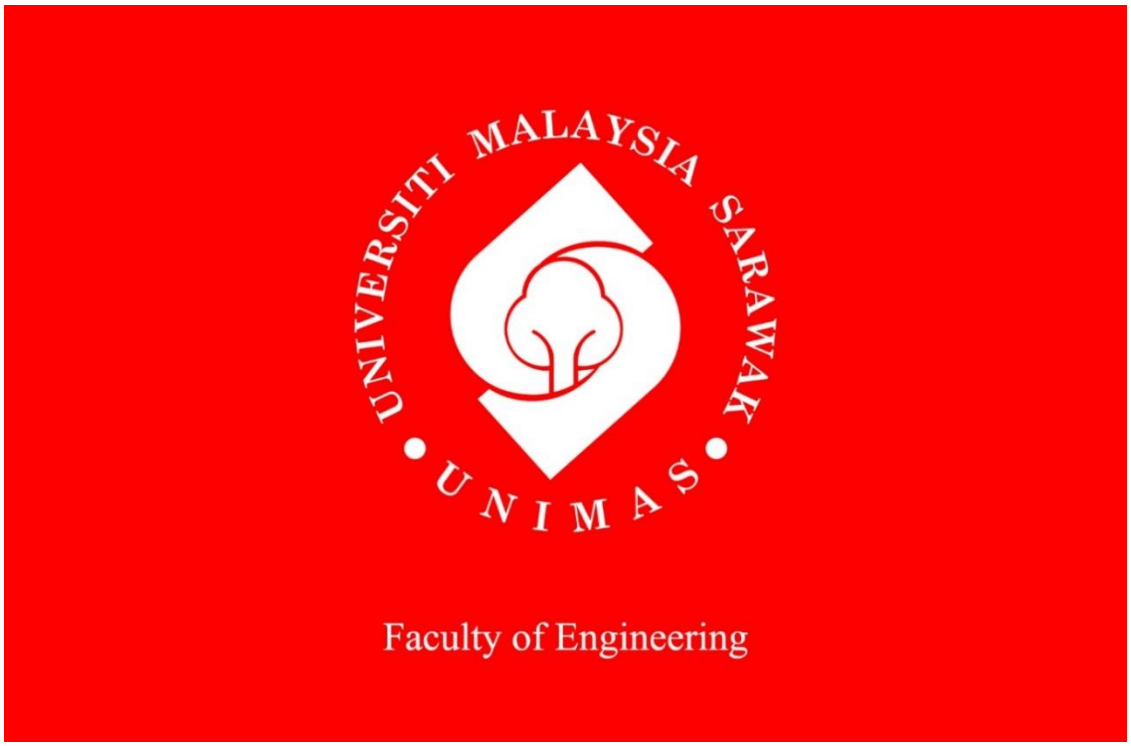

BODY POSTURE MONITORING SYSTEM

RHONDA ASHLEY ANAK JABAN

Bachelor of Engineering (Hons) in Electronics

(Telecommunications)

2017

This Final Year Project Thesis

Title	:	BODY POSTURE MONITORING SYSTEM
Student Name	:	RHONDA ASHLEY ANAK JABAN
Matric No	:	43820

Has been read and approved by:

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NUR ALIA ATHIRAH BINTI HAJI MOHTADZAR Date

(Supervisor)

BODY POSTURE MONITORING SYSTEM

RHONDA ASHLEY ANAK JABAN

(43820)

This project is submitted in partial fulfillment
of the requirement for the degree of
Bachelor of Engineering with Honours in Electronics
(Telecommunications)

FACULTY OF ENGINEERING
UNIVERSITY MALAYSIA SARAWAK

2017

DEDICATION

This thesis is dedicated to my family who have raised me to be a wonderful person I am today. I also dedicated this to my lovely friends for all the encouragement and motivation.

UNIVERSITI MALAYSIA SARAWAK

Grade: _____

Please tick (√)

Final Year Project Report ☑

Masters ☐

PhD ☐

DECLARATION OF ORIGINAL WORK

This declaration is made on the ....16....day of....JUNE....2017.

Student's Declaration:

I RHONDA ASHLEY ANAK JABAN, 43820, FACULTY OF ENGINEERING ---------- (PLEASE INDICATE STUDENT'S NAME, MATRIC NO. AND FACULTY) hereby declare that the work entitled ----- BODY POSTURE MONITORING SYSTEM ---------- is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

16/6/2017
Date submitted

RHONDA ASHLEY AK JABAN (43820)
Name of the student (Matric No.)

Supervisor's Declaration:

I NUR ALIA ATHIRAH BT HAZI MOHZADZAR (SUPERVISOR'S NAME) hereby certifies that the work entitled BODY POSTURE MONITORING SYSTEM (TITLE) was prepared by the above named student, and was submitted to the "FACULTY" as a * partial/full fulfillment for the conferment of BEng (Hons) Electronics (Telecommunications) -------- (PLEASE INDICATE THE DEGREE), and the aforementioned work, to the best of my knowledge, is the said student's work.

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First and foremost, thanks to God for showering His blessing and grace upon me throughout the completion of this project. I dedicated this page to express my appreciation to several individual that help me through this project. It is almost impossible to complete this thesis alone, but with the support from them it made my thesis successfully done.

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Last but not least, with lots of love, I would like to thank my parents and siblings for their continuous support in many ways. They are my role inspiration and motivation for me not to ever give up in completing this thesis.

ABSTRAK

Tajuk projek ini ialah *Body Posture Monitoring System*. Projek ini melibatkan kedua-dua pembinaan barang-barang dan juga perisian untuk menjayakan projek ini. Projek ini melibatkan Kejuruteraan Perubatan yang berkaitan dengan kesihatan manusia. Projek ini berhubung-kait dengan alat yang mudah dipakai untuk memberitahu tentang postur badan pengguna ketika mereka berdiri dan duduk. Projek ini terbahagi kepadadua bahagian iaitu modul belakang yang mengandungi *sensor* dan bahagian pergelangan tangan yang mengandungi LED dand LCD. Dengan litar yang direka, alat ini hanya akan memberi isyarat cahay apabila pengguna telah mencapai tahap parameter yang telah disetkan dalam perisian yang telah dibina. Namun, isyarat lampu tidak akan mengganggu rutin harian pengguna kerana ia hanya berlaku dalam jangka masa yang pendek sahaja. Tambahan pula, dengan teknologi Liquid Crystal Display (LCD) yang digunakan di dalm projek ini, pengguna boleh memantau tahap kesihatan postur badan mereka. Secara kesimpulannya, alat ini boleh mengurangkan risiko pengguna daripada menghadapi masalah kesan negatif daripada postur badan yang kurang sihat dan mereka boleh menikmati hidup yang sihat.

ABSTRACT

This project title is Body Posture Monitoring System. It involves both of the hardware and software construction to make this project complete successfully. This project involves Medical in Engineering field which related to the human health. This involves the wearable device to give alertness to user about their posture especially when sitting and standing. This device consists of two part which is the back module that contain sensor and wrist module that contain LED and Liquid Crystal Display (LCD). With the implemented circuit design, this device will produce light only at certain danger parameter which has been set in the software part. Nevertheless, the light will not interrupt the user daily activity because it happens only in a short while. Furthermore, with the implement (LCD) screen technology, the user can monitor his postural rate. In conclusion, user can decrease the risk of having the bad effect of poor body posture and can enjoy their healthy body posture.

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LIST OF ABBREVIATION

Term	Meaning
DC	Direct Current
BAN	Body Area Network
WBAN	Wireless Body Area Network
IDE	Integrated Development Environment
LCD	Liquid Crystal Display
LED	Light Emitting Diode
FIFO	First In First Out

CHAPTER 1

INTRODUCTION

1.1 Project Overview

Nowadays, ones are too focus on their daily routines makes them forgot on the importance of having a good body posture. In this project, the posture that is mainly concern is sitting and standing. Posture is the position of our bodies adopt in response to the effects of gravity [1]. In a perspective, different postures are required to do different tasks. For example, an office worker needs to sit for a long time in front of the desktop [2]. The back pain occurs in the spinal column which functions for load bearing, permits movement and protects spinal cord [3]. Bad posture leads to degenerates and the space for the nerve roots is reduced that causes the chronic back pain [3].

In this project, body posture alertness and monitoring system is applied. Alertness is necessary to make the user more careful about their posture when doing works. This device will produce light which is command by Arduino Uno when user reached the set parameters of the postural angle. Thus, the user will know when the red light on, they need to adjust their current posture to a normal posture. The light wills not disrupt the user activity.

The monitoring system is using the Liquid Crystal Display (LCD) technology. LCD technology is chosen because it is simple to use, low power consumption, low interference and has standardized protocol.

Figure 1.1: Bad Sitting Posture [2]

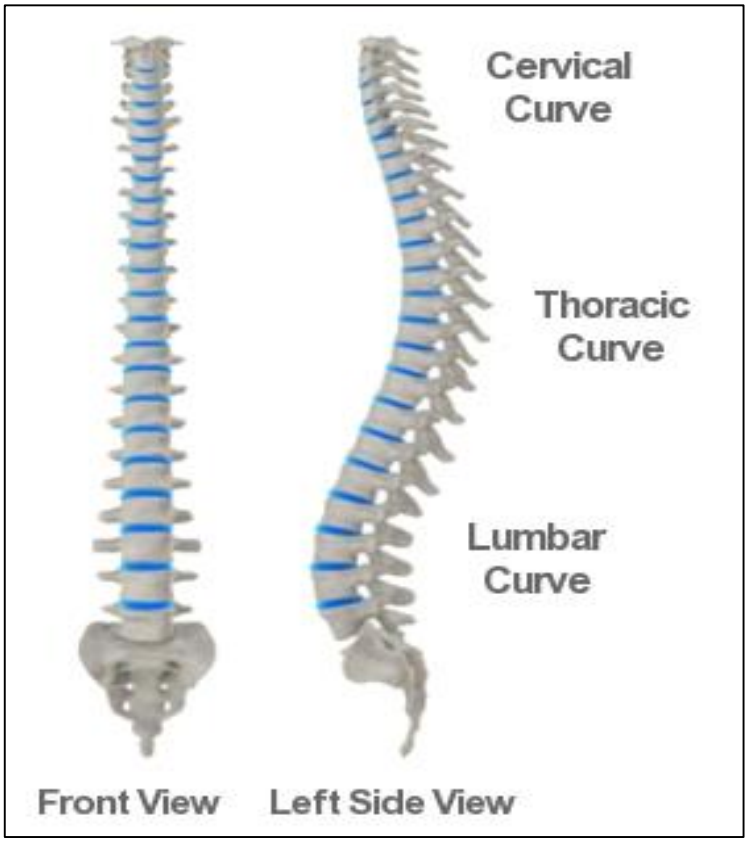

Figure 1.2: Backbone of Human [3]

1.2 Problem Statement

Due to the trend of advancement of technology, human nowadays are more attracted to gadget such as I-Pad, smartphone and laptop. Many of the workers and students nowadays spend most of their time doing their work in front of the laptop. After a while, doing their work without a proper posture, they will experience bad implication such as chronic back pain, headache and misalignment in the spine due to the poor siting posture.

In the market today, there are many existing type of wearable device to correct body posture. Mostly exist device is running consequently and consume high power. Nevertheless, there are wearable device that user need to wear for a long time and it takes time to correct body posture.

Hence, the body posture monitoring system demanded to increase user alertness and only trigger if user achieve certain danger angle of posture. This device consumes low power and user can monitor the rate of their postural problem using their smartphone.

1.3 Project Motivation

Emerging medical research on body posture with electronic engineering knowledge is quite challenging to me. But, for a future engineer it is the best to experience some skills and knowledge in a wide range of knowledge not only exposed to engineering knowledge. Thus, doing final year project involving medical research on body posture and electronic engineering knowledge is an interesting opportunity for me to broadening my skills and knowledge.

1.4 Project Objectives

- To study the concept and application of triple axis accelerometer (ADXL345).
- To design a system to monitor body posture angle by using accelerometer.
- To develop coding using Arduino Uno for the system.

1.5 Project Outlines

This report is divided into five chapters which are introduction, literature review, methodology, result and discussion and the final part is the conclusion and recommendations.

Chapter 1:

This chapter explains an introduction for the project of Body Posture Monitoring System. This part explains the importance of having good body posture is vital for a healthy life and this project makes one can monitor their body posture in their daily activities. Besides, this chapter also gives information on the statistics of the effect of poor sitting posture that leads to back pain in American. This chapter mainly contain project overview, objectives, problem statement and scope of the project. Overall, this chapter explains briefly on the project progressing. Furthermore, the project outline provides information which is delivered via each chapter.

Chapter 2:

Chapter 2 presents the literature review which emphasize on each components use in this project. The more details about the importance of body posture alertness is explains in this part. This chapter also contains the fundamental and characteristics of both accelerometer and Arduino Uno R3. This part also presents the past review by researchers or engineers based on the related topics to the project.

Chapter 3:

This chapter describes about methodology. The explanations are about both the software and hardware progress. This part relates on how the project progress step by step in order to get analysis and solution for the project.

Chapter 4:

Chapter 4 contains the results and discussion which clearly and precisely present the data and result of the project. Basically, it is a part of result outcomes justification and discussion.

Chapter 5:

This chapter presents the conclusion and recommendations of the project. This part highlights the summary of the project that contains discussion of the objectives. It also contains description of the methods employed within the project, and problem accesses include the resolving, minimizing and alternate solution. Lastly, recommendation provided on how to improve and approach the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Engineering in Medical Field

In advancement of technology, engineering and medical field are now converging and rapidly expanding which known as biomedical engineering. The technical knowledge in engineering which is needed to solve much kind of health problems is vital for patients. The technical knowledge in engineering that lead to development of many devices for monitoring, scanning, treatment and diagnostic disease is among the application of engineering in medical field. This device use sensor to detect the parameter of each disease in a patient.

In this project, accelerometer sensor is selected to monitor and corrected the postural problem of a patient. This device uses the principle of Body Area Network (BAN) a wireless network which attached to the human body. The device is wearable and the postural information can be monitor through the LCD.

2.2 Postural Problem

Currently, there are many cases related to poor body posture especially the back part of human regardless of the human age. When ones are too focus on their daily life they are tends to ignore their postural posture that will lead to poor body posture that may lead to other complications such as back pain, headache and losing focus.

There are some causes of poor body posture such as hereditary, poor fitness, lack of knowledge in health information and bad habits. Among the type of poor postural related to the back part is *scoliosis*. This condition characterized by a curve spine. The next type is *lumbar lordosis* the most common condition occurs in human and characterized by “sway back” posture which results from weak abdominals and short hip flexous. [4]. Thus, in order to get a good posture, body posture monitoring is very important to human.

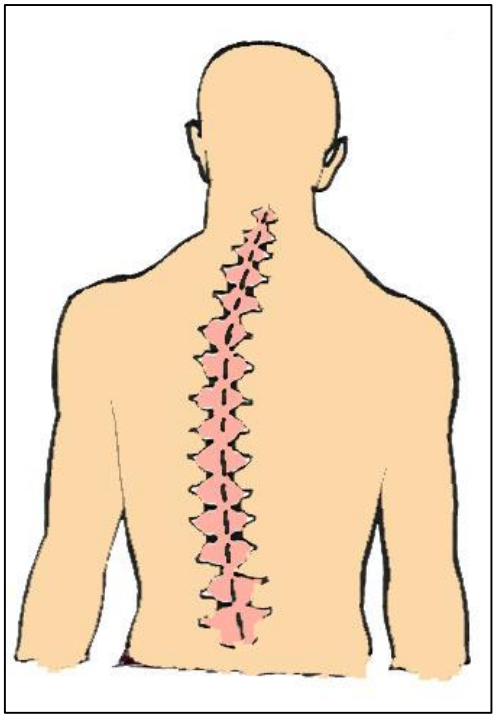

Figure 2.1: Scoliosis [4]

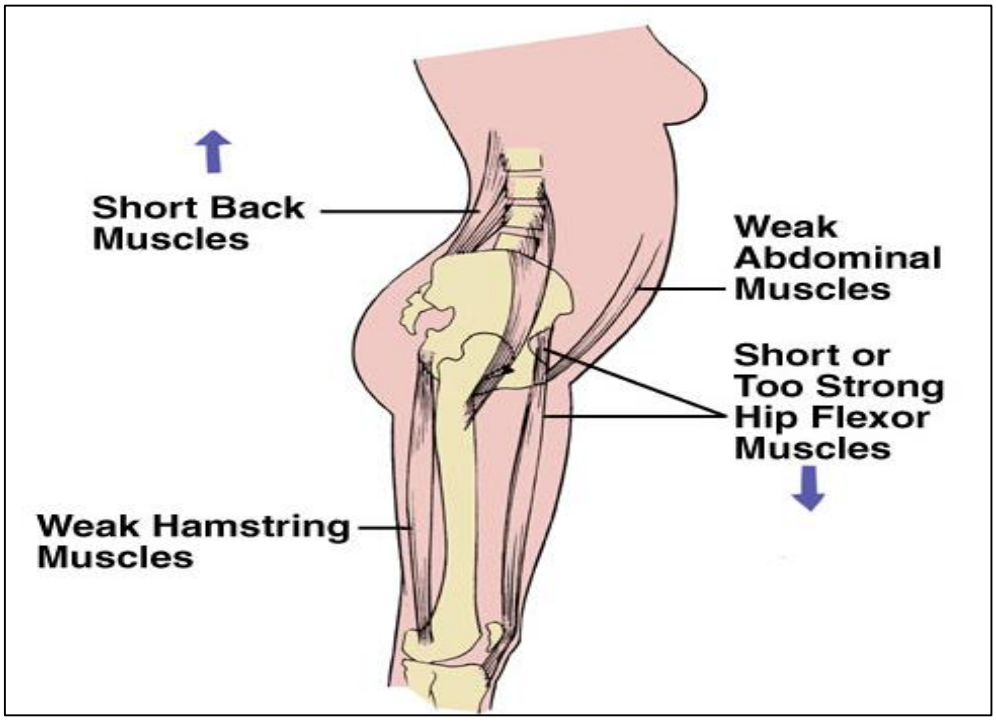

Figure 2.2: Lumbar Lordosis [4]