UNIVERSITI TEKNIKAL MALAYSIA MELAKA

IOT BASED BLOOD PRESSURE MONITOR USING RASPBERRY PI

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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APPROVAL

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ABSTRAK

Projek ini adalah berkenaan satu sistem untuk memantau tekanan darah menggunakan sistem 'IoT' melalui penggunaan Raspberry Pi. Alat memantau tekanan darah digunakan sebagai alat utama dalam pembikinan projek ini dan Raspberry Pi digunakan sebagai 'gateway' untuk pelaksanaan sistem IoT untuk melihat data. Aplikasi IoT yang digunakan dalam projek ini adalah aplikasi Gmail dan Telegram yang merupakan aplikasi normal yang biasa digunakan oleh semua orang. Fungsi untuk kedua-dua aplikasi adalah untuk melihat parameter tekanan darah seseorang dengan menggunakan rangkaian internet. Pada dasarnya, sistem ini dapat memindahkan data dari mesin tekanan darah normal melalui rangkaian dengan menggunakan kabel bersiri USB TTL yang dilampirkan kepada Raspberry Pi sebagai 'gateway' dan dapat melihat data tekanan darah ke aplikasi Telegram dan Gmail di mana-mana dan di mana sahaja oleh orang lain selagi terdapat sambungan internet. Sistem sebelumnya, yang digunakan pada dasarnya menggunakan tekanan darah normal dan hanya seseorang yang berada di dekat pesakit dapat melihat parameter tekanan darah. Sistem ini dapat membantu masalah yang dihadapi oleh pesakit dan doktor untuk memantau tekanan darah sekiranya pesakit mempunyai kesulitan untuk pergi ke hospital. Oleh itu, projek ini dapat menyelesaikan beberapa masalah yang dihadapi sekarang.

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ABSTRACT

The project is about an IoT based Blood Pressure Monitor using Raspberry Pi. The blood pressure is mainly to be used as the main devices and Raspberry Pi is used as a gateway for the implementation of the IoT system to view the data. The IoT applications-used in this project is Gmail and Telegram applications which are the most command applications that used by a human. The function for both applications is to view the person blood pressure parameter by using network interfaces. The previous system was basically a normal blood pressure detector and only a person who is near the patient can view the blood pressure parameter. This system is able to help the problem faced by the patient and the doctor to monitor the patient blood pressure remotely especially when the patient has difficulty to go to the hospital. Result taken from experiment setup shows that the system able to transfer the data from the normal blood pressure through the network by using USB TTL serial cable which is attached to Raspberry Pi as a gateway and are able to view the blood pressure data to the Telegram and Gmail application everywhere and anywhere by the other person as long as there is an internet connection. This project has been successfully designed, implemented and tested. Thus, this project is able to be settling some of the problems faced nowadays.

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DEDICATION

To my beloved father and mother

Thank you for your morally and physically support

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LIST OF SYMBOLS

mmHg	-	Millimeters of mercury, the height of a column of mercury
s	-	Second

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LIST OF ABBREVIATIONS

API	Application Programming Interface
CPU	Central Processing Unit
ECG	Electrocardiogram
EEPROM	Electrically Erasable Programmable Read-Only Memory
GPIO	General-Purpose Input/Output
GSM	Global System for Mobile Communication
GUI	Graphical User Interface
LAN	Local Area Network
MEMS	Microelectromechanical Systems
SMS	Short Service Message
I/O	Input and Ouput
IoT	Internet of Things
IP	Internet Protocol
IVHM	Integrated Vehicle Monitoring
LED	Light Emmitting Diode
MRI	Magnetic Resonance Imaging
OS	Operating System
PC	Personal Computer
RAM	Random Access Memory
SSH	Secure Shell
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

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VCC	Voltage Common Collector
VNC	Virtual Network Computing
VPN	Virtual Private Network
WiFi	Wireless Fidelity
WSN	Wireless Sensor Network

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CHAPTER 1

INTRODUCTION

This chapter gives a general thought of this project. It discusses the background of research, the problem statement, research objectives, the scope of work, expected result of the project, cost involved in this project and thesis organisation.

1.1 Introduction

The Internet of Things (IoT) has various applications in medicinal services, from remote checking to brilliant sensors and medical device integration. That application will possibly keep patients protected and keep being observed, as well as to enhance how doctors make their decision based on patient condition at the real time. Healthcare IoT can help to understand the needed and fulfilment by enabling patients to save more time and energy to associating with their doctors.

There are as of now various applications for the Internet of Things in healthcare, yet the innovation is as yet still in developing progress. While one of the difficulties of healthcare IoT is the way to deal with the majority of the information it gathers, the eventual fate of IoT will rely upon the capacity of healthcare associations to transform that information into important data.

1.2 Problem Statement

IoT based blood pressure monitor system can give helpful physiological data in the doctor's facility from patient home. This monitoring system is valuable for elderly or incessantly sick patients who might have difficulty to check their condition due to their

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limited way to be independent. Some of them need help from other people to assist them in the hospital. Remote sensors are used to gather and transmit signal of data and a processor is modified to get and consequently examine the sensor signals. In this project, proper sensors as indicated by what the users might want to identify and design an algorithm to understand the recognition.

Using a single parameter checking it is a way to deal with a blood pressure monitoring system was a design that expands medicinal services setting from patient's home to the doctor's facility. The process was to gather a blood pressure level parameters. The information from the single parameter checking value was then benefited for remote identification.

During planning the accompanying qualities of future medical applications followed:

a) Integration with current patterns in term of practices and innovation.

b) Real-time, long-term, remote checking, miniature, wearable sensors and long battery life of a planned device.

c) Assistance to the elderly and chronic patients. The devices need to be easy to use with minimal buttons.

1.3 Objective Project

The research objectives are stated as follows:

i. To design and develop an IoT based blood pressure monitor using Raspberry Pi.

ii. To analyze the performance in term of detectable range and delay based on the experiment setup.

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