

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITY TEKNOLOGI MARA
JOHOR

FINAL REPORT:
HEART RATE MEASUREMENT FROM FINGERTIP

ABDUL AUF BIN RAHMAN

2012499134

MUHAMAD AMIRUL NAIM BIN MOHD JAMALUDDIN

2012234832

SUPERVISOR:

MISS NOOR FADZILAH BINTI RAZALI

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	1
ABSTRACT	2
LIST OF FIGURES	3
LIST OF TABLES	4
LIST OF ABBREVIATIONS	5
1. INTRODUCTION	
1.1. Background of Study	6
1.2. Problem Statement	9
1.3. Objectives	9
1.4. Scope of Study	10
2. MATERIALS AND METHODS	
2.1. Methodology	11
2.2. Experimental Setup	15
2.3. Equipment and Component	17
3. CIRCUIT DESIGN AND OPERATIONS	
3.1. Schematic Diagram	25
3.2. Circuit Operations	26
4. RESULT AND DISCUSSION	
4.1. Hardware Implementation Result	30
4.2. Circuit Testing and Troubleshooting	32
4.3. Data Analysis and Discussions	36
5. CONCLUSION AND RECOMMENDATION	
5.1. Conclusion	38
5.2. Recommendation and Suggestion	39
REFERENCES	40
APPENDICES	41

ACKNOWLEDGEMENTS

In order to complete our final year project, supports from many parties are fully appreciated. Alhamdulillah. Thanks to Allah SWT, whom with His willing giving us the opportunity to complete this Final Year Project which is title Heart Rate Measurement from Fingertip. This final year project 2 report was prepared by us to fulfill the syllabus of this semester.

Firstly, we would like to express our deepest thank to, Miss Noor Fadzilah Razali, a lecturer at Universiti Teknologi Mara Pasir Gudang and also assigned as our supervisor in this project. Her advices and guidance had helped us a lot in this project.

We also want to thank the lecturers and staffs of Faculty of Electrical Engineering for their cooperation during we complete the final year project that had given valuable information, suggestions and guidance in the compilation and preparation this final year project 2 report.

Besides that, we also wish to express our appreciation to all our friends whose had help us a lot to speed up our progress for completing this project.

Lastly, thanks to our family who had given their greatest encouragement and support for all these years. Without their helps, there will be a problem for us to complete this project.

ABSTRACTS

The heart rate is one of the significant physiological parameters of the human cardiovascular system. Heart rate is the number of times the heart beats per minute. Heart rate data reflects various physiological states such as biological workload, stress at work and concentration on tasks, and the active state of the nervous system. Human cardiac dynamics are driven by the complex nonlinear interactions of two competing forces: sympathetic regulation increases and parasympathetic regulation decreases the heart rate. Thus, monitoring of heart rate plays a significant role in providing the status of cardiovascular system and clinically related information to medical professionals. Heart rate measurement is also considered as an essential parameter in patient care monitoring system. Heart rate can be measured either by the ECG waveform or by sensing the pulse - the rhythmic expansion and contraction of an artery as blood is forced through it by the regular contractions of the heart. The pulse can be felt from those areas where the artery is close to the skin. This paper highlights on the design of a microcontroller (PIC series) based heart rate counter that is able to capture the pulse from fingertip by sensing the change in blood volume. Heart rate of the subject is measured from the finger using optical sensors to detect the flow of blood through the finger. The main analog signal received from the human body gets captured with an instrumentation amplifier MC1458. Then the signal is filtered with another Op-Amp. The pulses are counted by a microcontroller and the output of the circuit is displayed on the seven segment clearly. This project design provides fastness and safety. Moreover, the installation of this device is not easy. Also, the designed device, being noninvasive one, can easily find its place in health care monitoring system.

CHAPTER 1

INTRODUCTION

For this semester for Final Year Project 2, we continued our last semester project, the heart rate measurement from fingertip. Heart rate measurement indicates the soundness of the human cardiovascular system.

1.1 Background of Study

The number of people suffering from chronic disease has been increasing dramatically by year because of the unhealthy life style of modern people. Based on the statistic by Malaysian Society of Hypertension (MSH), younger people are getting by high blood pressure mainly due to poor eating habit and an unhealthy life style. This trends is worrying because the high blood pressure mainly contributor to heart attack and stroke. Asian is known as the champion of the obesity where Malaysian people are the most obese and overweight in South-East Asia according to the latest statistic from the 2011 survey. Modern busy lifestyle are often obstacle that limit of people to achieve wellness through good nutrition and exercise. The nowadays people are not getting proper and continuous advice from the doctor as they are not spend their time for medical checkup. They will realized about their disease until they get sick.