UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF HEART ATTACK PATIENT'S TRACKER USING GSM

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

by

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ABSTRAK

Kadar kematian akibat serangan jantung di Malaysia semakin meningkat setiap tahun kerana kekurangan masa untuk menjaga kesihatan diri mereka dalam dunia modenisasi ini. Tujuan kertas ini adalah untuk membangunkan prototaip tracker pesakit serangan jantung menggunakan GSM. Sistem yang dicadangkan akan memberi amaran dan memantau parameter kesihatan pesakit seperti denyutan jantung dan suhu badan dari jauh. Sistem ini juga memaparkan semua parameter kesihatan melalui OLED pada peranti prototaip dan juga dapat memantau parameter dalam talian melalui khidmat pesanan ringkas. Sistem ini terdiri daripada Arduino Mega sebagai keutamaan prototaip yang bersambung dengan sensor MAX30102. Pada bahagian pengatucaraan, ia menghasilkan penukaran dari bacaan analog ke digital untuk sensor. Untuk memantau parameter kesihatan dan memberitahu apabila sensor mengesan lebih tinggi atau lebih rendah daripada nilai ambang modul GSM sim900A digunakan untuk berkongsi dan menghantar informasi melalui talian khidmat pesanan ringkas. Modul GPS telah digunakan dalam sistem untuk mengesan lokasi pesakit. Selain daripada itu, menggunakan sistem ini akan membantu mengesan pesakit apabila mereka berada dalam keadaan kritikal serangan jantung dan memaklumkannya kepada ahli keluarga mereka. Kesimpulanya, sistem ini akan dapat mengesan, mengenalpasti lokasi dan memberi isyarat amaran apabila orang memerlukan bantuan kecemasan.

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ABSTRACT

The rate of death due to heart attack in Malaysia rapidly increasing by every year because lack of time to take care their personal health in this modernization world. The aim of this paper is to develop a prototype of heart attack patient's tracker using GSM. The system proposed able to notify and monitor the patients' health parameter such as heart beat and body temperature as remotely. The system also displays all the health parameter through OLED on a prototype device and also able to monitor view mobile through short message service. This system consists Arduino Mega as brain of this prototype which interface with MAX30102 sensor. Programming part, it creates conversion from analog reading of sensor to digital. In order to monitor the health parameter and notify when the sensor detect higher or lower than the threshold value this GSM sim900A module is used to send notification through short message service. Additionally, GPS module have used in the system to track patient location this is because failure to identifying the patient who suffer from heart attack is also one of the reason the death rate increasing. Furthemore, using this system it help track the patient when they are in critical condition of heart attack and notify it to their family member. In conclusion this system able to track, identify and trigger person who need emergency help of medical.

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DEDICATION

I dedicate this project report to my beloved parents and friends. A special thanks to my mother Mrs. Parawavathi d/o Ethurajoo and father Mr. Krishnan s/o Kannan who both always being support my ideas and give encourage to do this project. I also being grateful to thanks my friends Amarjeet singh s/o Gurdir singh and Vegneshwaran s/o Pitchamuthu who always been backbone to develop this project. Lastly to my supervisor Puan Wan Haszerila Binti Wan Hassan who give lot of ideas and share her knowledge on doing report also prototype.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter covers the aspect of introduction, the principle motive is to review background of this various heart disease and cause of death due to heart problem. Development of heart attack patient's tracker for monitoring purposes very important nowadays where the problem which cause heart patient to death highly increased. The purpose of this project, is offer a chance to our people to protect their beloved person.

1.1 Background

In this modernization generation, one of the community problem which can extensively mentioned among most people is the heart disease. Heart disease is common, even for young aged people because the food intake and their lifestyle. Thus, heart disease area being one of the growing worries within the past decade. At the moment, Malaysia the problem which is high rate of death due to heart disease.

Additionally, failure to identify the patient who gets heart attack is the main cause of death. For example, heart failure, heart attack and unexpected cardiac arrest are not synonyms. Heart failure happens while the heart cannot pump sufficient blood to all the other organs to fulfill their want for oxygen and nutrients. It normally manifests as tiredness and weak, breathlessness and swelling of the legs and abdomen. Sudden dying can also occur due to heart failure. However, it is not always a function of the sickness.

The most crucial causes of heart failure are coronary artery sickness (which reasons a heart attack) and high blood pressure. This causes also the result of harm to the heart muscle itself (cardiomyopathy), problems with the valves (such as aortic stenosis).

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Moreover, the heart's rhythm is disturbed and it beats too rapid, too sluggish or irregularly (atrial fibrillation). On this situation, some of the patient are not in conscious and unable to take action. Consequently, for the conduct of bachelor degree project entitled "Development of heart attack patients tracker using GSM system", an electronic tool was proposed which can track and identify the patient location to send quick information so can take a proper action to secure the life.

This shape of monitoring heart rate can protect and take immediate action if there is any case of emergency. With the advancement of technology, the development of an effective heart attack patient tracker could able reduce casualties rate due to heart attack. The position of monitoring and tracking applications by use of Global System for Mobile Communications (GSM) technology comes into the frame as it represents a modernized and groundbreaking solution for heart patients.

There is nowhere to know when heart problem is going to hit. Even no one knows when it attacked. But on the time it attacks if there is no one there to safe them it causes them to death. By the way, with the implementation of this project without needing of someone near you to keep on monitoring your health it helps monitor your heart rate and body temperature then with the help of GSM sent the information to the responsible person to monitoring. Moreover, it also calculates the data taken and compared with the data set for purpose of when there are drastic changes in the data set it automatically send an alert to the person in charge.

Hence, as a way to fight the present day headaches faced by the patients in their heart disease, therefore a GSM monitoring system became planned in advanced to assist the patients experiencing diverse problems whilst undergoing heart attack. Using this device, sufferers should capable to detect by their family members even while they far away from them. It is make possible by using this device, patient is free to move where ever they wanted to go. Ideally, the patient would simply must strap to device, switch on and perform his daily life. So while the device on that person it started to measure the temperature and heart rate. When its crosses the limitation it sent and short message

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service (SMS) alert to their family member. This device also retrieves the relevant data before send SMS to their family member's mobile.

1.2 Problem Statement

One of the rising problems that is gradually becoming the concern of the community is the rising number of heart disease patients. Additionally, the patients who get attack are sometime not able to communicate or give alert so this situation sometime turns into death [1]. According to a recent scientific research, approximately sudden cardiac arrest is an upcoming cause of death in US, the death due to cardiac arrest is equal to number who die to Alzheimer's, Assault with firearms, breast cancer, cervical cancer, colorectal cancer, diabetes, HIV, house fires, vehicle accidents, prostate cancer and suicides. Almost 50% of death is due to sudden cardiac arrest [2]. Most of the time there been no prior symptoms and no previous history of heart disease to the person who get sudden cardiac arrest.

But in the case of heart attack the symptom not same as sudden cardiac arrest. Heart attack is basically occurring when blood flow to heart is blocked. So on that moment oxygen in blood unable to reach to a part of the heart. If the blocked part is not reopened quickly, the cells begin to die. The symptoms of heart attack are discomfort, shortness of breath, cold sweats. More often, for heart attack the symptoms start slowly and persist for hours, days or weeks before a heart attack. In this case the longer the person goes without treatment, the worst the damage he faced.

Therefore, after conducting several extensive studies, many researchers and professionals from medical field conclude that a quick conduct of Cardio Pulmonary Resuscitation (CPR) and contact emergency medical services is the best way to reduce risk of any potential side effects or death. From another perspective, to solving this problem is by producing a wireless device which monitor the patient's condition continuously and send alert to person responsible when an emergency.

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As compared to present day existing gadgets for heart attack tracker which are massive in length, complex, and not portable but this device compact in size, GSM inbuilt and prepared with battery for comfortably move around. It supports wireless data exchange. Hence, this device is part of PSM task it would offer a low cost and multi functionalities which fulfill the need of patients who suffers.

1.3 Objectives

Upon analysing the problem statements mentioned above, the primary objectives are:

i. To design smart alert system using temperature and pulse rate sensor with GSM notification.
ii. To develop a low cost pulse and temperature monitoring system which records relevant health data.
iii. To develop two-way communication heath monitoring device.

1.4 Scope of the project

In this project, the medical based sensor MAX30102 is utilized alongside a GSM module and Arduino microcontroller. Actually, the use of these sensor plays an important factor in measuring the body temperature and pulse rate. Furthermore, while optimizing the technology of GSM is communication protocol, it delivers an effective short message service to monitoring and alerting system.

Hence, the GSM module plays the role of a primary component in this wireless monitoring device in order to learn the effect and final outcome of executing the heart attack patient tracker system. Moreover, this proposed technology would allow monitoring of patient's heart beat and temperature which been optimized to deliver the data from the sensors onto the phone by short message service.

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CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter covers the aspect of literature review, the principle motive is to significantly review various scientific works and efforts which have been actively carried out by different outstanding researchers in this field of study. The scope of the literature review could familiar to the development of heart attack patient's tracker for monitoring purposes and all of the information that has been accumulated could subsequently concluded. Based on the literature review, the studies and method of studying produce the preferred outcome of this project.

2.1 Overview of heart attack, Sudden cardiac arrest patient and tracking system

In general, sudden cardiac arrest and heart attack is not same. A heart attack mostly happens when blood flow is blocked in the heart but sudden cardiac arrest is about the heart malfunctioning suddenly and heart stops beating suddenly. Person get heart attack when oxygen in blood unable to reach in the section of heart which always happen when a blocked artery occurs. For heart attack there are some symptoms which are feels pressure, tightness, pain, indigestion and some more. For sudden cardiac arrest it is different which happen in sudden without warning.

On that moment, no blood is pumped to the lungs, brain and any other organ by heart. So in fraction of second the person loses consciousness and his pulse drops. There been high chance of death if an immediate treatment not given to that person. There are also some symptoms for sudden cardiac arrest which is shortness of breath, chest pain, heart palpitation and fainting.

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All the issue is able to treated if the treatment is given on the time. But if they unable to get the treatment on time it can lead to death. This is the major problem which heart patients are concerning about. Because the major death of heart patients is due to unable to get treatment on time or there unable to get an emergency call.

Therefore, the role of heart attack patient's tracker using GSM technology comes into the frame to reduce heart attack patient's death due to lack of help they needed on time. Furthermore, this tracker work when the patient's heart beat or body temperature is not in the limit which approve by doctors, it sends and alert message to their family members with including the patient's location. So no longer the heart patient should monitor by a person, this device make sure the patients' health in good condition and make easier to track.

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2.2 Previous Related Work

Previous related work is basically about the researcher who have did similarly with the project which had plan. There are several researchers around the world had did almost the similar project, but there are differences in the equipment and method they have equipped to do the project. In order to complete this part had to select ten most similar article and summarize it. The article which chosen at are all listed at reference.

2.2.1 "Smart Health Band using IoT" by Siddharth A. Kokalki, Akshay R. Mali, Pawan A. Mundada and Ritesh H. Sontakke

A group of researchers from DKTE Society's Textile and Engineering Institute, Ichalkaranji consisting of Siddharth, Akshay, Pawan and Ritesh [3] have proposed a system which use IoT to monitoring health. In this project, health band can measure the body temperature and pulse rate of a person. from sensing the temperature and pulse rate, the information is sent to a cloud named "Thingspeak". Here, a graph shows the sensed temperature and pulse rate. This information is then fetched on a mobile application.

Then, consumer can see the heartbeat rate and temperature via mobile. In vital circumstance, if the heartbeat rate significantly increases or decreases above or below the threshold level, then a notification sent to the doctor. Smart Health Band is built with the help of Arduino Uno, pulse sensor, LilyPad temperature sensor, Wi-Fi module, batteries and Velcro Tape to installed on. This design intends to lower the dying rate which occur because of the coronary heart assault or coronary heart associated troubles.

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This system mainly on health care using IoT application. This health band contain pulse and temperature sensor which used for live monitoring of the cited health parameters. The affected person's location and pulse rate sent to doctors or family individuals, by using GPS navigation. After getting precise place of the patient, important action may take for proper treatment.

This band is nothing but a connection of Arduino Uno, pulse sensor, temperature sensor and Wi-Fi module that is altogether installed on a Velcro Tape. The band may further make extra convenient or small in size by the usage of different board. This gadget is a 4 step structure, which contain of sensor module, communication module, cloud module and android software module. Figure 2.1 shows a diagrammatic structure of the device.

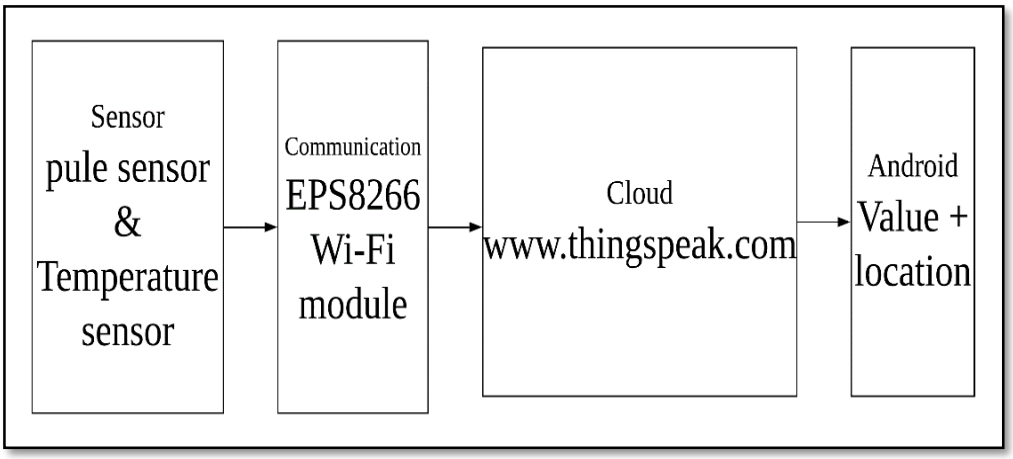

Figure 2.1: Structure Design Flow of the Smart Health Band

Each part plays the exact important venture. The first part, sensing module consists of pulse sensor and temperature sensor. The sensed values are then reverted to the Arduino Uno for calculations and conversions. The second part is the verbal exchange part. This module sending the received data values to the machine / cloud / computing gadgets. It uses Wi-Fi module to connect with the net and create a communication with the meant cloud platform.

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