UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF ANDROID APPLICATION FOR MONITORING THE MANUFACTURING PROCESS

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunication) with Honours.

by

SURAIEN A/L RAJA MOHAN

B071710623

961218055489

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

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.....

SURAIEN A/L RAJA MOHAN

Alamat Tetap:

357, JALAN 8,

TAMAN WIDURI INDAH

70450 SEREMBAN,

NEGERI SEMBILAN.

Tarikh: 28/1/2020

Disahkan oleh penyelia:

.....

EN KHAIRUL ANUAR BIN A.RAHMAN

Cop Rasmi Penyelia

TS. KHAIRUL ANUAR BIN A RAHMAN
Quality Control Manager, Teaching Factory
Deputy Vice Chancellor (Academic & International Office)
Universiti Teknikal Malaysia Melaka

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Signature: suraien ……

Author : SURAIEN A/L RAJA MOHAN

Date: 28/1/2020

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Telecommunication) with Honours. The member of the supervisory is as follow:

Signature: .....

Supervisor : EN KHAIRUL ANUAR BIN A.RAHMAN

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ABSTRAK

Terdapat banyak masalah disebabkan mesin di bahagian pengeluaran syarikat-syarikat di Malaysia. Tujuan kertas ini adalah untuk membangunkan aplikasi android untuk memantau mesin proses pembuatan. Sistem yang dicadangkan boleh memaklumkan dan memantau data mesin di mana-mana. Sistem ini juga akan memaparkan status lampu menara mesin sama ada berwarna hijau, kuning atau merah di papan pemuka Node-Red dan papan pemuka MQTT. Sistem ini terdiri daripada IoT Gateway Module yang menyediakan komunikasi antara mesin dan MQTT Dashboard. Selanjutnya, dengan menggunakan sistem ini, ia akan membantu mengesan kerosakan mesin dan dapat mengenal pasti masalah mesin. Hal ini dapat mengurangkan masa yang diperlukan oleh jurutera dan juruteknik untuk mengesan masalah mesin tersebut

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ABSTRACT

Many problems are caused by machines in production line of the companies in Malaysia. The aim of this paper is to develop an android application to monitor the manufacturing process machine. The proposed system can monitor the working progress of the machine and data of the machine is taken. This system will display the status of the tower light of the machine whether it is in green, yellow or red in Node-Red dashboard and MQTT dashboard. The system consists of the IoT Gateway Module as the brain of this project that provides the communication between the machine and MQTT Dashboard. Furthermore, by using this system, it will help to track which machine had break down and able to identify the problem of the machine so this reduces the time taken for the engineers and technician to detect the problem of the machine.

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DEDICATION

I dedicate this report to my parents and friends. A special thanks to my father Mr Raja Mohan A/L Gopal and my mother Mrs Ariyamallai A/P Suppiah who both always being support my ideas and give encourage to do this project. I also thank my friends and peoples who always been my backbone to develop this project successfully. Lastly, to my supervisor Encik Khairul Anuar Bin A. Rahman who gives many ideas and share his knowledge to me on how to do the report and the prototype.

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CHAPTER 1

INTRODUCTION

1.1 Background

In the new era of industrial digitalization, companies are evenly investing in tools and solutions that allows their processes, machines, employees and even the products themselves, to be integrate into a single integrated network for data collection, data analysis, the evaluation of company development, and performance improvement.

Nowadays, forth industrial is for the qualitative nature and innovative which the improvement in quality can be seen in the whole production process is managed and controlled in an integrated way. Digitalized tool must be implemented in every manufacturing process for constantly evolve their production systems in order to remain competitive. Industry 4.0 is to achieve more improvements in term of automation and operational efficiency. This is the main purpose.

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Our project is mainly to fulfil the forth-industrial revolution with the combination of 'Internet of Things'. 'Internet of Things' is a technology which used by worldwide for the wireless connection mainly between machine to machine communications (M2M). The figure 1.1 below shows the evolution of 'Internet of Things'.

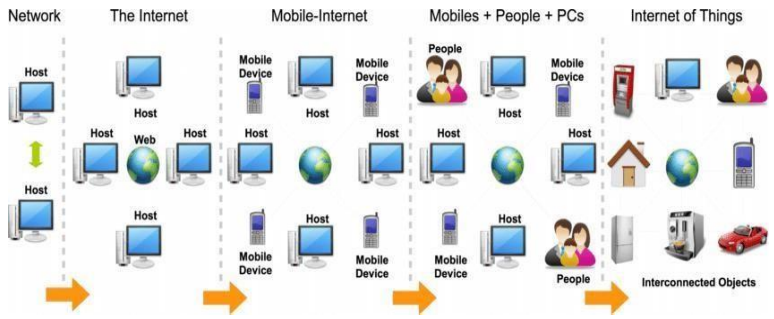

Figure 1.1: Evaluation of Internet

Manufacturing process is a very important process in a company. The manufacturing process that take place in the company must be very productive and efficient in producing the products. Engineers and the operators plays a very important role in this process. When a machine is shut down or giving problem, engineers have to act very fast in solving the issue on the machine in very short period .Hence, this project is to develop the application to monitor the manufacturing process. In other word, the manufacturing process can be monitored by using the MQTT dashboard.

1.2 Problem Statement

Nowadays most of the manufacturing industry facing many problems that has been growing in size day by day. The main issues that always will take place is the problem caused by the machines. When there is a problem in a machine, there is a big probability for the line to be in shut down condition until the machine is repaired. This takes quiet a long time for the technician and engineers to detect the problem of the machine. An appropriate system to detect and monitorthe machine is one of the solution for this problem.

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Besides that, every machine has its own data that we can see from the machine. The example of data that a machine will have is the pressure of the machine, the time, the date and more over. The data of the machine dependx on the type of the machine. During the busy hours, production manager or the technician will not be able to collect the data of the machine by going to the machine itself. It will take a longer time for a production manager or the technician to go into the line and record all the data from the machine. This problem can overcome by analysising the data generated from the machine.

1.3 Objective

This project that is development of android application for monitoring the manufacturing process was created the most significant to give more space to the consumer. There are few objectives as shown:-

1. To develop an android application to monitor the manufacturing process
2. To analysis and collect the data from the machine

1.4 Scopes of Project

The main look of this project is to develop the android application for monitoring the manufacturing process. The system will be using the MQTT dashboard and Node Red platform for monitoring the manufacturing process. Raspberry Pi is the main central for transferring the data from the machine to MQTTdashboard and Node Red. The proposed system is limited only to collect the data which is the time take for the product to move along the conveyor of the machine and monitoring the work progress when the machine is process. This project can be implement by all industries.

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1.5 Organization of Report

Basically, the final report consists of 5 chapters contains which is Introduction, Literature Review, Methodology ,Results ,Discussion and the end of the chapter is Conclusion. In Chapter 1, the background of study, problem statement of the project, objective of the project and the scope that covered in this report and the structure of organization report. In Chapter 2, all the theory that is applied will be explained in this chapter. The comparison for each research for hardware and advantage or disadvantages from each research has been done. Chapter 3, the methods, techniques and project planning that was carried out in this project will be discussed. The conceptual model will be developed. Assumptions, coding, system simulations project will be presented in this chapter. Chapter 4 that is results and discussions. Overall of the study in this project are recorded in this chapter. Moreover, the result databased on the satisfaction of the project to be illustrated in this chapter. Finally, the last chapter 5 is conclusion. In this chapter, we will discuss overall of our project and the achievement of the objective.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The theory and information that needed which is related to the scope of the projects will be discussed in this chapter. Other than that, discussion regarding the information and methods used in earlier research is also revised. In this chapter, the equipment and software related to the project that is Monitoring System for manufacturing process are explained in this chapter. Various researchers have designed this monitoring system.

2.2 Needs for Monitoring System for the Manufacturing Process

The modern lifestyle that is practice has become the requirement for the modern tools meet the demand the current modern lifestyle. Subsequently, monitoring system for the manufacturing process has become a challenge to society in industrial sector. This system is a very new to the industry and not many of the company uses this system for their industries. Therefore, this manufacturing process monitoring system can help save time and energy. This can achieved by using this monitoring system for the manufacturing process will help to observe the real time data from the machine at anytime and anywhere.

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2.3 Previous Related Work

Previous related work is about the researcher who did similarly with project that had been planed. There are several researcher around the world who did almost the similar project, but there is the differences in the equipment and method they have equipped to do the project. In order, to complete this part, we had to select fifteen most similar article and summarize it. The article which chosen are all listed at reference.

2.3.1 "History of Industrial Revolution" by De Vries

De Vries (2019) has carry studies on the history of industrial revolution. In early 18th century, first industrial revolution has been generated the power by using the steam power and mechanism of production. This method is more effective than before which is produced on simple spinning wheels. This makes the increasing human productivity in industrial purposes. In this first industrial revolution, steam engines are used which could generate the high power.

In 19th century, the second industrial revolution has been invented. This revolution has begun through the discover of electricity and assembly line production. The second industrial was characterized to build out the railroads, large- scale iron and steel production. In manufacturing, its increased used of steam power, and telegraph that has been used in widespread that using petroleum in the beginning of electrification. This principle has been carried out into automobile production. This technology is used by Ford in automobile production. Now, the vehicles were produced in partial step on conveyer belt. This implementation makes the process more efficient and mainly it reduce the cost.

Third technological revolution began within the period of 70's to 20 century through partial automation using memory-programmable control and computer. Since the introduction of those technologies, we are now able to automate a whole production process without human assistance. After that the last decade of IR3.0, the invention of a variety electronic devices including component which is transistors and integrated circuits has automated the machines substantially which has reduced effort, increased speed, greater accuracy and complete replacement of the manpower. The production still run automated using PLC, robotics, IT system, software system, etc. To lead the cases in control and monitoring of plant processes, its enable management processes such as enterprise resources planning, inventory management, shipping logistics, product flow scheduling and tracking throughout the plant.

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