UNIVERSITI TEKNIKAL MALAYSIA MELAKA

HEART RATE MONITORING SYSTEM FOR PATIENTS USING ANDROID BASED

This report submitted in accordance of the Universiti Teknikal Malaysia Melaka(UTeM) for the Bachelor's of Computer Engineering Technology (Computer Systems) with Honours

By

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(Encik Zulhasnizam Bin Hasan)

ABSTRAK

Laporan ini membentangkan pembangunan Sistem Pemantauan Kadar Jantung untuk Pesakit Menggunakan Android. Sistem Pemantauan Kadar Jantung digunakan untuk pesakit yang memerlukan untuk memantau denyutan jantung mereka dan mengetahui julat atau purata yang mereka dapat. Untuk mengelakkan keadaan yang tidak dijangka, seperti berlakunya sesuatu kecemasan bagi pesakit lebih mudah untuk mengawal keadaan mereka. Pendekatan kadar jantung adalah dengan menggunakan sensor nadi yang akan mengesan denyutan jantung pesakit di mana keadaan atau gaya hidup atau aktiviti berbeza yang yang mereka jalankan. Ia lebih mudah untuk mendapatkan kadar nadi denyutan jantung daripada pesakit yang disepadukan dengan pelindung Wi-Fi untuk menghantar data ke pangkalan data pada pelayan Web. Arduino Uno diguna pakai sebagai cip kawalan utama dan pengawal untuk aktif sensor nadi dan juga data bertukar-tukar dicapai dengan menggunakan pelindung Wi-Fi. Pelindung Wi-Fi akan menghantar data apabila memasukkan nilai-nilai denyutan jantung kepada pangkalan data. CPanel digunakan dengan log masuk pengguna dalam daftar yang mengandungi lebih daripada maklumat pangkalan data yang diperlukan daripada pengguna. Data ini akan dipaparkan secara automatik pada jadual pangkalan data. Keputusan ujian menunjukkan kadar denyutan jantung kebiasaanya dalam julat 40 Bpm sehingga 120 Bpm. Sistem pemantauan digunakan untuk memantau semua rakyat tanpa mengira umur dan masyarakat serta mereka boleh menggunakan sistem ini secara meluas untuk setiap hari walau dimana mereka berada. Data dari pangkalan data akan direkodkan dan statistik menunjukkan dalam bentuk graf dengan setiap titik termasuk tarikh, masa dan nilai denyutan jantung. Paparan graf menunjukkan statistic kadar denyutan jantung berdasarkan minit lawan BPM. Pesakit akan tahu nilai tepat mereka daripada kadar jantung tersebut pada wktu itu. Keputusan eksperimen adalah berkesan untuk setiap lapisan masyarakat bagi mengenalpasti dan mendapatkan nilai sebenar kadar jantung mereka.

ABSTRACT

This report presents the development of Heart Rate Monitoring System for Patients Using Android Based. Heart Rate Monitoring System is used for patients who need to monitor their heart rate and determine the range or average they are. To avoid unexpected situation, such as the occurrence of an emergency for the patient that it is easier to control their condition. The approach is to use a heart rate sensor that detects heart beats in which the patient's heart condition or lifestyle or different activities that they run. It's easier to get the pulse rate of the patient's heartbeat that is integrated with Wi-Fi Shield to send data to the database on the Web server. Arduino Uno adopted as the main control chip and a controller for active pulse sensor and the data exchange is achieved by using Wi-Fi Shield. Wi-Fi Shield will send data when entering values heartbeat to the database. CPanel is used to log the user in a list that contains more than the required database information from users. This data will be displayed automatically in a database table. The test results showed that heart rate typically in the range 40 to 120 Bpm. The monitoring system is used to monitor all people regardless of age and society, and they can use this system extensively for every day no matter where they are. Data from the database will be recorded and statistics show that in the form of a graph with each point including the date, time and the heartbeat. The graph display indicates a statistic based on the minutes versus BPM opponent. Patients will know their exact value of the heart rate on it further. The experimental results are effective for all levels of society to identify and gain the true value of their heart rate.

DEDICATIONS

Special appreciation, I dedicate this thesis to my father Zakaria Bin Jusoh @ Junus , my mother Sofiah Binti Yahaya and all.

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Bpm	=	Beat per Minutes
SMS	=	Short Messaging System
IR	=	Infrared
ECG	=	Electrocardiogram
LCD	=	Light Crystal Display
MIT	=	Massachusetts Institute of Technology
TNG	=	The Next Generation
IDE	=	integrated development environment
RAMPS	=	RepRap Arduino Mega Pololu Shield
USB	=	Universal Serial Bus
AVR	=	Aboriginal Voices Radio
IIS	=	Internet Information Services
HTTP	=	HyperText Transfer Protocol
IEEE	=	Institute of Electrical and Electronics Engineer's

WLAN	=	Wireless Local area Network
WEP	=	Wired Equivalent Privacy
WPA	=	Wi-Fi protected Access
SD	=	Secure Digital
SPI	=	Serial Peripheral Interface Bus
ICSP	=	In-Circuit Serial Programming
FTDI	=	Future Technology Devices International
IP	=	Internet Protocol
TCP	=	Transfer Control Protocol
UDP	=	User Datagram Protocol
AT32UC3	=	Series Software Framework
SS	=	Slave Select
HDG204	=	Complete WLAN System In Package
SSID	=	Service Set Identifier
DFU	=	Device Firmware Upgrade
8U2 HWB	=	Firmware on port 8U2
SDA	=	Serial Data Line
SCL	=	SAS Component Language

AREF pin	=	Above GND on Arduino port
IOREF	=	IO voltage reference (connected to +5V)
PWM	=	Pulse-width modulation
MHz	=	Mega Hertz
V	=	Voltage
KB	=	Kilo Bytes
RTD	=	Resistance Temperature Detectors
DVD	=	Digital Video Disc
RF	=	radio frequency
TTL	=	Transistor–transistor logic
NMEA	=	National Marine Electronics Association
WPAN	=	Wireless Personal Area Network
BAN	=	Body Area Network
URL	=	Uniform Resource Locater
ARM7(LPC2148)	=	Processor standalone board for LPC2148 microcontroller.
OS	=	Operating System

CHAPTER 1

INTRODUCTION

1.1 Background

This project is about the heart rate for the patient whose have heart disease which will monitor their heart beat using the monitoring system. The heart beat will evaluate this value of heart beat will transfer to the android based to know that the patients have the out of the level for average heart rate. A heart attack is a disease which the correctly and constantly care should be taken. Patients require monitoring for 24 hours. However, practically patients cannot afford to go in the hospital for 24 hours. Sensor systems are widely used to monitor vital signs in hospitals and at home that designed for patients and connected to the hardware and attached to the patient's body using the heart rate monitoring to count heart beat. This value is sent to a mobile phone or android application. This device application takes the values and analyzed to predict heart attack. The SMS or notification contains the patient's values of heart rate is sent to Android or iOS of patients (Navale et al. 2014).

1.2 Problem Statement

People nowadays difficult to go to the hospital because of the cost of treatment that has the sickness especially heart attack. The problems faced by patients especially patients with heart disease will have difficulty in receiving treatment in the event of an emergency due to the limitation of tools to monitor heart rate for each hospital. The hospital also requires an effective monitoring

system in order to control the patient so that it can act promptly when the patient is in a state of worry. The patient should make an appointment with a doctor or physician in order to monitor the heart beats can be used on the day fixed for the tool to be booked. Then, outpatient appointments were not in by physicians is limited and may not be able to receive treatment in the use of assistive monitor for heart failure. This problem mostly occurs in hospitals which need continuous monitoring for patients with heart problems. Doctors should regularly visit or monitor the patient and also assess the situation by analyzing heart rate. In case of emergency, the doctor needs to monitor the application or through some means of communication such as Android. However, comfort of monitoring system approved by the patient and the doctor. This requires a mechanism or system to further monitor can measure heart rate at any time and update their patient's health status and also to take action remote control if desired. Therefore, a system should be developed to solve this problem.

1.3 Objective

The objectives of this project are mainly focus:

1. To study limitation of value measurement experienced by patient for heart rate monitoring system.
2. To develop heart rate monitoring system for outside hospital.
3. To analyze the performance of heart rate monitoring system to patients.

1.4 Scope of Project

In heart rate monitoring system, the only one main sensor that have been choose is Pulse sensor. Pulse sensor is medical device that measure the heart rate of the all people who want to easily incorporate live heart rate data .It also grown to be one of the most commonly used medical tests in modern medicine. This project is used and decided with the location at UTeM. This project also will be reviewed on the patients for male and female ages from 20 to 30 years old which needed to attach patient's body. The first situation dependence of a hospital to receive a lot of heart patients. The event of an emergency patient need appropriate tools to help monitor the patient's body. The database store the Web system where it can show data display on all application included android based. The data of heart beat also will display the output on Serial port of Arduino IDE and also will display on LCD. Then, the patients can know the range of heart rate that 40 BPM until 120 BPM is the normal value. However when the patients are out of their heart average from 120 beat per minutes above accurately, the buzzer will released it sound (Palatini 2012).

1.5 Significance of Study

Nowadays, the usages of the heart rate monitoring system are widely used by patients with heart problems. The monitoring system is a device that allows users to get the size of their heart beats. Patients need an effective system to control heart problems they face. This monitoring system is important to patients in order to know they have the disease or not. Then, monitoring system will monitor the patient and they can know how your heart rate they have. In an emergency situation, patients also need the appropriate system to help monitor their body. The patients need this monitoring system because the hospital is sometimes a lack of

monitoring and monitor of doctors in stages or continuously. Therefore, this monitoring system can improve control continuously by a doctor through a notification in the android that has been stored in the analysis of data and Web systems. This can make it easier for doctors to know that someone is there or not heart disease through the values read from the notification on Android or iOS. Moreover, the use of this monitor system is uniform and wide to all those who want to measure the heart rate and especially to those with heart disease.

1.6 Structure of Project

Chapter 1:

This chapter will provide brief explanation about the project which will cover the background, problem statement, objective, scope of the project and significant of project. This explanation will describe the idea and concept of the project and how it is applied in the real world situation.

Chapter 2:

This chapter will cover the background study about the project based on the knowledge and information required to design and develop the project. The research that will target on every software and hardware that used to develop this project. The source of these researches has to be acceptable in the system format such as books, journals, articles and website that are licensed.

Chapter3:

This chapter contains methodology. Methodology chapter is a schedule or steps that need to be complete, detailed reports of studies done to achieve aim objective. When the project complete, this chapter explains the procedure taken. It consist the detail development of this current project.

Chapter 4:

This chapter presents the result and the findings of the study, the result from the experiments that are presented in tables, figures, drawings and graphs and are discussed elaborately in the chapter. Several observations are also projected from the findings.

Chapter 5:

This chapter summarizes the outcomes of this experiment. The chapter also outlines several recommendations for further development and improvement on the design. Suggestions for future inventor are also provided within the chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will cover on the background study about the project based on the knowledge and information required to design and develop the project. To develop this project, it is necessary to go through several researches that is related to the idea of this project. The research that will target on every hardware and software that will used to develop this project. With this, it will help in achieving the idea of the project based on what component is suitable to use. The source of these researches has to be acceptable in the system format such as books, journals, articles and website that are licensed.

2.2 Software Part

2.2.1 Android Based

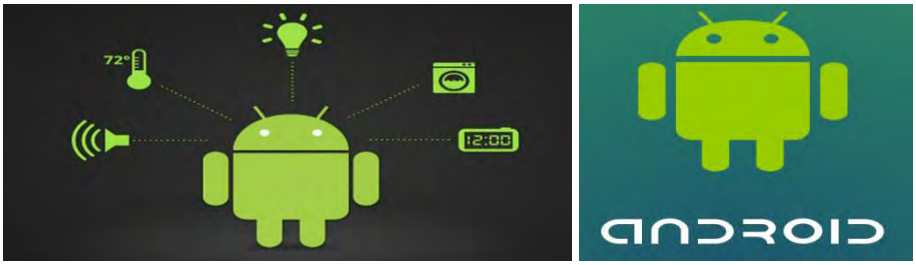

Figure 2.1: Android Logo