Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF IOT-BASED PERSONAL EMERGENCY ALERT SYSTEM USING ELECTROCARDIOGRAM (ECG) SIGNAL

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Bachelor of Electronics Engineering Technology with Honours

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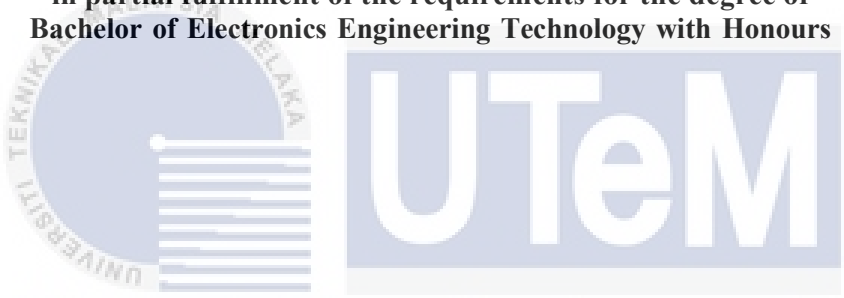
DEVELOPMENT OF IOT-BASED PERSONAL EMERGENCY ALERT SYSTEM USING ELECTROCARDIOGRAM (ECG) SIGNAL

AHMAD FIRDAUS BIN MOHD RASDI

A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology with Honours



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Tajuk: Development of IoT-Based Personal Emergency Alert System Using Electrocardiogram (ECG) Signal

Sesi Pengajian : 2022/23

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I declare that this project report entitled **"Development of IoT-Based Personal Emergency Alert System Using Electrocardiogram (ECG) Signal"** 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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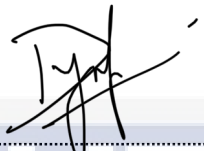
I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honours.

Signature : 

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Date : 13/1/2023

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DEDICATION

BISMILLAHIRRAHMANIRRAHIM

Special for

My beloved mother, Norhasimah Binti Abdullah and father, Mohd Rasdi Bin Jusof for all of your sacrifices, prayers, blessing and love which are the main reason behind the completion of this project.

To my respected supervisor,

Madam Dayanasari Binti Abdul Hadi with the most thankful and appreciation for all the guidance and valuable knowledge throughout the production of this undergraduate project.

To others,

Especially to my friends, I would like to give my gratitude for them being the support either it is directly or indirectly through my ups and down. No words could describe on how their encouragement and support has been the greatest gift to lift up my morale.

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ABSTRACT

Nowadays, a lot of health cases related to heart failure such as cardiac arrest because peoples' today health condition are not great leading to various disease. The cardiac arrest is the abrupt loss of heart function in a person who may not been diagnosed with heart disease and it can come on at unexpected time. There are a lot of junk food product produced by food and beverage business. People are eating the junk food a lot and prevent healthy food such as vegetables or fiber. When government announced the Malaysia Movement Control Order or stay at home for everyone, people has been unfit since they are unable to go for exercise or any sports to prevent pandemic disease from being spread. The amount of unfit and old people living alone at home increasing rapidly because of social isolation and loneliness. The Electrocardiogram (ECG) are the major focus of health community to observe and monitor people's pulse to acknowledge their health status. The Electrocardiogram (ECG) signal can be used out of hospital by connecting to microcontroller module and with wireless communication tools, the new device can be innovated through studies and helps the community. With this, a studies and research been made on how we can use the electrocardiogram (ECG) signal for unfit young people and old people living alone at home through reading past conference paper and article related. After that, a development of the Personal Emergency Alert System using Electrocardiogram (ECG) signal using Internet of Things (IoT) been made.Then, the efficiency of the project being tested in order to prevent any accident and gives benefit to health community and people who needed it the most. This project consist the push button assimulate the Electrocardiogram (ECG) signal and streamed the result to a Blynk application on smartphone to analyse the health status of a person and option for caretaker to seek for medical attention if anything happens.

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ABSTRAK

Pada masa kini, banyak kes kesihatan yang berkaitan dengan kegagalan jantung seperti jantung berhenti ekoran keadaan kesihatan masyarakat pada hari ini yang tidak begitu baik sehingga membawa kepada pelbagai penyakit. Jantung terhenti adalah kehilangan fungsi jantung secara mendadak pada seseorang yang mungkin tidak didiagnosis dengan penyakit jantung dan ia boleh datang pada masa yang tidak dijangka. Terdapat banyak makanan ringan yang dihasilkan oleh perniagaan makanan dan minuman pada hari ini dan orang ramai mengambilnya dengan kuantiti yang banyak dan tidak mengamalkan pemakanan yang sihat seperti sayur-sayuran dan serat. Apabila kerajaan mengumumkan Perintah Kawalan Pergerakan Malaysia, kualiti keadaan fizikal orang ramai tidak cergas semakin bertambah kerana mereka tidak boleh pergi bersenam atau mana-mana sukan untuk mencegah penularan wabak. Jumlah orang yang tidak sihat dan tua yang tinggal bersendirian di rumah terus meningkat dengan tinggi kerana pengasingan sosial dan kesunyian. Elektrokardiogram (ECG) adalah tumpuan utama komuniti kesihatan untuk memerhati dan memantau nadi orang ramai untuk mengetahui status kesihatan mereka. Isyarat Elektrokardiogram (ECG) boleh digunakan di luar hospital dengan menyambung ke modul mikropengawal dan dengan alat komunikasi tanpa wayar, peranti baharu itu boleh diinovasikan melalui kajian dan membantu masyarakat. Dengan ini, kajian dan penyelidikan telah dibuat tentang bagaimana kita boleh menggunakan dan memanfaatkan penderia elektrokardiogram untuk golongan muda yang tidak sihat dan orang tua yang tinggal bersendirian di rumah melalui pembacaan kertas persidangan dan artikel berkaitan yang lalu. Selepas itu, pembangunan Sistem Makluman Kecemasan Peribadi menggunakan isyarat Elektrokardiogram (ECG) menggunakan Internet of Things (IoT) telah dibuat. Kemudian, saya menganalisis kecekapan peranti bagi mengelakkan sebarang kemalangan dan memberi manfaat kepada komuniti kesihatan dan orang ramai. siapa yang paling memerlukannya. Projek ini terdiri daripada butang tekan untuk beberapa kali mengikut keadaan kadar hati daripada isyarat Electrokardiogram (ECG) dan menstrimkan hasilnya ke aplikasi Blynk pada telefon pintar untuk menganalisis status kesihatan seseorang dan pilihan untuk penjaga mendapatkan rawatan perubatan jika apa-apa berlaku.

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LIST OF SYMBOLS

δ	-	Voltage angle

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LIST OF ABBREVIATIONS

V	-	Voltage
s	-	Second
BPM	-	Beats Per Minutes

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CHAPTER 1

INTRODUCTION

1.1 Background

This chapter will explain about the background of the project Development of an IoT-Based Personal Emergency Alert System Using Electrocardiogram (ECG) Signal with feedback mechanism. This chapter will include brief background study, problem statement, objective and scope of project. An electrocardiogram (ECG or EKG) is a test that measures the electrical activity of the heart. It records the heart's rhythm and activity on a graph, which can be used to diagnose a variety of heart conditions, such as heart attacks, arrhythmias, and heart failure. It typically involves placing electrodes on the skin of the chest, arms, and legs, which detect the electrical signals produced by the heart and transmit them to a machine that records the information.Electrocardiography refers to the technique of using an electrocardiogram machine to measure the electrical activity of the heart and record it, while an electrocardiogram is the actual recorded output or tracing that results from the process.

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1.2 Problem Statement

Recently, the amount of unfit young and old people living alone at home has raised after the pandemic phase when people being isolated or stay at home after being instructed by the government during the coronavirus disease wildly spread on the public. This issue has concern many people as there are a lot of them suffering social isolation and loneliness [1]. Moreover, the world's today produced a lot of junk food which is not good for health. People especially the youngster take the junk food can harm their body and brain. With

current technologies, the youngster also tend to lay down and playing phone can effect their physical conditions after not doing any exercise [1]. There is always a solution to every problems as the studies and researches about how to help the unfit young people and old people living alone at home can being taken care of to prevent any bad things happen.

The self wearable medical devices has been the goal towards the new technology to ease patient of the medical community. Due to the limited instrument of Holter monitor, the ability to detect any potential disease from unfit people is low. To overcome this, the push button can assimulate the Electrocardiogram (ECG) signal can be used to create new devices. The Electrocardiogram (ECG) is the major focus of health community to help monitor's patient to increase survival rate of people and prevent the potential complications.

The Electrocardiogram (ECG) can show a pulse by the reading people's body and gives the current health status.With this invention, we can monitor and diagnose patient with heart disease and take quick reaction when the pulse from the ECG on abnormal state. With the addition of notification system also helps the guardian of the patient to reach out the medical attention. Electrocardiograms are the major focus of the medical community due to high heart issues not only among elderly but also young people in our country. This invention required less cost and easy to obtain for the sensor and the microcontroller. But, as the engineering field limitation on biomedical projects, the project was unable to continue using the Electrocardiogram (ECG) sensor instead the method used were using the actual Electrocardiogram (ECG) signal and assimulate it on the projects using push button in 5 seconds time frame.

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1.3 Project Objective

The main aim of this project is to propose a systematic and effective methodology to use Electrocardiogram (ECG) signal to be analysed and differentiate into 3 different heart rate condition. Specifically, the objectives are as follows:

a) To investigate how to simulate the Electrocardiogram (ECG) signal using push up button in 5 seconds time frame.

b) To develop an IoT-Based Personal Emergency Alert System Using Electrocardiogram (ECG) signal.

c) To analyze the data taken from the Electrocardiogram (ECG) simulator MS400 in order to identify the 3 category of a heart rate condition.

1.4 Scope of Project

The scope of this project are as follows:

a) Hardware used in this project are Electrocardiogram (ECG) simulation, MS400 , NodeMCU ESP8266 and push up button

b) The software used in the project is Arduino IDE for coding and Blynk application for Internet of Things (IoT)

c) The project is to assimulate the Electrocardiogram (ECG) signal into push up button in 5 seconds time frame

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss the differences of previous studies to be explained in more detailed matters related to the product that will be developed. Furthermore, this chapter will also discuss the explanation of the uses of Electrocardiogram (ECG) sensor on previous project so that the understanding of the theory is good. In this chapter also will give detailed knowledge on the research that will be going through. Today's world produce a lot of unhealthy food such as various kind of fast food has leading to the increasing amount of unhealthy young people in our country resulting them being not fit enough to do daily works. The unfit status of people can be seen when they easily get tired and always lying down after stressing out at studies or work and never do any exercise to increase their body level of fitness. The old people that living alone at home without guardian looking after them needs to be paid attention because their health is not the same as young people and anything can happens to them anytime. These problems lead to the how we can exploit the electrocardiogram sensor, a medical device used to check people's pulse. The electrocardiogram is a limited machine available for monitoring patient in the hospital and is very highly cost for treatment in hospital. The invention of this device can benefit to old people and unhealthy young people living alone at home with additional feedback mechanism feature for emergency call on getting medical attention.

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