**CHAPTER I**

**INTRODUCTION**

One of the most important organs of the body is Heart. It consists of the atrium and ventricles. The two coordinates for the heart to pump blood throughout the body.

Blood Pressure is the pressure circulating blood on the walls of blood vessels. Blood pressure is usually expressed in terms of the systolic pressure (maximum during one heart beat) over diastolic pressure (Minimum in between two heart beats) and is measured in millimeters of mercury (mmHg). Normal resting blood pressure in an adult is approximately 120 mmHg systolic, and 80 mmHg diastolic, abbreviated “120/80 mmHg”. Blood pressure has two states the low blood pressure also known as the hypotension and hypertension for the high blood pressure. Long term hypertension can affect the body it is a risk factor for many diseases, including heart disease, stroke, and kidney failure. Heart rate is one of the vital signs. It is the number of times per minute that the heart contracts or beats. The resting heart rate is the rate where you’re sitting or lying and when you’re calm it is said that the heart rate is normally between 60 (beats per minute) and 100 (beats per minute).And the normal body temperature

Disease related to the heart is one of the most common cause of death among Filipinos. “21 percent of Filipino adults are hypertensive,” said Dr. Dante Morales, President of the Philippine Society of Hypertension (PSH) during the National hypertension Awareness celebration conducted at the Universidad De Manila on 19 May 2012.

Blood pressure and heart rate are interrelated components of the cardiovascular system and therefore, not mutually exclusively. One can affect another according to, ”Dr. Shelby-Lane. If the blood pressure is not monitored properly the arteries and the vital organs in the body will be damaged causes heart attack, stroke, heart failure, aneurysm or renal failure. Which means there is a need for the patients’ family members, friends and communities to involve in the care activities.

In recent years,

This makes newer cellular phones a very promising mobile platform for advanced applications. To complete the picture, we observe that the growing popularity in the third-party online data storage platform with security and privacy features, such as Google sheet. The advantages of Google sheet includes: (1) facilitates information sharing between patients and multiple health care providers; (2) exports the Personal Health Records (PHR) into a trusted third-part healthcare system for analysis purpose. Thus, it is possible to bring wearable sensors with Wireless Local Area network to create a personalized, integrated, and collaborative care system for real-time, long-term and remote self-monitoring the physical signs of patients like pulse rate and blood pressure which would improve people’s long-term health, especially for elderly patient who has hypertension.

**Background of the Study**

The doctors the nurses and the barangay health workers are the one who is capable of reading the blood pressure while some other people practice reading their own or others blood pressure using the traditional way with the use of stethoscope and brachial pressure cuff this thesis will help to avoid the human error from misinterpreting because of the failure to identify the Korotkoff sounds that can lead to over and under estimation of the blood pressure. Also, it can help to conserve time because to have an accurate reading of the blood pressure you must go to the clinic or hospital but if there are so many patient it will take time finish measuring everyone’s blood pressure.

In this thesis, we design a monitoring device that will allows the patient to measure their heart rate and blood pressure and directly sends the data to the android application installed in the android phone. It is a wearable monitoring device with sensors with alert system so that if there are abnormalities in the measurement of the blood pressure even if is above or below normal we will immediately notify so we can respond quickly. Also, the system will record the previous reading of your blood pressure because having a constant high blood pressure have a bad effect in the body.

This thesis will gather the data from the device in fast and accurate way and send it to the application installed in the and phone.

**OBJECTIVES**

* The general objective of the study is to create a device that monitor the blood pressure, pulse rate and body temperature. And print the following results.
* To determine the sensors
* To create a program that allow the device to send the data to the
* To create a software application that will produce the output of the real time blood pressure.

**Significance of Study**

This research study is beneficial to the patient and physician. With the result of this study, monitoring the blood pressure and pulse rate with fast accurate output. Keep tracks of patient PHR so the Doctor or Nurse can easily determine if the medication have progress. Respond with proper action according to the patient condition. As for the patient relative, this study can help them to monitor the patient more often. This study may also serve as basis or guide for future research.

**Scopes and Limitation**

This research focuses on monitoring and keeping track of blood pressure and pulse rate. We use same sensor used by sphygmomanometer and we will also use a sensor for pulse rate and a microprocessor in monitoring the system and create an application with database for recording the data gather from the system.

The device of this research study will only measure the blood pressure and pulse rate. For pulse rate, the patient is required to be seated on a chair and one’s body must be relaxed to minimize the alteration. The user must have the proper posture when measuring the blood pressure like the conventional way of measuring it.

The application of this research study will collect the data from the device through the Wi-Fi. It will display the output both the blood pressure and pulse rate. This will operate on any android version.

**Definition of Terms**

1. Android - an operating system for smartphones and other devices, developed by Android, Inc. and later purchased by Google.

2. Blood Pressure - the pressure of the blood in the circulatory system, often measured for diagnosis since it is closely related to the force and rate of the heartbeat and the diameter and elasticity of the arterial walls.

3. C programming language – is a programming language that is ideal for developing firmware or portable applications. It is a [procedural language](https://simple.wikipedia.org/w/index.php?title=Procedural_language&action=edit&redlink=1), which means that people can write their [programs](https://simple.wikipedia.org/wiki/Computer_program) as a series of step-by-step instructions.

4. [Database](https://en.wikipedia.org/wiki/Database) - is the collection of [schemas](https://en.wikipedia.org/wiki/Database_schema), [tables](https://en.wikipedia.org/wiki/Table_(database)), [queries](https://en.wikipedia.org/wiki/Query_language), reports, [views](https://en.wikipedia.org/wiki/View_(SQL)), and other objects. The data are typically organized to model aspects of reality in a way that supports [processes](https://en.wikipedia.org/wiki/Process_(computing)) requiring information, such as modelling the availability of rooms in hotels in a way that supports finding a hotel with vacancies.

5. Diastolic Pressure - the blood pressure after the contraction of the heart while the chambers of the heart refill with blood.

6. Hardware - is a comprehensive term for all of the physical parts of a computer, as distinguished from the data it contains or operates on, and the software that provides instructions for the hardware to accomplish tasks.

7. Heart rate - is the speed of the heartbeat measured by the number of contractions of the heart per minute (bpm).

8. Java - is a widely used programming language expressly designed for use in the distributed environment of the internet.

9. Microcontroller - is a computer present in a single integrated circuit which is dedicated to perform one task and execute one specific application. It contains memory, programmable input/output peripherals as well a processor.

10. Real -Time - relating to applications in which the computer must respond as rapidly as required by the user or necessitated by the process being controlled.

11. Sensor - is an [electronic component](https://en.wikipedia.org/wiki/Electronic_component), module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a [computer processor](https://en.wikipedia.org/wiki/Computer_processor).

12. Software - is that part of a [computer system](https://en.wikipedia.org/wiki/Computer_system) that consists of [data](https://en.wikipedia.org/wiki/Data_(computing)) or computer instructions, in contrast to the [physical hardware](https://en.wikipedia.org/wiki/Computer_hardware) from which the system is built.

13. Sphygmomanometer – an instrument for measuring blood pressure in the arteries, especially one consisting of a pressure gauge and a nylonor rubber cuff that wraps around the upper arm and inflates to constrict the arteries.

14. System - A set of detailed methods, procedures and routines created to carry out a specific activity, perform a duty, or solve a problem.  
15. Systolic Pressure – indicating the maximum arterial pressure occurring during contraction of the ventricle of the heart.

16. Personal health record (PHR) - is a collection of health-related information that is documented and maintained by the individual it pertains to.

17. PHR- Personal Health Record.

18. Pulse rate - a rhythmical throbbing of the arteries as blood is propelled through them, typically as felt in the wrists or neck.

19 .Wireless - is the [transfer of information](https://en.wikipedia.org/wiki/Telecommunication) or [power](https://en.wikipedia.org/wiki/Wireless_power_transfer) between two or more points that are not connected by an electrical conductor.

**CHAPTER II**

**REVIEW OF RELATED LITERATURE AND STUDIES**

In this chapter the researchers gathered thorough information to present well the related literature and studies. The researcher think and analyze the concept of the research to form a conceptual framework to fully understand the research to be done.

**Related Literature**

**Blood pressure**

- is when your heart beats, it pumps blood throughout your body to give energy and oxygen one’s body need. When the blood moves, it push through the side of the blood vessels. The pressure of this pushing is your blood pressure. If your blood pressure is too high, it puts extra strain on your arteries and heart may cause heart attacks and strokes. Also if when your blood pressure to low it may lead to dizziness and weakness but also fainting and a risk of injury from falls. And also low blood pressure lead to damage your heart and brain due to lack of oxygen. Blood pressure is determined both by the amount of blood your heart pumps and the amount of resistance to blood flow in your arteries. The more blood your heart pumps and the narrower your arteries, the higher your blood pressure.

**Low Blood Pressure** (Hypotension)

-is the condition when the systolic blood pressure of less than 90 millimeter of mercury (mm Hg) or diastolic of less than 60 mm Hg is generally considered to be hypotension.

Hypotension is the opposite of hypertension, which is high blood pressure. It is best understood as a physiological state, rather than a disease. Severely low blood pressure can deprive the brain and other vital organs of oxygen and nutrients, leading to a life-threatening condition called shock. Through often associated with shock, hypotension is not necessarily indicative of it. Low blood pressure can cause not only dizziness and weakness but also fainting and a risk of injury from falls. And severely low blood pressure from any cause can deprive your body of enough oxygen to carry out its normal functions, leading to damage to your heart and brain.

**High blood pressure** (Hypertension)

-is a condition which the amount of strain on blood artery walls is to high enough that it may eventually cause health problems. You can have high blood pressure (hypertension) for years without any symptoms. Even without symptoms, damage to blood vessels and your heart continues and can be detected. Uncontrolled high blood pressure increases your risk of serious health problems, including heart attack and stroke.

High blood pressure generally develops over many years, and it affects nearly everyone eventually. Fortunately, high blood pressure can be easily detected. And once you know you have high blood pressure, you can work with your doctor to control it.

**Pulse Rate/Heart Rate**

- is the speed of the heartbeat measured by the number of contractions of the heart per minute (bpm). The heart rate can vary according to the body's physical needs, including the need to absorb oxygen and excrete carbon dioxide. It is usually equal or close to the pulse measured at any peripheral point. Activities that can provoke change include physical exercise, sleep, anxiety, stress, illness, and ingestion of drugs.

**Tachycardia**

-is a condition when heart rate is too fast, defined as above 100 bpm at rest.

**Bradycardia**

-is a condition when heart rate is too slow, defined as below 60 bpm at rest.

**Normal Resting Pulse Rate**

for adults ranges from 60 to 100 beats a minute. Generally, a lower heart rate at rest implies more efficient heart function and better cardiovascular fitness. For example, a well-trained athlete might have a normal resting heart rate closer to 40 beats a minute.

**Artery**

-is part of the circulatory system, which is responsible for the delivery of oxygen and nutrients to all cells, as well as the removal of carbon dioxide and waste products, the maintenance of optimum pH, and the circulation of proteins and cells of the immune system. In developed countries, the two leading causes of death, myocardial infarction (heart attack), and stroke, may each directly result from an arterial system that has been slowly and progressively compromised by years of deterioration.

Source:<https://en.wikipedia.org/wiki/Artery>

**Android**

**-** is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input.

Source: <https://en.wikipedia.org/wiki/Android_(operating_system)>

**Sensor**

A sensor is a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomena. The output is generally a signal that is converted to human-readable display at the sensor location or transmitted electronically over a network for reading or further processing.

In this research, Sensor is used to measure the blood pressure and pulse rate.

Source: <http://whatis.techtarget.com/definition/sensor>

**Sphygmomanometer**

A sphygmomanometer is a device used to measure a person blood pressure it can be manual digital or electric. It consist of inflatable cuff, a measuring and a mechanism for inflation which may be a manually operated bulb and valve or a pump operated electrically. When the cuff's pressure equals the arterial systolic pressure, blood begins to flow past the cuff, creating blood flow turbulence and audible sounds. Using a stethoscope, these sounds are heard and the cuff's pressure is recorded. The blood flow sounds will continue until the cuff's pressure falls below the arterial diastolic pressure. The pressure when the blood flow sounds stop indicates the diastolic pressure.

**Factors affecting the blood pressure**

According to [Dr. Hafeza Shaikh, DO](https://www.sharecare.com/doctor/dr-hafeza-shaikh), Cardiology (Cardiovascular Disease)

*“One factor that affects blood pressure is age. With age, sometimes the resistance and the amount of stiffness that the blood vessels and arteries have can change. This can lead to hypertension, or high blood pressure, over time. Other reasons that people get high blood pressure include a couple of rare diseases that may be inherited, or a person may be born with.”*

According to [Dr. Deborah Raines, MSN](https://www.sharecare.com/user/dr-deborah-raines), Nursing

“Blood pressure is affected by any event or behavior that alters the body’s cardiovascular system specifically: peripheral resistance, vessel elasticity or cardiac output

There are a number of factors that cause changes in the cardiovascular system and thereby affect blood pressure. Many of these factors have a short-term effect on blood pressure, but over time the effect may become long-term.

Some of the factors causing a short-term affect on blood pressure are

* Asleep or awake – Sleeping usually results in a lowering of BP
* Body position - lying down results in a lowing of BP while sitting or standing results in an increase in BP
* Emotional state - stress and anger increase BP while being relaxed decreases BP
* Temperature – blood pressure will tend to go up when a person is cold
* Sleep apnea - pauses in breathing while sleeping raise blood pressure
* Smoking – increases blood pressure
* Caffeine – increases blood pressure
* Alcohol – increases blood pressure
* Drugs – increases blood pressure

The last four items, sleep apnea, smoking, caffeine and alcohol over an extended period of time can cause the resting blood pressure to increase to the impact of these factors on the heart muscle and vascular resistance of the circulatory system.”

**REVIEW OF RELATED STUDIES**

According to their research Lui J, G. Balodis1 , Z. Markovics, J. Lauznis and Dr. Joseph Cafazzo the study of android-based monitoring system with uncontrolled hypertension will get their blood pressure (BP) under control. The patient will merely checked their BP at home even there are no guiding of physician. This technology will be very useful and will provide the needs of the patient. This is a hot topic because of the mobility and that sense of connection between patient and the provider.

The usual way of getting the blood pressure by wearing the ambulatory blood pressure device and they have to remember or write down the measured BP. The solution to this problem is to develop a system that a patient’s blood pressure is measured automatically and transferred to the android devices over wireless network. In this device we need a server that collect the data that will be transfer real time information via wi-fi connection. The BP measurement are will be saved into the database that we will operate. The person that have the software device can be also observed and analyse the data through the server.

In the system that we created , the main components of the wireless portable blood pressure are smartphone with software for making personal measurement. Data measurement from the device is sent wirelessly through the mobile android phone. According to the study of MedLab’s OEM NIBP (Non Invasive Blood Pressure), it contains compressor pressure sensors and microprocessor for measuring blood pressure. With the help of concept of the existing technology Omron this module detect the user’s body status and the daily activity of the patient that are suitable for blood pressure measurement.

**The Design of Smart Sphygmomanometer based on Android Mobile Device**

A research done by Gaoxu Deng, Chen Deng, and Yiming Wang designed the intelligent wearable device based on Android phones. Mainly introduces the design and implementation of hardware and software of the Android mobile phones and STM32 as the core, individual blood pressure and heart rate control and measurement. Implements of the Android WiFi control of blood pressure, blood pressure measurement and abnormal warning s a good way to meet the demand for the hypertension patients on blood pressure measurement, has the characteristics of high performance, low cost and low power consumption.

**Detecting Vital Signs with WearableWireless Sensors**

Tuba Yilmaz , Robert Foster and Yang Hao designed wearable monitoring systems can provide continuous physiological data, as well as better information regarding the general health of individuals. Thus, such vital-sign monitoring systems will reduce health-care costs by disease prevention and enhance the quality of life with disease management. In this paper, recent progress in non-invasive monitoring technologies for chronic disease management is reviewed. In particular, devices and techniques for monitoring blood pressure, blood glucose levels, cardiac activity and respiratory activity are discussed; in addition, on-body propagation issues for multiple sensors are presented.

**Mobile personal health care system for patients with diabetes**

Fuchao Zhou propose a personal diabetes monitoring system which integrates wearable sensors, 3G mobile phone, smart home technologies and Google sheet to facilitate the management of chronic disease - diabetes. The system utilizes wearable sensors and 3G cellular phone to automatically collect physical signs, such as blood glucose level, blood pressure and exercise data like heart rate, breathing rate and skin temperature. It allows users, especially seniors with diabetes, to conveniently record daily test results and track long term health condition changes regardless of their locations. It does so without having to ask users to manually input them into the system. The system also utilizes Google sheet to manage Personal Health Records (PHRs), which not only bridges the gaps between patients and different healthcare providers but enabling accesses to patients’ PHRs anywhere and anytime by taking advantage of the universal accessibility of Google sheet. The system further integrates with GPS, Google Search and Google Map functionalities to facilitate the user to find all hospitals near to his/her current location including address, phone number, directions to the selected hospital and street view of the selected hospital.

**A Remote Patient Monitoring System using Android Mobile Devices**

According to Alex Cors Bardolet aim of his thesis is to validate the use of mobile applications for taking care of the health of patients in a preventive way. First of all, the results of a research of the actual state of art are presented. With this results, a proposition is done. This preposition includes the acquisition and realization of some sensors, the realization of a mobile

application and the programming of a server application. The sensors used includes a ex profeso breath rate sensor and a commercial thermistor used for human temperature measures. All this sensors will be connected trough a device that handles the power and communication. After

that, an Android application have been done to control this device and show the results of the measures. The value of the measures are sent to a remote server in order to store information.

At the end, some indications are pointed about how this project could be further developed after discussing the prototype with several professionals of the medicine.

**Design of Wireless Mobile Monitoring of Blood Pressure for underserved in China by Using Short Messaging Service**

A research done by Jiang, Zhuangzhi, Jun, and Prabhu, aims to provide an affordable medical service for community residents by designing an interactive medical monitoring system. This system consists of three units: 1) Smart sensor unit, which is wearable on patient’s arm in order to register the required BP and transfer it by SMS module. 2）The server unit, which enables medical staff in the CHC/P to remotely observe patient’s BP condition through a computer within an existing network. At the same time, the server unit can be connected to the big hospitals through existing internet, and the specialists in big hospitals will give some advises if needed. 3) The terminal unit, which allows Patient/User to access and query the medical bio-data recorded in the server as well as for the information notification (such as alarming function). BP measurement methodology is based on Oscillometric method.

In this design, the terminal unit can be a mobile phone, a Personal Digital Assistant (PDA) or a computer with an SMS receiver. The server will not send a message unless the BP value is abnormal, so it will not affect user’s normal life.

**Abnormal Heart Rate Detection Device Warning via Mobile Phone Network**

A reseach done by Adisorn Sirikham(2010), created a device designed to send rate of heartbeat and warning signal via mobile phone network when 13 abnormal heart rate is detected. The hardware system consists of 3 main parts. The first is heartbeat signal receiving part which detects cardiac electrical signal on the skin. The second part is processing unit part that computes heart rate by using the data from the first part. And the last part is warning sender part that sends heart rate and warning signal to patient’s physician or relative when the system found that the heart rate is abnormal.

**MICROCONTROLLER BASED HEART RATE MONITOR USING FINGERTIP SENSOR**

According to LIENA ELRAYAH ABDELKHAIR KHAIRELSEED presented the design and development of an integrated device for measuring heart rate using fingertip to improve estimating the heart rate. As heart related diseases are increasing day by day, the need for an accurate and affordable heart rate measuring device or heart monitor is essential to ensure quality of health. However, most heart rate measuring tools and environments are expensive and do not follow ergonomics. Our proposed Heart Rate Measuring (HRM) device is economical and user friendly and uses optical technology to detect the flow of blood through index finger.

The goal of this thesis is design low-cost device which measures the heart rate of the subject by clipping sensors on one of the fingers and then displaying the result on a text based LCD. Miniaturized heart rates monitor system based on a microcontroller. It offers the advantage of portability over tape-based recording systems. The thesis explains how a single-chip microcontroller can be used to analyze heart beat rate signals in realtime. the Hardware and software design are oriented towards a single-chip microcontroller-based system, hence minimizing the size. The important feature of this project is the use of Fourier transforms to compute heart rate on real-time. It then processes to provide the information of bradycardia and tachycardia of heart rates and notified the user if the heart rate exceed the maximum allowable. It will be shown that the device meets diverse and conflicting requirements, including reliability, minimum loading effects, and low battery power consumption.

Qualitative and quantitative performance evaluation of the device on real signals shows accuracy in heart rate estimation, even under intense of physical activity. We compared the performance of HRM device with Electrocardiogram signal represent in oscilloscope and manual pulse measurement of heartbeat. The results showed that the error rate of the device is negligible

**CHAPTER III**

This chapter describes the procedure used in developing the design and in development of the required program needed to make the prototype functional.

**RESEARCH LOCALE**

The place we chosen is the Lucban, Quezon, it is a second class municipality located at the foot of Mount Banahaw in the province of Quezon, Philippines. According to the 2015 census, it has a population of 51,475 people. The main campus of SLSU is can be found in the Lucban, Quezon.

**Location map**



**RESPONDENTS**

The respondents of this study are the select people of Lucban, Quezon. People who have high blood pressure (hypertension) or low blood pressure (hypotension) will be examined through our prototype devices. In this activity the patient will know the exact BP and Pulse Rate, then if there is a hypertension or hypotension symptom they will avoid eating food that may cause high or low blood. This project will help a lot of people to increase the possibility of saving their lives. The lack of knowledge in hypertension will cause a major problem to the humanity. Because 25% of the population in the world are not aware of having the hypertension so it is too late for them to treat themselves. Thanks to this brilliant devices over 27% of people were aware of their current blood pressure.

**Research Design**

The study is entitled Android Based Application for Blood Pressure and Pulse Rate Monitoring. The study uses a commercially available digital blood pressure and heart rate circuit system, which constructed by the researchers. The system is capable of measuring the blood pressure and pulse rate of the patient. For the blood pressure and heart rate, the data extracted from the sensor that is in the digital sphygmomanometer and it will transfer the data to the Raspberry Pi. The data is then transfer to the android phone via portable wi-fi hotspot. Then it will be display on the android phones via an application made by the researchers.

**Procedure**

For the researchers enable to get the reading the blood pressure and pulse rate of the patient. The researchers must need the hardware device for measuring the blood pressure and pulse rate and an application that the data extracted from the device will be output. The hardware device must have a sensor used to measure the blood pressure and pulse rate of the patient the device must have wi-fi hotspot modem so that the android phone can connect to the device and get the extracted data from the sensor.

The android application is easy to use but first the patient must connect the android phone to the Raspberry Pi via wi-fi hotspot. The android application has some features to show the output and to show the previous readings for the monitoring system. For developing the application the researcher use different platform in creating the application like the visual studio.

The nature of the program is to gather data stored in the memory of the digital blood pressure and then transmit to the microcontroller then transfer the data to the android device with the help of wireless connection.

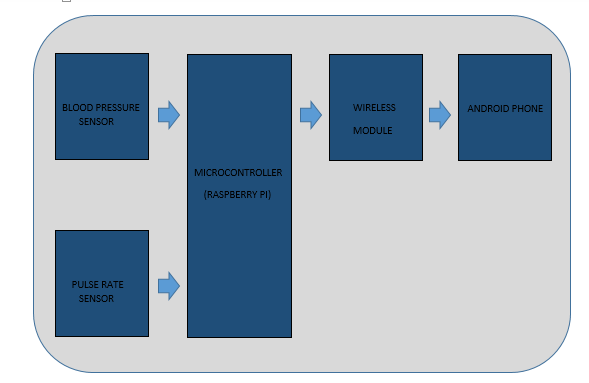
Meanwhile in order for the android phone to be able to communicate with the microcontroller it requires application software installed on the smart phone, the researchers apply the JAVA programming schemes deploying it on a particular software known as Basic4android.

**Project Development**

***Designing***

The Android based Blood Pressure and Pulse Rate Monitoring is composed of

Sensor System, Communication Network, Data Transmission and Monitoring. Researcher create a circuit design and flow chart to know the flow of Android based Blood Pressure and Pulse Rate Monitoring and elaborate how the system works.



**Block Diagram of the Android based Blood Pressure and Pulse Rate Monitoring**

**Sensor System**

The researcher will search for sensor that measure blood pressure and pulse that serve as input data to the device. And circuit diagram to guide the researcher to make successful and effective output of the device. The systolic and diastolic values are obtained from the blood pressure once the start button is pressed on the blood pressure module, while continuous heart rate measurements are obtained from the heart rate circuit.

**Communication Network**

The researcher will need to create a program that can connect the microcontroller and the android phone. To be able to communicate with the microcontroller. Android application will be created for the Android based Blood Pressure and Pulse Rate Monitoring to display the gathered data.

**Data Transmission**

The researcher will use Wi-Fi module, enabling wireless communication between the measuring devices and the output device.

**Monitoring**

The researcher will need to create an android application. The phone is the output device. In this design, the android phone capable of monitoring the patient blood pressure and pulse rate time-to-time.

**Assembly**

When the program for the microcontroller is created. The researcher will be modifying a device that will be connected to microcontroller. Wireless module will be connected to the microcontroller to transmit the current status that is read by the sensors. And the android phone connected to the hotspot and use the android application to display the output.

**Testing**

The objectives in this project is to see that researcher prototype can read the blood pressure and pulse rate through wireless connection. The data needs to be display on the screen of an android phone with complete details of the BP and pulse rate. Also test the application if it can handle the massive collection of input data from the patients and how accurate it can be.

**Evaluation**

Evaluating is important because researcher can identify whether the device is capable of measuring and recording the accurate data of respondents. By this process, the output will be determined instantly and tell that this project is relevant for the future use. This provide a valuable information that will affect the standard or the quality of the given project. If the result is reliable then we can say that this project is successful one.