UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF IOT BASED PATIENT HEALTH MONITORING USING ARDUINO

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

by

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I hereby, declared this report entitled Development of IoT Based Patient Health Monitoring using Arduino 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 Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Telecommunications) with (Hons). The member of the supervisory is as follow:

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Co-supervisor: DR. ADAM WOONG YOON KHANG

ABSTRAK

Sistem pemantauan kesihatan yang berasaskan IoT akan membantu ahli perubatan, jururawat atau ahli keluarga pesakit untuk memantau mereka dari semasa ke semasa dan di mana sahaja dengan mempunyai akses ke Internet. Pemantauan pesakit atau pesakit yang sudah tua yang keluar dari hospital selepas pembedahan memerlukan perhatian yang lebih dan peranti yang sedia ada adalah rumit dan mahal. Tujuan projek ini adalah untuk membangunkan sistem pemantauan jantung pesakit berasaskan IoT menggunakan Arduino yang memberi sistem yang kos efektif. Sistem pemantauan ini terdiri daripada empat komponen utama yang merupakan mikrokontroler, sensor kadar jantung dibina dengan sensor suhu badan, sensor GSR dan modul wifi. Input sistem adalah denyutan jantung, suhu badan, SPO2 dan keadaan emosi pesakit atau pengguna yang dikesan oleh sensor yang diproses oleh Arduino dan dihantar ke rangkaian awan melalui modul wifi. Hasil yang diharapkan dari projek ini adalah kondisi pesakit dapat memantau pada setiap 10 saat dan data akan disimpan dan dipantau melalui aplikasi Blynk App. Data boleh diakses and disimpan dalam rangkaian awan. Data akan dikemas kini pada setiap saat. Sistem pemantauan ini boleh dipercayai kerana data akan disimpan dalam rangkaian awan.

ABSTRACT

The IoT based health monitoring system will help the medical experts, nurses or family members of the patient to monitor them from time to time and anywhere by having access to the Internet. Monitoring elderly patients or patients being discharged from hospital after surgery would need extra attention and the devices available are complex and expensive. The purpose of this project is to develop an IoT based patient heart monitoring system using Arduino UNO which is also cost-effective. This monitoring system consists of three main components which are the microcontroller, the heart rate sensor with a built-in body temperature sensor, GSR sensor, and the wifi module. The input of the system is the heartbeat, body temperature, SPO2 and emotional level of the patient or user which is detected by the sensor, processed by the Arduino and transmitted to the cloud network through the wifi module. The expected result of this project is the condition of the patient can be monitored every 10 seconds and the data will be stored and monitored through Blynk App. The data stored can be accessed anytime. The data will be updated every time it detects the reading. This monitoring system is reliable because the data will be saved in the cloud network.

DEDICATION

Dedicated in thankful appreciation for support, encouragement and understanding to my parents, supervisor and friends.

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IOT	Internet of Things (IoT)

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This part of the chapter describes the introduction of the heart monitoring system, the background of the project, problem statement, objective and scope of the project. This project is about the development of IoT based health monitoring system using Arduino UNO.

1.1 Background

Health monitoring is vital for every patient or a user to monitor their health from time to time. Nowadays, the advancement in data communication technology has a great influence in the evolution of health monitoring system. Many of the existing patient health monitoring systems are integrated with the data communication networks where the data can be transferred to any location via the internet. The implementation of telecommunication devices in the medical field will assist the problem experienced by the medical experts to monitor their patients simultaneously.

This system can help them to monitor the patients without being physically present in hospital, home or any other area. Various sensors are used in this system which measures the important physiological parameters of the patient such as ECG, blood pressure, pulse rate, respiration rate and many more. It removes the geographical barriers in the medical field.

This device will be more helpful for medical experts to monitor their patients during treatment or after surgery. A health monitoring system can be used anywhere

such as hospitals, sports area, home care and it is also portable internationally. Doctors can monitor the patient's heartbeat and body temperature anywhere as IoT (Internet of Things) ensures the accessibility of the patient's health record through mobile devices, emails or desktops. Medical experts are also taking advantage of these smart devices which causes the field of IoT to be rapidly developed in the healthcare industries.

1.2 Problem statement

Monitoring and tracking a patient's health condition has become a harder task as it is not accessible anywhere or anytime. Medical experts would need to monitor their patients only through desktop or devices available in the hospital only. Elderly patients should be monitored more attentively and their family members should be informed of their health condition from time to time while they are not physically present to their loved ones. Elderly patients are more prone to heart diseases such as Myocardial Infarction commonly known as heart attack and also cardiac arrest. Patients getting discharged from the hospital after treatment or surgery should be monitored frequently as the chances of being in a critical stage is high. Devices in the market are complex and expensive to be owned by most of them.

1.3 Objective

The main objective of this project is to develop an IoT based patient health monitoring system using Arduino. The three main objectives are listed below:

1. To develop a simple health monitoring system.
2. To design an IoT based health monitoring system using Arduino.
3. To analyse the performance of the developed IoT based patient health monitoring system

1.4 Scope of the project

The range of this project is to monitor the patient or user anytime and anywhere with internet by also having an access to the physiological parameters of their health (health record). This project is designed for one person at a time and it is more compatible to be used indoor since the pulse sensor uses the principle of light which causes the sunlight to disrupt the reading during the daytime. A few types of wireless modules are compared to develop the right system to transmit the data from Arduino to the cloud network. It is also applied to choose the right pulse sensor to get the physiological parameters of the patient accurately. Accuracy is essential for measuring body temperature, heartbeat and emotion level of the user.

1.5 Project significance

This project is aimed to provide a useful device for health monitoring which can be used anywhere with internet service and this can be highly demanding in the market. This project can be demanding because of the low-cost equipment and does not require much maintenance with a simple design. It is very essential for an elderly patient which require frequent monitoring.