



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DESIGN AND DEVELOPMENT OF AUTOMATIC PROPER
POSTURE DETECTION CHAIR**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours

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I hereby, declared this report entitled “Design and Development of Automatic Proper Posture Detection Chair” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours. The member of the supervisory is as follow:



ABSTRAK

Judul untuk projek ini ialah 'Reka Bentuk dan Membangunkan Pengetua Pegesanan Posture Automatik' di mana semua tentang reka bentuk kerusi ergonomik yang boleh menghalang postur yang buruk yang buruk dan rasa tidak selesa bagi pelajar sekolah. Walau bagaimanapun, reka bentuk projek ini menggunakan kerja pepejal. Sesetengah sekolah redah masih menggunakan kerusi kayu untuk pelajar, kebanyakannya tahun satu dan tahun dua di dalam kelas. Ketidakelesaian ini akan menyebabkan kesakitan punggung untuk pelajar apabila mereka duduk d kerusi kayu di dalam bilik darjah untuk masa yang lebih masa, sementara mereka mempunyai postur yang lemah apabila ketidakelesaian bermula. Mendapatkan penyelesaian daripada projek ini untuk pelajar sekolah dapat mengesan postur yang lemah, postur yang baik, dan pendedaran tekanan sambil duduk di atas kerusi kayu. Untuk mengesan mengesan postur yang lemah dan postur yang betul, sensor ultrasonik yang dipasang di belakang kerusi kayu dan sensitif sensitif daya dipasang pada kusyen untuk mengesan tekanan yang disebarkan. Disampin itu, faedahnya adalah apabila pelajar duduk di postur yang lemah yang ditunjukkan oleh kelakuan visual dengan membawa dan audio dengan buzzer. Projek ini dianalisis menggunakan DAQ-Data Protocol untuk mengukur data Arduimo dan mempakarkan hasilnya dalam Microsoft Excel.

ABSTRACT

The title for this project is ‘Design and Development of Automatic Proper Posture Detection Chair’ where all about ergonomic chair design that can prevent poor sitting posture and discomfort pain for school students. However, this design of the project uses solid work. Some primary schools still use wooden chairs for students, mostly year one and year two in the classroom. Although, year three until year six using plastic chair. This make discomfort will cause buttock pain for students when they sit on the wooden chair in a classroom for a longer time, while they have poor posture when discomfort begins. Getting a solution from this project for primary school students can detect poor posture, proper posture, and distribution of pressure while sitting on a wooden chair and plastic chair. In order to detect poor posture and proper posture, the force sensitive resistors sensor mounted on backrest cushion and seat cushion to detect pressure distribution. In addition, when students sit in poor posture seating will produce alarm and turn on indicators. This analyzed project uses termite to calculate data from Arduino Uno and shows the output in Microsoft Excel.

DEDICATION

To my beloved parents Sir Manimaran and Madam Rukumany, thank you very much
for your support during this project

To school headmaster Madam Kogilan from Sjk(T) Durian Tunggal

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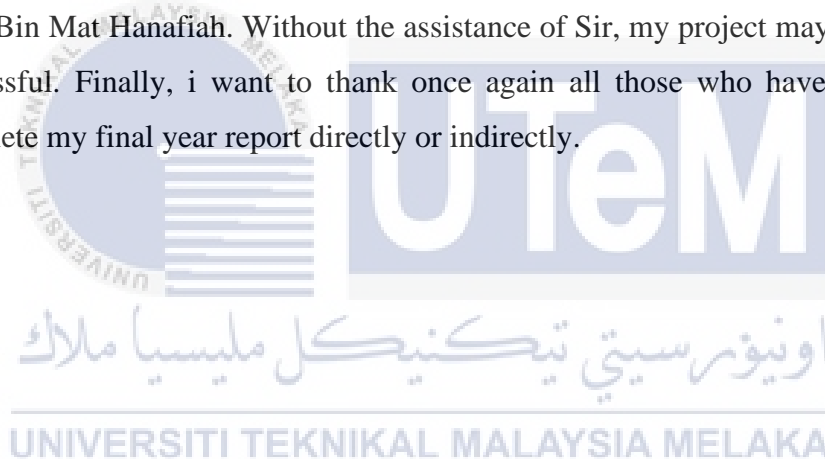


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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

DAQ	-	Digital data acquisition
IDE	-	Integrated development environment
%	-	Percentage
FSR	-	Force sensitive resistor
V	-	Voltage
DC	-	Direct current
Cm	-	Centimetres
Kg	-	kilogram
Ohm	-	unit electrical resistance
PIC	-	Peripheral Interface Controller
IOT	-	Internet of things
GND	-	Ground
PWM	-	Pulse width modulation
USB	-	Universal serial bus
MHz	-	Megahertz
LCD	-	Liquid crystal display
USB	-	Universal serial bus
IDE	-	Integrated development environment
SRAM	-	Static random-access memory

CHAPTER 1

INTRODUCTION

1.1 Background

Siting is the one act that everyone will always do their daily lives most probably offices and school. Normally students spend extend time by siting on the chair in classroom compare to other activities. Therefore, they are struggling to finish up school homework. There is high probability of getting neck and low back pain. Hereby, if such conditions continue, students will face many medical conditions affecting their present and future lives. Furthermore, if the students do not know the harmful effect of placing themselves in a wrong position, that problem will become harmful. Do the students know the good siting posture, and do they apply it if they are aware of it? There have been many studies on the effect of a bad sitting posture, but there is only dearth of study on student's awareness of good siting posture. Students need to be told and aware of an issue, only then will they follow it and apply it. Hence this study is to analyses the performance of the design system on the student siting posture. This report discusses about "Design and Development of Automatic Proper Posture Detection Chair" project. This project to set up prototype poor and proper posture detection chair among primary school students. In addition, the objective and scopes of this project is briefly described, how the project can be implemented.

1.2 Problem Statement

Students spend most of their time studying in the classroom, doing the homework and taking the exam. Muscles and other soft tissue are stretched or shortened even with to long periods of time during all these activities. It can get severe, particularly if the students sit in the posture of bad things. If the students still don't improve their sitting posture, they will experience a lot of medical conditions that can affect their study life. Hence, the purpose of this study is design and development of automatic proper posture detection chair.

1.3 Objectives

The objective of this project:

- i. To set up a prototype of a proper posture detection chair.
- ii. To design and develop a proper posture detection chair using Arduino controller with suitable sensor.
- iii. To analyse the performance of the design system on the student sitting posture.

1.4 Scope

The important elements need to be considered in order to ensure the objectives are achieved:

- i. Build a prototype of proper posture detection chair that can be used mainly in primary school students and this project beneficial for school student that aged between 7 to 12 years old.
- ii. Solid work is used to design the hardware.
- iii. Analyse the suitable sensor attached to wooden chair and plastic chair with Arduino Uno controller.
- iv. Using Termite, all data signals are analysed and stored in excel.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Besides that, details and data from reading papers, books, articles, and some other were also collected in this part of the report. The idea is to have a good understanding of the fundamental connection to this project. The concept is basically taken from the writer anyway by combining and rephrasing it is entirely written in own words.

2.2 Theory

The word ergonomic originates from an ancient Greek, meaning rules or work. It is also known as factors of human design. Ergonomic aims to provide a suitable design for people who design systems, processes, equipment and environments. So that their requirements are limited, but also maximized. Therefore, the design focuses on the person or a group of people. This is often known as user-centered design.

Ergonomics is a science, thorough research, the design and the styling of the user (Limited, 2008). It is widely used in areas such as aviation and other transportation systems, sports, learning, public facilities, homes, recreation and workplaces. Ergonomic supports the whole community. There are three fields of ergonomics, physical ergonomics, cognitive ergonomics and organizational ergonomics. Related to physical ergonomics in this project. Figure 2.1 below show the physical ergonomics below is shown.