UNIVERSITI TEKNIKAL MALAYSIA MELAKA

WEB-BASED HEARTBEAT MONITORING SYSTEM USING NODEMCU AND THINGSPEAK

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

by

HIDAYATUL SALIKIN BINTI HALMI

B071610314

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Power) with Honours. The member of the supervisory is as follow:

Signature: …….

Supervisor : AZHAN BIN AB RAHMAN

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Co-supervisor: ZUL HASRIZAL BIN BOHARI

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ABSTRAK

Bidang bioperubatan tidak lagi terpisah dalam dunia automasi hari ini. Dalam bidang bioperubatan,telah membuktikan kepentingan penerapan kejuruteraan dan teknologi. Malah, ia bukan sahaja menjadikan doctor lebih cekap, tetapi juga membantu mereka memperbaiki proses pengambilan keseluruhan.Juga, sistem pemantauan pesakit adalah langkah baru dalam automasi pengawasan doktor. Idea asal di sebalik projek ini adalah sama ada seseorang itu berada di rumah atau luar bandar, pesakit boleh terus berhubung dengan doktor dan jika perlu, mengambil tindakan segera. Pesakit menghadapi masalah kematian yang tidak dijangka disebabkan oleh masalah penyakit jantung tertentu dan serangan yang disebabkan oleh kekurangan penyelenggaraan perubatan yang baik kepada pesakit pada masa yang diperlukan. Ini adalah untuk memantau pesakit-pesakit dan memberi maklumat kepada doktor dan orang tersayang. Oleh itu, kami mengemukakan projek yang inovatif untuk mengelakkan kematian mendadak yang menggunakan teknologi pengesan menggunakan internet untuk berkomunikasi dengan orang tersayang dalam masalah. Sistem ini menggunakan pengesan denyutan untuk mengesan kesihatan pesakit. Pengesan disambungkan kepada Nodemcu. Sebaliknya, paparan LCD dan sambungan wi-fi dihubungkan untuk mengesan mikrokontroler kesihatan pesakit untuk menghantar data ke pelayan web. Menggunakan IoT, data pesakit akan dihantar sekiranya terdapat sebarang perubahan mendadak dalam pukulan hati. Oleh itu, kesihatan pesakit yang berasaskan IOT menggunakan internet untuk memantau kesihatan pesakit dengan berkesan dan membantu pemantauan pengguna dari kerja dan menyelamatkan nyawa

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ABSTRACT

The biomedical field is no longer apart in today's automation world. In the field of biomedical, the application of engineering and technology has demonstrated its significance. Not only did it make doctors more efficient, but it also helped them improve the overall medication process. Also, the patient monitoring system is a new step in the automation of doctor supervision. The basic idea behind this project is that whether a person is at home or rural, the patient can stay connected to the doctor and, if necessary, take immediate action. Patient face an unexpected death problem due to the specific disease of heart problems and attack that is due to the lack of good medical maintenance to patients at the required time. This is for monitoring the patients of the informing doctors and loved ones in particular. We are therefore proposing an innovative project to dodge such sudden death which uses sensor technology and uses the internet to communicate with loved ones in case of problems. This system uses pulse sensor to track the health of patients. The sensor is connected Nodemcu. In turn, the LCD display and wi-fi connection are interfaced to track the patient's health microcontroller to send the data to the web server. Using IoT, the patient is sent about the patient in case of any abrupt changes in heart rate alert. Hence, the IoT-based patient health uses the internet to monitor patient health effectively and helps the user monitor from work and save lives for their loved ones.

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DEDICATION

This research is dedicated to my parents for their encouragement, motivation, and endlessness. Special thanks to my supervisor, Mr Azhan Bin Ab Rahman also my co-supervisor, Mr Zul Hasrizal Bin Bohari, my lecturer and my friends who helped me throughout this project directly and indirectly.

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LIST OF SYMBOLS

C	-	Celsius
V	-	Voltage
‘+’	-	Positive
‘-’	-	Negative

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LIST OF ABBREVIATIONS

AC	Alternating Current
WLAN	Wireless Local Area Network
BPM	Beat Per Minute
CPU	Central Processing Unit
CVD	Cardiovascular Disease
DC	Direct Current
ECG	Electrocardiography
GPRS	General Packet Radio Service
GSM	Global System for Mobile
IoT	Internet of Things
IP	Internet Protocol
ISP	Internet Service Provider
LCD	Liquid Crystal Display
LDL	Low-Density Lipoproteins
LED	Light Emitting Diode
PWM	Pulse Width Modulation
TCP	Transmission Control Protocol
USB	Universal Serial Bus
GND	Ground

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CHAPTER 1

INTRODUCTION

1.1 Background

At that young age, Malaysians develop heart problems compared to their counterparts somewhere else. The Malaysian based on population death rate of heart disease (CVDs) has been 36 percent in 2014, according the World Health Organization. An approximately 17.7 million people across the world died in 2015 from CVDs representing 31 percent of all deaths annually. While HDL took cholesterol from cells to a liver to be excreted from of the bodies thus minimizing the risk of heart disease. LDL (high-density lipoprotein cholesterol) brings cholesterol onto cells that can cause to blood vessel obstruction. High LDL rates therefore are identified as a risk factor for CVDs. To prevent from heart disease must control the pressure of blood. A major risk aspect for heart disease is high blood pressure. The blood pressure must be regularly checked-for most young people at least once per year, more often and have high blood pressure. Take steps to avoid or control high blood pressure, such as lifestyle changes. Furthermore, daily exercise must be done. Physical activities have many benefits, including the heart getting strengthened and the oxygen supply being bettered. It could also help to keep the weight healthy, lower cholesterol and lower blood pressure. All of that can decrease the risk of heart disease.

More efficient heart function and normal cardiovascular fitness are usually assumed by lower heart rate at rest. A well-trained athlete, for example, has a comfortable heart rate closer to 40 beats per minute, but this rate will change during a heart attack due

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to the disrupted blood flow. Wherever the heart blockage occurs, there is often a direct exchange on the heart rate variety. This project is expected to use the Internet of Things (IoT) to identify heart attack. The system will collect the patients ' ECG signal and heartbeat rate, then send it to the hospital server via the internet and store the data. The system also recognizes the abnormality and alerts the doctor and hospital by buzzing if there has been any abnormal condition about the patient so the doctor can equip himself or the therapy. The system also allows the doctor to monitor the status of their patients using their laptop or smartphones. The aim is to provide early exposure to heart attacks so that within the first few important hours medical observation is given to the patient, thereby greatly boosting the patient's chances of survival. (World Health Organization: Cardiovascular Disease, 2016, retrieve from : https://www.who.int/cardiovascular_diseases/en/).

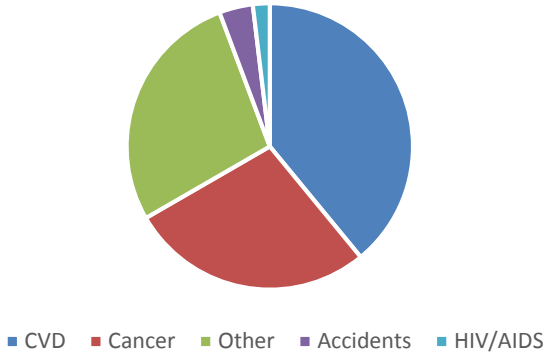

Figure 1.1: The source of pie chart is Human Disease

(World Health Organization: Cardiovascular Disease,2016 retrieve from: https://www.who.int/cardiovascular_diseases/en/)

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1.2 Problem Statement

Nowadays, the ratios of heart diseases are rising in our population. The risk of a person to get a heart attack these days are growing from time to time. The biggest problem that affects the person is coming from the person itself, which point not to care about one's nutrition. Various people in this world are not knowledgeable of the harmful of heart attacks. This is because one does not want to be worried about health and one reason that doing a medical check-up usually is a waste. In this project, the aimed device can be very effective for the heart attack patient as well as a regular person. This is because the project could easily set the rate of the heartbeats of the user. If the device recognizes any abnormal rate of heartbeats, the data are monitored by one personal doctor and procedure can be used. About half of the patients who died due to the late detection of the strange heart rate and most of them also were not brought to the hospital shortly. Accordingly, the recommended device will be very valuable to society in terms of health matters.

1.3 Objective

1. To detect the heart rate of patient by making a device that can operate as a heart rate monitor.
2. To analyse a system that is capable of sending the readings to internet server in order to provide real- time monitoring of the heartbeat
3. To implement the interface of patient condition.

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1.4 Project Scope

My project of analysis will emphasis on a patient's heartbeat and convert it into e lectrical signals and pulses. The based microcontroller that will be applied in this device is Nodemcu. The signals and pulses will be stored on the internet so the doctor could observe the patient’s heart rate at any time.

1.5 Project Significant

The proposed will begin with a brief synopsis of my design that is to observe the heartbeat of the patient by using Nodemcu and Thingspeak. It is created for the healthcare population because it can help the doctor could monitor the situation of the patient every time. In development, will be a quick reaction and can spare life. This is because someday an expected symptom will happen so this is can help them. Since this product is produced, it will be much simpler for them to manage and control their health.

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