department and it even helps in improving the body fitness.

This model, if further developed can be used in the medical field, helps detect stress levels and can help lower stress levels. It is an adorable device, a must have for every house. It is user friendly to be use regularly to check one's stress level. This project is easy to use, easy to transport, less power consumption and desired output.

5.2 Conclusion

This project has had a lot of impact on the community, especially the students. Society will be more sensitive in ensuring that the stress level is not in a high state. Next, this project give birth to a healthy society and take care in everything. In this stage, this project has made Malaysia a country with the lowest average in stress problem.

The results in this project is a stress meter minor with the treatment version are successfully designed for software and hardware. The purpose of stress meter can assess the level of stress. That the device can allows to give the method to reduce the stress after knowing the level of stress. And the system allows to take it out the audio which has been set up in the program.

5.3 Suggestion for Future Work

1) Can display the video of simple exercise and song playlist   through the LCD display module.

2) Not only can measure the stress level but can 100% reduce the stress.

5.4 Chapter Summary

The usability in this project is used to measure the stress level through property of the skin. The touch pads of the stress meter senses voltage variations across the touch pads and convey the same to the circuit. The circuit is very sensitive and detects even a minute voltage variation across the touch pads. Stress level indicator is used for measuring resistance of skin. To know mental state of person with detected level stress and in diagnosis of excessive sweating.

CHAPTER 6

6 PROJECT MANAGEMENT AND COSING

6.1 Introduction

This project involves the cost of purchasing components and materials throughout its implementation, components involving cost are hardware Arduino Uno, IC LM3915, SD Card Module, Led Bar Display, Transistor BD139, Resistor (3.3k, 2.2k), Jumper wire (generic), Touch pad and Mini Speaker, Micro SD Card, 10 Volt Battery, and other additional components. All of these components are purchased through online purchase and face-to-face purchase methods. During the construction process of the project, I found that many components need to be included in the circuit and there is an increase in the inclusion of components. There are some components that cannot be used, and there are problems when connecting components. So, this is the final proof of the components I used to complete my final project.

6.2 Gant Chart and Activities of the Project

6.3 Milestone

6.4 Cost and Budgeting

No.	Component and materials	The unit price	Quantity	Total
1	ARDUINO UNO set	RM 46.90	1	RM 46.90
2	IC LM3915	RM 8.00	1	RM 8.00
3	SD Card Module	RM 5.60	1	RM 5.60
4	LED Bar Display	RM 5.00	1	RM 5.00
5	Transistor BD139	RM 1.50	1	RM 1.50
11	Resistor (3.3k,2.2k)	0.10sen	2	0.20sen
12	Jumper Wire (generic)	RM 1.00	10	RM 10.00
13	Touch Plate/pad	RM 4.29	1	RM 4.29
14	Mini Speaker (8ohm)	RM 5.50	1	RM 5.50
15	Micro SD Card	RM 25.00	1	RM25.00
16	10 Volt Battery	RM 10.00	1	RM 10.00
17	10 Volt Battery connector	RM 3.00	1	RM 3.00
18	Resistor (220 ohm)	0.10sen	10	RM 1.00
19	Resistor (3k, 1k)	0.10sen	3	0.30sen

20	BC 546	0.50sen	1	0.50sen
21	Pin Header Female	RM 1.50	1	RM 1.50
22	Pin Header Male	0.80sen	1	0.80sen
	Total :			**RM 129.09**
	List of other costing			
1	Transportation	RM 20.00	-	RM 20.00
2	Postage	RM 4.50	3	RM 13.50
3	Craft Work			
4	Internet			
5	Application			
	Total :			**RM 33.50**
			Overall total	**RM 162.59**

Table 1

6.5 Chapter Summary

The overall gross budget estimate in the implementation of this project is RM 162.59 and other expenses as shown in Table 1 According to this budget cost, this project is can be considered as a less costly project compared to other projects 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. This project is a stress meter minor with the treatment version are successfully designed for software and hardware. The purpose of stress meter can assess the level of stress. That the device can allows to give the method to reduce the stress after knowing the level of stress. And the system allows to take it out the audio which has been set up in the program.

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