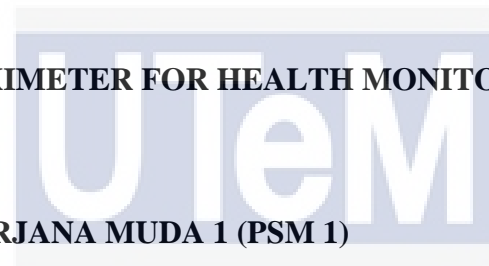




اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF DIY OXIMETER FOR HEALTH MONITORING



PROJEK SARJANA MUDA 1 (PSM 1)

اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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[DEVELOPMENT OF DIY OXIMETER FOR HEALTH MONITORING]

[ENGKU AIMAN ZAKWAN BIN ENGKU ZAIN]



This report is submitted in partial fulfilment of the requirements for the
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
Bachelor of [Computer Science (Computer Networking)] with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY UNIVERSITI
TEKNIKAL MALAYSIA MELAKA

[2021]

DECLARATION

I hereby declare that this project report entitled
[DEVELOPMENT OF DIY OXIMETER FOR HEALTH MONITORING]
is written by me and is my own effort and that no part has been plagiarized
without citations.

STUDENT : _____ Date : _____

([ENGKU AIMAN ZAKWAN BIN ENGKU ZAIN])



I hereby declare that I have read this project report and found
this project report is sufficient in term of the scope and quality for the award of
Bachelor of [Computer Science (Computer Networking)] with Honours.

SUPERVISOR : Nurul Azma Zakaria Date : 11/9/2021

([DR. NURUL AZMA BINTI ZAKARIA])

DEDICATION

This project is dedicated to Allah Almighty, my creator, pillar, source of inspiration, wisdom, knowledge, and understanding. Through this project, He has been my source of power, and I have only been able to fly on His wings. I also dedicate this work to my parents, Engku Zain Bin Engku Azam and Engku Fauziah Binti Tuan Jalai, my family, sisters, and brother who has encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started. My supervisor, Dr. Nurul Azma Binti Zakaria, and fellow friends are willing to share and guide me along the journey. Thank you. I can never quantify my love for you. God bless you.



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Next, I would like to offer my heartfelt gratitude to my wonderful family. I am grateful for their unwavering support during this journey. Their support and care gave me confidence and a good attitude while finishing this project. Gratitude also extends to my students, faculty seniors, and anyone who has volunteered to assist me with their skills.

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ABSTRACT

A worldwide health crisis that causes life loss in a few nations across the globe, the Covid-19 pandemic. The Covid-19 pandemic reported a broad variety of symptoms, including as shortness of breath and other symptoms. Necessary action is needed to preserve more lives in this nation or globe. This project involves designing and developing a prototype for easy, succinct, and efficient oxygen saturation and heart rate monitoring utilizing the MAX30100 internet-based sensor (IoT). Specifically, the MAX30100 sensor is designed to measure oxygen saturation and heart rate in the percentage value. C, C++, JavaScript may be used to interface with NodeMCU Microcontroller. Due to the current pulse oximeter, the concept to create this project is very costly, feature restriction, not user-friendly. To finish this project, many actions must be taken as a project process. First, the literature study (prior research) needs to be done to obtain the hardware, software, language, technique utilized in the project. Next, specify the components to utilize and create the hardware and software project. In this stage, the components and design must be suitable to fulfil this project's need to answer the issue statement and achieve the project goal. Next, hardware development starts with the implementation of all software and hardware. Finally, this project's testing and verification will be tested, and the project recorded for verification.

ABSTRAK

Krisis kesihatan di seluruh dunia yang menyebabkan kehilangan nyawa di beberapa negara di seluruh dunia, pandemi Covid-19. Pandemi Covid-19 melaporkan pelbagai gejala, termasuk sesak nafas dan gejala lain. Tindakan yang diperlukan diperlukan untuk memelihara lebih banyak nyawa di negara atau dunia ini. Projek ini melibatkan merancang dan mengembangkan prototaip untuk ketepuan oksigen yang mudah, ringkas dan cekap dan pemantauan degupan jantung menggunakan sensor berasaskan internet MAOT30100 (IoT). Secara khusus, sensor MAX30100 dirancang untuk mengukur ketepuan oksigen dan denyut jantung dalam nilai peratusan. C, C ++, JavaScript boleh digunakan untuk berinteraksi dengan NodeMCU Microcontroller. Oleh kerana pulse oximeter semasa, konsep untuk membuat projek ini sangat mahal, sekatan ciri, tidak mesra pengguna. Untuk menyelesaikan projek ini, banyak tindakan mesti dilakukan sebagai proses projek. Pertama, kajian literatur (penyelidikan sebelumnya) perlu dilakukan untuk mendapatkan perkakasan, perisian, bahasa, teknik yang digunakan dalam projek. Seterusnya, tentukan komponen yang akan digunakan dan dibuat projek perkakasan dan perisian. Pada peringkat ini, komponen dan reka bentuk mestilah sesuai untuk memenuhi keperluan projek ini untuk menjawab pernyataan masalah dan mencapai matlamat projek. Seterusnya, pengembangan perkakasan dimulakan dengan pelaksanaan semua perisian dan perkakasan. Akhirnya, ujian dan pengesahan projek ini akan diuji dan projek direkodkan untuk pengesahan.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

TABLE OF CONTENTS

	PAGE
DECLARATION	II
DEDICATION	III
ACKNOWLEDGEMENTS	IV
ABSTRACT	V
ABSTRAK	VI
TABLE OF CONTENTS	VII
LIST OF TABLES	XII
LIST OF FIGURES	XIV
LIST OF ABBREVIATIONS	XIX
LIST OF ATTACHMENTS	XX
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Problem Statement	2
1.3 Project Question	2
1.4 Project Objective	3
1.5 Project Scope	4
1.6 Project Contribution	4
1.7 Report Organization	5
1.8 Conclusion	7
CHAPTER 2: LITERATURE REVIEW	8
2.1 Introduction	8

2.2 Related Work Background	8
2.2.1 Background of NodeMCU	8
2.2.2 Sensors for Oximetry	9
2.2.3 Human Requirements of Oxygen Saturation	11
2.3 Critical Review of Current Problem and Justification	12
2.3.1 Design Low-Cost Pulse Oximetry Based on Raspberry Pi	12
2.3.2 A Cost-Effective Pulse Oximeter Designed Response to The Covid-19 Pandemic ..	14
2.3.3 Design, Simulation, and Implementation of a Digital Pulse Oxygen Saturation Measurement System Using the Arduino Microcontroller	16
2.3.4 IoT Pulse Oximetry Status Monitoring for Home Quarantined Covid-19 Patients ...	17
2.3.5 The Development of Heart Rate Detection Using Arduino Microcontroller	19
2.3.6 Severity Monitoring Device for Covid-19 Positive Patients	21
2.4 Proposed Solution	38
2.5 Conclusion	40
CHAPTER 3: METHODOLOGY	41
3.1 Introduction	41
3.2 Methodology	41
3.2.1 Requirements Analysis	43
3.2.2 System Design	43
3.3.3 Implementation	46
3.3.4 Testing	46
3.3.5 Deployment	46
3.3.6 Maintenance	47
3.4 Project Milestones	47
3.5 Conclusion	50

CHAPTER 4: ANALYSIS AND DESIGN	51
4.1 Introduction	51
4.2 Problem Analysis	51
Current Pulse Oximeter System	52
4.3 Requirements Analysis	53
4.3.1 Data Requirement	53
4.3.2 Functional Requirement	54
4.3.3 Non-functional Requirement	55
4.3.4 Others Requirement	56
4.4 High Level Design	61
4.4.1 System Architecture	62
4.4.2 User Interface Design	63
4.5 Detailed Design	67
4.5.1 Circuit Diagram	67
4.5.2 Flow Chart	69
4.5.3 Pseudocode	70
4.5.4 Deployment View of DIY Pulse Oximeter System	72
4.6 Conclusion	72
CHAPTER 5: IMPLEMENTATION	73
5.1 Introduction	73
5.2 Software Development Environment Setup	73
5.2.1 Prototype Development	73
5.2.2 Software Development	74
5.3 Software Configuration Management	75

5.3.1 Prototype Configuration Setup	75
5.3.2 Software Configuration Setup	83
5.4 Complete Prototype	85
5.4.1 Prototype	85
5.4.2 Software	88
5.4.3 Integration Between Prototype and Software	88
5.5 Implementation Status	90
5.6 Conclusion	91
CHAPTER 6: TESTING AND ANALYSIS	92
6.1 Introduction	92
6.2 Test Plan	92
6.2.1 Test Organization	92
6.2.2 Test Environment	93
6.2.3 Test Schedule	93
6.3 Test Strategy	93
6.3.1 Classes of test	94
6.4 Test Design	95
6.4.1 Test Description	95
6.4.2 Test Data	103
6.5 Test Result and Analysis	116
6.5.1 Accuracy of Sensor and Comparative User Analysis Testing	116
6.5.1.1 Scenario: Day 1 to Day 5 for Accuracy and Comparative Testing	119
6.6 System Usability Test (SUS)	123
6.7 Conclusion	128

CHAPTER 7: PROJECT CONCLUSION	129
7.1 Introduction	129
7.2 Project Summarization	129
7.3 Project Contribution	131
7.4 Project Limitation	131
7.5 Future Works	132
7.6 Conclusion	133
REFERENCES	134
APPENDIX	136



LIST OF TABLES

	PAGE
Table 1.1 Summary of Problem Statement	2
Table 1.2 Summary of Project Question	2
Table 1.3 Summary of Project Objective	4
Table 1.4 Summary of Project Contribution	5
Table 2.1 Specification of ESP32	9
Table 2.2 Comparison of Previous Project	23
Table 2.3 Functionality Comparison Between Previous Project	29
Table 2.4 Comparison of Commercial Product	32
Table 3.1 System Requirement	43
Table 3.2 Hardware Requirement	43
Table 3.3 Software Requirement	44
Table 3.4 Project Milestone	47
Table 3.5 Project Gant Chart	49
Table 5.1 Detail Pins Number for Node-MCU	86
Table 5.2 Implementation Status	90
Table 6.1 Connectivity of NodeMCU and Computer	95
Table 6.2 Connectivity Test Between Sensor and NodeMCU	96
Table 6.3 Connectivity Test Between OLED and NodeMCU	97
Table 6.4 Connectivity Test Between Blynk Application and NodeMCU	98
Table 6.5 Reading Test Based on Location of Sensor	99
Table 6.6 Reading Test for The Accuracy	100

Table 6.7 Blynk Application Notification Test	101
Table 6.8 Blynk Data Record Test	102
Table 6.9 Position Test of Heart Rate Measurement	110
Table 6.10 Position Test for Oxygen Saturation (SpO2)	111
Table 6.11 Comparison between Two Methods of Calculating Heart Rate and Oxygen Saturation	113
Table 6.12 Accuracy and Comparative Heart Rate Measurement Data	121
Table 6.13 Accuracy and Comparative Oxygen Saturation Data	122
Table 6.14 Table System Usability Scale	127
Table 7.1 Strength and Weakness Prototype	130



LIST OF FIGURES

	PAGE
Figure 2.1 ESP8266 Module (Joy-IT, 2021)	8
Figure 2.2: Components of MAX30100 Sensor (Pixel Electric)	10
Figure 2.3: Block Diagram of the MAX30100	10
Figure 2.4: Functional Block of the MAX30100 (LEETS ACADEMNY, 2017)	11
Figure 2.5: Level of Oxygen Saturation (Sp2O) in Human (Pinterest)	11
Figure 2.6: Haemoglobin Saturation Curve (Wikipedia, 2021)	12
Figure 2.7: Concept Design of Design Low-Cost Oximetry Based on Raspberry Pi (Bakhri, S., Rosiana, E., & Saputra, R. C., 2020)	13
Figure 2.8: Pulse Oximetry made (Bakhri, S., Rosiana, E., & Saputra, R. C., 2020)	13
Figure 2.9: Percentage data collection SpO2 between two devices	14
Figure 2.10: System Architecture for Project (Metcalf, B., Iravani, P., Graham-Harper-Cater, J., Bowman, R., Stirling, J., & Wilson, P., 2021)	15
Figure 2.11: Flow Diagram for Project (Metcalf, B., Iravani, P., Graham-Harper-Cater, J., Bowman, R., Stirling, J., & Wilson, P., 2021)	15
Figure 2.12: Block Diagram for the system (Bhuyan, M. H., & Sarder, M. R., 2021)	16
Figure 2.13: Complete Circuit Diagram for the system (Bhuyan, M. H., & Sarder, M. R., 2021)	17
Figure 2.14: Proposed System (Miron-alexe, V., 2020)	18
Figure 2.15: Flowchart Algorithm (Miron-alexe, V., 2020)	18
Figure 2.16: Design of Project (Sihombing, P., Barus, Y. E., Sembiring, S., & Zamzami, E. M., 2020)	20
Figure 2.17: Complete Design of Project (Sihombing, P., Barus, Y. E., Sembiring, S., & Zamzami, E. M., 2020)	20

Figure 2.18: Circuit Connection (A. Dhadge and G. Tilekar, 2020)	21
Figure 2.19: Architecture Design for Proposed Solution	39
Figure 3.1 Waterfall Model (EXISTEK, 2017)	42
Figure 3.2 System Design	45
Figure 4.1 Current Pulse Oximeter	52
Figure 4.2 Proposed Pulse Oximeter System	52
Figure 4.3 Project Data Requirement	54
Figure 4.4 Functional Diagram	55
Figure 4.5 Arduino IDE	56
Figure 4.6 Blynk Application	57
Figure 4.7 Node.js	57
Figure 4.8 NodeMCU (ESP8266)	58
Figure 4.9 Jumper Wire	58
Figure 4.10 MAX30100 Sensor	59
Figure 4.11 Resistor	59
Figure 4.12 Breadboard	60
Figure 4.12 OLED Display	60
Figure 4.14 High Level Design Diagram	61
Figure 4.15 System Architecture	62
Figure 4.16 Login Interface of Development of DIY Oximeter for Health Monitoring	63
Figure 4.17 Login Interface of Development of DIY Oximeter for Health Monitoring	64
Figure 4.18 Login Interface of Development of DIY Oximeter for Health Monitoring	64
Figure 4.19 Exporting the Graph of Data Monitoring	65
Figure 4.20 Input Display Widget of Heart Rate Reading	65

Figure 4.21 Input Display of SuperChart	66
Figure 4.22 Historical Graph	66
Figure 4.23 SuperChart Data	67
Figure 4.24 Circuit Diagram	68
Figure 4.25 Circuit Diagram for NodeMCU	68
Figure 4.26 MAX30100 Circuit Diagram	69
Figure 4.27 OLED Display Circuit Diagram	69
Figure 4.28 Flowchart System	70
Figure 4.29 Pseudocode System	71
Figure 4.30 Deployment View of DIY Pulse Oximeter System	72
Figure 5.1 Block Diagram for NodeMCU Environment	73
Figure 5.2 Block Diagram for MAX 30100 Sensor Environment	74
Figure 5.3 Block Diagram for OLED Display Environment	74
Figure 5.4 Block Diagram for Blynk Application Environment	75
Figure 5.5 Arduino Website Download	76
Figure 5.6 Arduino IDE Initialize	76
Figure 5.7 Arduino Code Platform Interface	77
Figure 5.8 Declare the Library	77
Figure 5.9 Declare Wi-Fi SSID and Password	78
Figure 5.10 Declare Token Auth	78
Figure 5.11 Code for the OLED to Display Reading	79
Figure 5.12 Code to Calculate Heart Rate, and Oxygen Saturation for MAX 30100 Sensor	80
Figure 5.13 Code for Heart Rate, and Oxygen Saturation	80
Figure 5.14 Code to Connect NodeMCU to Blynk Application	81

Figure 5.15 Setup Coding	82
Figure 5.16 Code to Threshold and Notification	82
Figure 5.17 Blynk Application	83
Figure 5.18 Create Project Interface	83
Figure 5.19 Widget Box	84
Figure 5.20 Pulse Oximeter Interface	84
Figure 5.21 Architecture of Development of DIY Oximeter for Health Monitoring	85
Figure 5.22 Node-MCU Board Pins Details	86
Figure 5.23 View of The Prototype	87
Figure 5.24 Interface Pulse Oximeter Application	88
Figure 5.25 Integration Between Prototype and Software	88
Figure 5.26 Real Environment Integration Between Prototype and Software	89
Figure 6.1 Black Box Testing (Imperva, Unknown)	94
Figure 6.2 Connection Between NodeMCU and Computer	103
Figure 6.3 Board NodeMCU Function	103
Figure 6.4 Coding has been uploaded successfully	104
Figure 6.5 Connectivity NodeMCU and MAX 30100 Sensor	104
Figure 6.6 Output Reading Sensor from The Sensor on Serial Monitor	105
Figure 6.7 Output Reading Sensor on Blynk Application	105
Figure 6.8 Connectivity NodeMCU and OLED Display	106
Figure 6.9 Output Reading Sensor from The Sensor on OLED Display	106
Figure 6.10 Connection of Blynk on Serial Monitor	107
Figure 6.11 Code Snippet for SpO2 and BPM Condition Notification	108
Figure 6.12 Notification Message on Smartphone	108

Figure 6.13 Position of Wrist and Fingertips	109
Figure 6.14 Position Setup for Testing	110
Figure 6.15 Block Diagram from Top View of The Setup	110
Figure 6.16 Commercial Pulse Oximeter	112
Figure 6.17 Widgets of SuperChart	113
Figure 6.18 Option of SuperChart	114
Figure 6.19 Email of Pulse Oximeter	114
Figure 6.20 Early Data	114
Figure 6.21 Latest Data	114
Figure 6.22 Online Conversion	115
Figure 6.23 Formula Conversion	115
Figure 6.24 Setup Brand 3 for Accuracy and Comparative Test	117
Figure 6.25 Setup Brand 1 for Accuracy and Comparative Test	117
Figure 6.26 Setup Brand 2 for Accuracy and Comparative Test	118
Figure 6.27 Block Diagram Setup All Brand	118
Figure 6.28 Setup for Accuracy and Comparative Testing	119
Figure 6.29 Block Diagram Setup for Accuracy and Comparative Testing	119
Figure 6.30 End-User Gender	124
Figure 6.31 End-User Age	124
Figure 6.32 End-User Experience	124
Figure 6.33 Set of Questions	125
Figure 6.34 Bar Chart of System Usability Scale	126

LIST OF ABBREVIATIONS

IoT	-	Internet of Things
FYP	-	Final Year Project
BPM	-	Beat Per Minute
SpO2	-	Oxygen Saturation
PS	-	Problem Statement
PQ	-	Project Question
PO	-	Project Objective
PC	-	Project Contribution
FDA	-	U.S. Food and Drug Administration
MDA	-	Malaysia Device Authority
SUS	-	System Usability Scale
IDE	-	Integrated Development Environment
DIY	-	Do It Yourself
SDLC	-	Software Development Life Cycle



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LIST OF ATTACHMENTS

		PAGE
Appendix A	Product Specification	136
Appendix B	User Details	139
Appendix C	Day 1 to 5 Accuracy and Comparative Data for Heart Rate Measurement (BPM)	140
Appendix D	Day 1 to 5 Accuracy and Comparative Data for Oxygen Saturation (SpO2)	142



CHAPTER 1: INTRODUCTION

1.1 Introduction

A global health crisis that causes life loss and disrupts economies in a few countries worldwide, the Covid-19 pandemic. People infected with the Covid-19 pandemic reported various symptoms, such as respiratory shortness and other signs. In the exchange of oxygen and carbon dioxide, the breathing system is the organ and other parts involved in breathing. The severely affected patients of COVID-19 require ventilators to survive and meet the oxygen requirement. This project also will monitor people's health.

The DIY Oximeter is an IoT project designed to detect people's heart rate and oxygen saturation because people monitor their health with a laptop and phone. DIY Oximeter will be cheaper compared to the commercial oximeter and smartwatch. It notifies or alerts people when oxygen saturation is below that 94 per cent (Dr Guleria, 2021) that can be an excellent way to check their health. DIY Oximeter also can show and record alert data of previous oxygen saturation. This project is expected to help people who have possibly been infected with Covid-19 by given the alerts to the people and will record the last monitoring health when the oxygen saturation is low because prevention is better than cure. Other than that, this system will reduce the number of cases that involve Covid-19 of a people.

1.2 Problem Statement

People may not be sensitive to their health because some people may not be able to buy the commercial oximeter and smartwatch that has been built up to check oxygen saturation in people's bodies. People also may not be sure if their body is healthy because sometimes the oximeter only shows the oxygen saturation data but does not give the alert when their SpO₂ is not in good condition. The current oximeter may not save the data because it builds with hardware only, not including the software. To summarize this, the problem statements for this project are shown in Table 1.1.

Table 1.1 Summary of Problem Statement

PS	Problem Statement
PS ₁	The market price of a commercial pulse oximeter is expensive to purchase.
PS ₂	Users are unaware of their oxygen saturation condition in the home and not be able to see the previous data.
PS ₃	Users will not get an alert.

1.3 Project Question

They used project research questions to identify questions on monitoring oxygen saturation and heart rate. Based on several studies, it can be concluded that there are some difficulties in determining whether oxygen saturation or SpO₂ is good or not. Table 1.2 shows the summary of the project question.

Table 1.2: Summary of Project Question

PS	PQ	Project Question
PS ₁	PQ ₁	How can you build a low-cost pulse oximeter that gives reliable readings?
PS ₂	PQ ₂	How to determine oxygen saturation condition based on SpO ₂ or heart rate?