Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF HUMAN TEMPERATURE DETECTOR BY USING SENSOR WITH AUTOMATIC SANITIZER

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

NUR SYAFIKAH BINTI KAMARUDIN

Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

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DEVELOPMENT OF HUMAN TEMPERATURE DETECTOR BY USING SENSOR WITH AUTOMATIC SANITIZER

NUR SYAFIKAH BINTI KAMARUDIN

A project report submitted
in partial fulfillment of the requirements for the degree of
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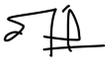

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I declare that this project report entitled “Development Of Human Temperature Detector By Using Sensor With Automatic Sanitizer ” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

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DEDICATION

I dedicate this project to everyone who support, encourage me toward the end of the project. I also dedicate this report to my husband Muhamad Zahiruddin bin Alias, my father Kamarudin bin Md Yusof, my family, my lecturer and all my friend from FTKEE. Not to forget my supervisor En Ahmad Zubir bin Jamil for the guidance throughout the journey.

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ABSTRACT

Every day the number of Covid-19 patient has been increase not only in Malaysia but all over the world. In Malaysia itself, the case has raised to almost 10,000 positive case in April – June 2021 with 5,767 new infections reported on average each day. There are almost 4000 coronavirus-related deaths reported in the country since the pandemic began. As the cases are rises, the precaution should be prepare to safe people's life from being effected by the virus. The goal of this project is to ensure that everyone is safe and fully sanitize before entering such as the premises, hospital school, factory and offices from the front door. The design and development of Human Temperature Detector by Using Sensor with Automatic Sanitizer is presented in this study. The system is intended to help prevent the spread of Covid-19 infection and assist in maintaining and/or improving community health and reducing the negative impact of the infection on the economy and society. The idea of implementing this project is due to the critical condition of the country on handling the virus. As the technology growth, the use of controller that can automatically handle the crowd by using sensors are very useful, everyone need to follow the SOP by control the distance within 1 meter with other people. This project is fully automatic since it is using Arduino UNO as microcontroller. This project is very user friendly and effective to control the spreading of Coronavirus. Besides that, this project will be using Arduino Uno to secure the data. The MLX 90614 as a contactless infrared (IR) digital temperature sensor will measure the temperature of human body and send the data to the Arduino. In fact, the LED will light up RED if the temperature more than 37.5C and GREEN if the temperature is below than 37.5C. This is to ensure that the person who enter the premise is not in fever or ill. Next PIR sensor will be used to detect the presence and motion and send the data to the Arduino before the motor is activated and rotate to dispense the solution through the pipeline to spray the sanitizer solution. Lastly, the system is envisioned for strategic deployment in public and private areas like public markets, banks, hospitals, schools, offices, residences, and many others.

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ABSTRAK

Setiap hari bilangan pesakit Covid-19 semakin meningkat bukan sahaja di Malaysia malah di seluruh dunia. Di Malaysia sendiri, kes itu telah meningkat kepada hampir 10,000 kes positif pada April – Jun 2021 dengan purata 5,767 kes baharu dilaporkan setiap hari. Terdapat hampir 4000 kematian berkaitan coronavirus dilaporkan di negara ini sejak wabak itu bermula. Apabila kes semakin meningkat, langkah berjaga-jaga harus disediakan untuk menyelamatkan nyawa orang ramai daripada terkena virus. Matlamat projek ini adalah untuk memastikan semua orang selamat dan membersihkan diri sepenuhnya sebelum masuk seperti premis, sekolah hospital, kilang dan pejabat dari pintu depan. Reka bentuk dan pembangunan Pengesan Suhu Manusia dengan Menggunakan Sensor dan Sanitizer Automatik dibentangkan dalam kajian ini. Sistem ini bertujuan untuk membantu mencegah penularan jangkitan Covid-19 dan membantu dalam mengekalkan dan/atau meningkatkan kesihatan masyarakat dan mengurangkan kesan negatif jangkitan terhadap ekonomi dan masyarakat. Idea untuk melaksanakan projek ini adalah kerana keadaan negara yang kritikal dalam mengendalikan virus. Seiring dengan perkembangan teknologi, penggunaan sistem pengawal yang boleh mengendalikan orang ramai secara automatik dengan menggunakan sensor sangat berguna, setiap orang perlu mengikut SOP dengan mengawal jarak dalam 1 meter dengan orang lain. Projek ini adalah sepenuhnya automatik kerana ia menggunakan Arduino UNO sebagai pengawal mikro. Projek ini sangat mesra pengguna dan berkesan untuk mengawal penyebaran Coronavirus. Selain itu, projek ini akan menggunakan Arduino Uno untuk menyelamatkan data. MLX 90614 sebagai sensor suhu digital inframerah (IR) tanpa sentuh akan mengukur suhu badan manusia dan menghantar data ke Arduino. Malah, lampu LED akan menyala MERAH jika suhu melebihi 37.5C dan HIJAU jika suhu di bawah 37.5C. Ini bagi memastikan orang yang memasuki premis tersebut tidak demam atau sakit. Sensor PIR seterusnya akan digunakan untuk mengesan kehadiran dan pergerakan dan menghantar data ke Arduino sebelum motor diaktifkan dan berputar untuk mengeluarkan larutan melalui saluran paip untuk menyembur larutan sanitizer. Akhir sekali, sistem ini dibayangkan untuk penggunaan strategik di kawasan awam dan swasta seperti pasar awam, bank, hospital, sekolah, pejabat, kediaman dan banyak lagi.

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LIST OF SYMBOLS

C - Celcius

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LIST OF ABBREVIATIONS

LCD	-	Liquid Crystal Display
cm	-	centi meter
COVID-19	-	Corona virus disease
SARS	-	Seevere acute respiratory syndrome
MERS	-	Middle East Respiratory syndrome

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CHAPTER 1

INTRODUCTION

1.1 Background

The innovation of thermoscope is to built the equipment that helps to measure the temperature. Since the first invation of the thermoscope doest not comes with the scale, the measurement results conducted is not precise and accurate. Galileo Galilei, an Italian inventor, invented the world's first thermoscope in 1593 (Rubin, 2018). After few decades, a numerical scale to the thermoscope invented. The creation results the first basic thermometer for medicinal purpose. The addition of several scales for temperature measurement, results to a precise and accurate temperature readings.

Usually, people will use infrared thermometer gun in temperature screening. There is no need to come into direct contact with the item or person while using a thermometer gun to take surface temperatures from a distance. Since the Coronavirus risk spreading worldwide, the use of thermometer guns has grown massively. Many businesses and public institutions use thermometer guns to screen large numbers of people to detect those who might be sick and running a temperature. In facts, because to operator errors and unforeseen environmental conditions, thermometer guns could be quite inaccurate. Next, other than the thermometer, sanitizer is also important nowadays. Sanitizer can help to reduce the microbial count and kills many harmful germs that could infect workers in flu and other viruses. We need at least 60% of alcohol in sanitizer to avoid getting sick and spreading germs to those around you (Chamary, 2020). Alcohol-based hand sanitizers help to detect the spread of germs and illness-causing bacteria such as in school, mall and factory.

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Moreover, some of body temperature monitoring including the fever diagnostics. Fever diagnostics has been conducted as government's suggested solutions for breaking the infectious illness transmission chain. This is evidenced by the widespread use of public testing along the SARS epidemic in 2003, the H1N1 onslaught in 2009, and the latest COVID-19 pandemic. The emergence of the lethal COVID-19 virus has resulted in a global pandemic that has put enormous strain on both commercial and public healthcare institutions. In addition, the A considerable number of people have died as a consequence of the COVID-19 epidemic. Next, other than the thermometer, sanitizer is also important nowadays. Sanitizer can help to reduce the microbial count and kills many harmful germs that could infect workers in flu and other viruses. We need at least 60% of alcohol in sanitizer to eliminate and stop the spreading germs to those around you (Chamary, 2020). Alcohol-based hand sanitizers is used to detect the spread of germs and illness-causing bacteria and etc.

1.2 Problem Statement

I. The idea of this project comes due to pandemic covid-19 that occur all over the world. Everyone around the world are attempting to order daily temperature checks at all places they visit (Hamblin, 2020). The normal thermometer can measure the temperature of a Covid-19 patient and also may spread the virus easily by touching the same thermometer gun. Also, it can be highly inaccurate due to environment condition and operator.

II. The existing temperature scanner on the market is distance-dependent (QIAN, 2021), which implies that the temperature detected fluctuates with distance. The temperature observed tends to vary with measurement distance.

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III. Eventually, sanitizer is one of the important things to use during this pandemic era. We used sanitizer to kill the germs, bacteria and virus instead of washing hands (Howes, 2020). But, the manual sanitiser require us to touch the pump to dispense, it can also spread the germs. Moreover, cleaning hands only will not 100 percent kills the virus.

1.3 Project Objective

This main objective of this project :

a) To design a functional contactless temperature scanner.

b) To develop a cheap expenses for touch free hand sanitizer disspenser.

c) To analyse a user friendly contactless thermometer and sanitizer dispenser.

1.4 Scope of Project

The project focuses on developing a affordable functional contactless thermometer and sanitizer dispenser.. The scope of project are as below:

a) Hardware : Arduino UNO R3, LCD, Contactles Temperature Sensor MLX90614, Ultrasonic Sensor.

b) Software : Arduino IDE

The prototype allow the automated measuring with varies distance for the body temperature checking. The primary purpose of the project is to design a touchless temperature detector and build in automatic sanitiser. Thus, the accuracy and measuring distance will be taken in this project.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

As the technology has grown faster, there are many new invention has been created. Some is still being upgraded. SARS, MERS and Covid-19 can be categorise as a pandemic that widespread over the country and the world. The spreading of this virus is very fast. As the time ticking, the technology to helps to avoid the spreading should be as fast as the virus too. The development project will be very helpful in certain area or premises. The technology used in this project such as Arduino has been widely used in automation industry as it can work automatically without being monitored. Basically, it can be used anytime and can save the power consumption.

2.2 Temperature of Human Body

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The quantity of heat concentration in the body is indicated by temperature. The human temperature is the main indicators of health condition. It is frequently assessed in the medical context as a prelux to any analysis. The aim of body temperature observation is to look for any signs of related illness in the presence of fever. Fever is one of the clinical indications of sickness in humans and one of the common reasons for seeking medical attention. During an illness, In order to eliminate germs or viruses and trigger antibody responses, the human body's defence mechanism raises body temperature. Following that, to achieve proper physiological function. The hypothalamus is a portion of the brain that is in charge of constantly adjusting and regulating body temperature in order to maintain an optimal body function surroundings. By managing heat loss and uptake, the thermoregulation process keeps the body temperature within a small range. A human's body temperature is primarily

stable and independent of the ambient temperature. However, it is also normal for body temperature to fluctuate during the day (Tonny Heng Yew Ling, 2015).A normal condition persons, body temperatures can fluctuate based on environmental and biological factors. However, the temperature of individual body is usually being controlled by their age and humidity. Regardless of the variation, a normal body temperature should be kept within the normal range, which is 36.5°C to 37.5°C. The normal body temperature measurement range is depicted in Figure 2.1.

Table 2.1: Individual body temperature at various stages (Tonny Heng Yew Ling, 2015)

Body Temperature Range	Hypothermia	Normal	Hyperthermia
Baby (Birth to 2 years old)	36.00 ºC	36.00 ºC – 37.00 ºC	37.00 ºC – 38.00 ºC
Children (3 to 12 years old)	36.00 ºC	36.0 ºC – 36.77 ºC	38.00 ºC
Adult (13 to 40 years old)	36.10 ºC	36.1 ºC – 37.20 ºC	37.50 ºC
Elder (above 40 years old)	35.00 ºC	35.77 ºC – 36.94 ºC	37.44 ºC – 37.94 ºC

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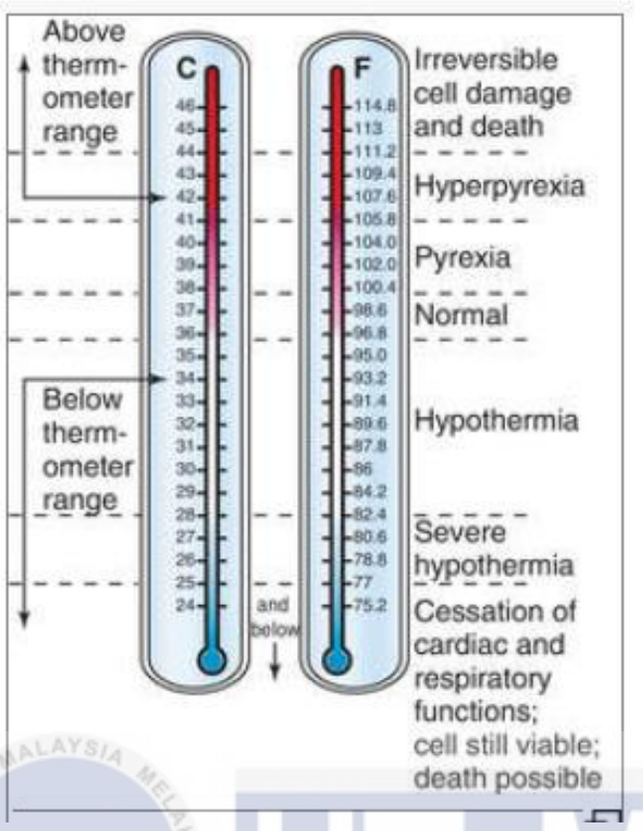

Figure 2.1: Body Temperature Measurement Range

2.2.1 Comparison Between Contactless and Contact Thermometer

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There are two types of thermometer that widely used which is Contact and contactless Thermometer. But there are still have pros and cons between the two types of the thermometer. In brief, as compared to a contactless thermometer, a contact thermometer still the most trusted temperature reading depending on the measurement site. A contactless thermometer's reaction time is less than that of a contact thermometer usually will give high performance. Nonetheless, the contactless thermometer is a far more sanitary measuring procedure than contact thermometers.

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Table 2.2: Contact Vs Non-Contact Thermometer

Aspect	Non-Contact Thermometer	Contact Thermometer
Speed	Faster	Slower, Response time might differ depends on measurement locality.
Accuracy	Not accurate	Have high accuracy
Hygiene	Have high hygiene, no contact is required.	Less hygiene, required physical contact during measurement.

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Figure 2.2: Non-Contact Thermometer & Contact Thermometer

2.3 Body Temperature Measurement Location

The location of the temperature measurement can be done in various ways. It is depending on the condition of the person. The most common method on taking the temperature is by Oral which is mouth and the person must be able to breathe through their nose (Staff, 2020). If not, they can also do the temperature measurement through rectum ear of armpit. Other way, the most accurate way to measure the temperature of the body is Rectal (Staff, 2020).

It is recommended for babies and for people who cannot hold the thermometer safely. In addition, during the Covid-19 pandemic, checking temperature at forehead has necessary anywhere around the globe. The result might not be accurate compare to the rectal but is hygiene and faster compare to other location. There is also other location that commonly used in measuring the temperature for human body. Table 2.3 shows the comparison, the pros and cons of body temperature at different location.

Table 2.3: Comparative of various methods of measuring body temperature locality

Location	Pros	Cons
Axillary	• Easily accessible and safe • Adequate accuracy	• Unreliable measurement site due to the absence of prominent blood vessels. • Longer response time, Tendency to introduce errors..
Forehead skin	• Simple to use and secure • Have good accuracy	• Sensitive to several elements
Oral	• Easy accessibility and convenient • Quick Response • Good accuracy	• Oral temperature easily affected by foodstuffs, mucosal inflammation or circulating air

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