DEVELOPMENT OF LOW- COST WAREHOUSE DATA LOGGER

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BORANG PENGESAHAN STATUS LAPORAN

JUDUL: [DEVELOPMENT OF LOW-COST WAREHOUSE DATA LOGGER]

SESI PENGAJIAN: [2020 / 2021]

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DEVELOPMENT OF LOW-COST WAREHOUSE DATA LOGGER

NUR NABILAHUDA AFIQAH BINTI AHMAD SUFFIAN

This report is submitted in partial fulfilment of the requirements for the 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 LOW – COST WAREHOUSE DATA LOGGER]

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : _____ Date : _____
([NUR NABILAHUDA AFIQAH BINTI AHMAD SUFFIAN])

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])

DECLARATION

DEDICATION

This effort is dedicated to Allah Almighty, who is my creator, cornerstone, and source of wisdom, knowledge, and insight. He has been my source of power throughout this undertaking, and I have only been able to soar on His wings. I also like to thank my parents, Ahmad Suffian bin Omar and Maznah Binti Abdullah, for their support in helping me accomplish this project. Dr. Nurul Azma Binti Zakaria, my supervisor, and fellow friends ready to share and help me along the way. Thank you very much. My affection for you all is unquantifiable. God's blessings on you.

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ABSTRACT

In this project, the Development of Low-Cost Data Logger mainly focuses on Pulp and Paper Industry. The warehouse seems to be involved in fire incidents and mould growth that can cause death and losses. The data logger consists of temperature, humidity, altitude, and pressure using the BME280 sensor. It also has an MQ2 gas/ smoke sensor to detect flammable gases such as LPG, propane, methane, hydrogen, alcohol, smoke, and carbon monoxide. The mainboard of this data logger is made up of a Wi-Fi module microcontroller to connect to the smartphone using Blynk Application, an alkaline battery 9v, oled display and power bank 10000mah as the power supply. The project presents a data collection system to focus on Pulp and Paper Warehouse to monitor the condition and environment by using Waterfall Model. It has 6 phases: requirement analysis, system design To run successfully, it has six phases: requirement analysis, system design, implementation, testing, deployment, and maintenance. So, developing a low-cost data logger may help the industry in monitoring data. If the designated threshold of the data logger is surpassed, the user will get an alert signal from the microcontroller. Therefore, the data logger will help the user detect high temperatures and smoke that can cause fire incidents at the beginning phase. Besides, it can notify the user if the relative humidity exceeds the regular reading, which helps to prevent mould growth. This project is significant because it uses a BME280 temperature, humidity, altitude, and pressure sensor, which is more accurate than the other sensor. Hopefully, the future work of this project can add more functionality and make a case for the prototype to look neat. Besides, improve gas/ smoke detectors with sprinkle systems, a self-contained system that detects, controls, and extinguishes fires while also alerting residents.

ABSTRAK

Dalam projek ini, Pembangunan *Data Logger* Kos Rendah menumpukan pada Industri Pulpa dan Kertas. Ini kerana gudang nampaknya berpotensi terlibat dalam kejadian kebakaran dan pertumbuhan kulat yang boleh menyebabkan kematian dan kerugian. *Data logger* ini terdiri daripada suhu, kelembapan, ketinggian, dan tekanan menggunakan sensor BME280. Ia juga mempunyai sensor gas/ asap MQ2 untuk mengesan gas mudah terbakar seperti LPG, propana, metana, hidrogen, alkohol, asap, dan karbon monoksida. Papan utama *data logger* ini terdiri daripada mikrokontroler modul Wi-Fi untuk berhubung dengan telefon pintar menggunakan Aplikasi Blynk, bateri alkali 9v, paparan oled dan power bank 10000mah sebagai bekalan kuasa. Projek ini menyajikan sistem pengumpulan data untuk fokus pada gudang pulpa dan kertas untuk memantau keadaan dan persekitaran dengan menggunakan Model Air Terjun. Ia memiliki 6 fasa iaitu analisis keperluan, desain sistem, pelaksanaan, pengujian, pemasangan, dan pemulihan agar projek dapat berjalan dengan jayanya. Oleh itu, dengan mengembangkan data logger yang rendah ia dapat membantu industri dalam memantau data. Sekiranya bacaan *data logger* yang ditentukan dilampaui, pengguna akan mendapat isyarat amaran dari mikrokontroler. Ini akan membantu pengguna dalam mengesan suhu tinggi dan asap yang boleh menyebabkan kebakaran pada fasa permulaan. Selain itu, ia dapat memberi amaran kepada pengguna jika kelembapan relatif melebihi bacaan normal yang membantu mencegah pertumbuhan kulat. Projek ini penting kerana menggunakan suhu, kelembapan, ketinggian, dan sensor tekanan BME280 yang lebih tepat daripada sensor yang lain. Karya masa depan projek ini diharapkan dapat menambahkan lebih banyak fungsi dan membuat cetakan untuk prototaip sehingga akan kelihatan kemas. Selain itu, tingkatkan alat pengesan gas / asap dengan sistem pemadam api untuk mengesan, mengawal, dan memadam kebakaran sambil juga memberi amaran kepada pekerja di gudang.

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LIST OF ABBREVIATIONS

IoT	**-**	**Internet of Things**
FYP	**-**	**Final Year Project**
PS	**-**	**Problem Statement**
PQ	**-**	**Project Question**
PO	**-**	**Project Objective**
PC	**-**	**Project Contribution**
SUS	**-**	**System Usability Scale**
IDE	**-**	**Integrated Development Environment**
SDLC	**-**	**Software Development Life Cycle**

LIST OF ATTACHMENTS

CHAPTER 1: INTRODUCTION

1.1 Introduction

Data loggers are electronic instruments that continuously monitor and record environmental parameters, allowing for measurements, documentation, analysis, and validation of circumstances. A sensor collects data, which is then saved in the data logger by a computer chip. In the pharmaceutical, automotive, and food industries, data recorders, sometimes known as loggers, are employed at every stage of the manufacturing process, storage, and shipment monitoring. There are several factors to consider when selecting a data logger: input signal, number of inputs, size, speed/memory, and real-time operation. This small device is pricey, but it is useful.

This project is primarily focused on the development of a low-cost data logger for the Pulp and Paper Industry's warehouse monitoring system, which will assist manufacturers in maintaining a regulated and monitored storage environment. The warehouse is a large building used to store things until they are sold, utilized, or shipped to shops alternatively. The products have been hanging in a warehouse for months since distribution has been halted due to a strike. In this project, the data logger focuses on Pulp and Paper warehouse as it is very potential to be involved in a fire incident. A low-cost data logger uses a BME280 temperature, humidity, and pressure sensor to detect data readings using IOT based on an Arduino to collect and monitor data. This idea main implemented for cost-saving purposes at the same time provide systematic data collection. The data logger is built up with affordable hardware.

1.2 Problem Statement (PS)

In Pulp and Paper warehouse at a particular time, it can be busy with goods and people. So, a few problems happen, such as inconsistent data collection in temperature, humidity, and pressure standards by the person in charge to make mistakes such as misread the readings result, damage, and misplace. Hence, this project will provide accurate readings and ease the documenting process by using a suitable sensor. The summary of the problem statements is shown in Table 1.1 below.

Table 1.1 Summary of Problem Statement

PS	Problem Statement
PS1	Inconsistent manual data entry is prone to human error by making mistakes and misread the reading results.
PS2	Physical data collection is possible to damage and be misplaced.

1.3 Project Question (PQ)

The project research question is used to identify the question on manual collecting data. Based on a few kinds of research, it can be concluded that there are some difficulties to determine using manual methods in collecting data. Table 1.2 shows the summary of the project research question.

Table 1.2 Summary of Project Question

PS	PQ	Project Question
PS1	PQ1	How to record a consistent data reading?
PS2	PQ2	How to save the data digitally?

1.4 Project Objective (PO)

The project objective is to assist Pulp and Paper manufacturing warehouses in managing and recording data about their warehouse's condition digitally. Table 1.3 shows the summary of the project object.

Table 1.3 Summary of Project Objective

PS	PQ	PO	Project Objective
PS1	PQ1	PO1	To provide accurate readings and quality data according to the duration of the monitoring period.
PS2	PQ2	PO2	To generate the report digitally and provide a notification alert when the abnormal condition and the fire happened.

1.5 Project Scope

This project aims to build up a low-cost data logger for Pulp and Paper manufacturing with an accuracy of the sensor. Data logger consists of a few features such as detecting temperature, humidity, and pressure readings in the paper warehouse. Then, record the data digitally. Furthermore, the data logger will differentiate readings between normal and abnormal one, making it more efficient for international utilization. Lastly, the alert from the Blynk application will notify the user through the smartphone immediately when the readings exceed abnormal.

1.6 Project Contribution (PC)

The expected output from this project is defined by the project contribution. The data logger will help the manufacturing industry to monitor and record the data. The main goal of this project is to ease the data record and save a lot of time and effort.

The data logger uses Wi-Fi technology is connected to the smartphone, which helps to view the data collection. The algorithm will differentiate the normal and over readings. Blynk application will notify the user immediately when the over readings so the person can take action quickly. Table 1.4 shows the summary of the project contribution.

Table 1.4 Summary of Project Contribution

PS	PQ	PO	PC	Project Contribution
PS1	PQ1	PO1	PC1	Provide a solution in recording accurate readings.
PS2	PQ2	PO2	PC1	Provide an algorithm that differentiates standard condition monitor and notify alert notification.

1.7 Report Organization

Chapter 1: Introduction

This chapter discusses the purpose of developing a Low-cost Data Logger for Paper Warehouse, including the project objective, problem statement, and project research question to clarify the system's intention.

Chapter 2: Literature Review

This chapter discusses other topics that are related to this project. This chapter will compare this project to other existing projects using different tools, algorithms, methods in over-heat, over moisture, and high pressure for each condition. This chapter will make differences in past projects clearer and justifies the enhancements needed in this project.

Chapter 3: Methodology

This chapter discusses the suitable method used to perform the project, whether using the SDLC model or OOAD model. Every phase of methodology will be recorded in this chapter. In addition, this chapter's milestones will be determined to make well-plan time to complete a specific task or phase of this project.

Chapter 4: Analysis and Design

The information such as functional requirements, software requirements, and hardware requirements will be defined in this chapter. It is essential in deciding the best design and to make sure that this project is working efficiently and successfully.

Chapter 5: Implementation

The primary purpose of this chapter is to implement all the designs determined from the previous chapter. This chapter also includes all the software and hardware that are required to develop this system.

Chapter 6: Testing

The testing will be made throughout this chapter based on the test plan; test organization, test environment, and test schedule. Finally, all the results of the test will be recorded in this chapter and analyzed. Thus, this testing chapter will examine the system and decide whether this project is successful or not.

Chapter 7: Project Conclusion

The last chapter for this project will explain the objective that has been achieved based on the implantation and testing phase. Finally, all the results obtained will be concluded, including the weakness and strengths of this project.

1.8 Summary

In this chapter, the objectives, problem statements, research question hypothesis, project scopes, and project contributions to the user can be identified in detail. This project was able to develop a data recording method that can be viewed via the Blynk Application. The process is completed and ready to be used in real-life situations as the smartphone is a common communication device that is used every day. Therefore, this project will be beneficial to overcome the manual record data problems.