

**UNIVERSITI TEKNOLOGI MARA  
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**LOW POWER WEARABLE ECG  
MONITORING SYSTEM FOR SINGLE  
PATIENT**

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## ABSTRACT

A wireless Electrocardiograph (ECG) technology monitoring system today is very important role in prevention, diagnosis the abnormality of patients and rescue of heart disease. This thesis focuses on the continuously monitoring ECG activity using smartphone via Bluetooth transmission. Previously, existing ECG system are already exists (e.g Holter monitors). Based on this problem, the patients need to wear the Holter ECG monitor with the weight and dangling wires in their bodies because that monitor can be wear on the patients belt or hung around the neck. The patients' needs regularly visit the hospital to records their ECG data. If the recordings can be made the cardiologist via the internet, it will be more easily the patient without visit to the hospital. The cardiologist can capture the patients ECG data easily with help for this wireless ECG monitoring system. This major objective of this study is to develop a low cost portable heart rate monitoring using Bluetooth Transmission. The methods that is used in this project using Bluetooth transmission and serial WiFi module can be used to monitoring the heart disease for continuous record heartbeat. All seven subjects with different gender participated in the study. The results collected data from the adults' heart rate. This project conducted experiments on taking heart rate measurements and comparing results obtained from theoretical value provided by American Heart Association. The results show that in age 24 years old the reading of heart rate is 142-172 bpm. The reading measured value 172 bpm. Thus, the result can be concluded that the measurement values are achieved after the values are compared with measurement and theoretical parts. To summarize it, the system is suitable for long term measurement. In addition, the cardiologist can be analysed and will get more information about the patient for health care. As future work, other physiologist parameters such as blood pressure, temperature could be integrated to build a portable multi-functional health monitoring device with real time.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND OF STUDY

Currently, cardiovascular disease (CVD) is the one of the most dangerous death in Malaysia and many parts of the world. According to the World Health Organization (WHO) in 2004, the CVD is the leading causes of death globally with estimated 17.1 million people died from cardiovascular disease, representing 29% of all global deaths. It can estimate 7.2 million were due to coronary heart disease and 5.7 million were due to a stroke of these deaths [1]. Cardiovascular disease leading cause of death for both men and women. More than half of deaths due to cardiovascular disease in 2008 were in men. The risk factors for cardiovascular include stroke, diabetes mellitus, hypertension, smoking, abdominal obesity, and psychosocial stress.

Nowadays, the age of patients with cardiovascular disease is getting younger. Those between 40 to 60 years old are high risks for CVD. Cardiovascular disease can cause both of men and women. So this issue for early diagnosis detection and monitoring of cardiovascular disease is particularly important. Electrocardiography (ECG) is represented by the process of recording the electrical activity of the heart rhythms. ECG is used by medical term to monitor the heart of patients. An ECG can be used to detect normal and abnormal cardiovascular symptoms, monitor heart disease and measure heart rates.

The most important components of the ECG waveform that devices need to report include the P waves, QRS interval, and the T wave. These waveforms have the inherent issue that measurable signals have amplitudes in the range of 0.1mV to 1mV on top of large DC signals. Another issue with these signals is that the smallest time components last as little as 50ms (the PR segment), or 80ms (the entire QRS complex). This short time means that sampling speed for the signal needs to be