UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF WIRELESS MEASUREMENT DIAL GAUGE

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

by

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APPROVAL

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

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ABSTRAK

Dalam era pemodenan ini, teknologi adalah salah satu inisiatif terbaik untuk meningkatkan kualiti dan produktiviti syarikat. Teknologi ini dapat menolong syarikat dari pelbagai aspek juga akan memberi banyak faedah sekiranya teknologi itu digunakan dengan cara yangbaik. Kita dapat melihat banyak syarikat sekarangmengambil peluang teknologi ini untuk berkembang ke tempat kerja mereka. Teknologi ini akan menjadi penyokong kepada pekerja kerana kadang-kadang sebagai manusia kita akan melakukan kesalahan kecil tanpa menyedarinya. Seperti yang kita lihat, banyak teknologi mengembangkan sistem yang menggunakan sambungan tanpa wayar atau dikenali sebagai Wi-Fi di mana kawalan sistem dari jauh tanpa sambungan wayar. Objektif projek ini adalah untuk merancang dail gauge kepada syarikat CTRM yang dapat melakukan log data tanpa wayar berdasarkan mikrokontroler, untuk memantau data yang diambil dari pengukuran langsung dari mikrokontroler dan untuk mencegah kehilangan data yang diambil yang dapat disimpan terus ke Microsoft Excel. Sistem wayarles tolok dail digital ini menggunakan ESP8266 sebagai mikrokontroler untuk mengawal input dan output sistem dan modul Wi-Fi sebagai pemancar untuk menghantar data ke komputer peribadi. Tolok dail digital digunakan untuk menghitung pengukuran dan data akan dipindahkan ke ESP8266 sebagai mikrokontroler dengan menggunakan sistem tanpa wayar melalui modul Wi-Fi. Projek ini mudah digunakan dan dikendalikan kerana ini merupakan peningkatan yang lebih baik untuk sistem pengukuran dan data log.

ABSTRACT

In this era of modernization, technology is one of the best initiatives to improve the quality and productivity in the company. This technology can help the company from many aspects also will give many benefits if the technology being used in good way. We can see many companies now days take this opportunity of technology to develop into their workplace. This technology will be becoming such a supporter to a worker because sometime as a human we will happen to do a small mistake without knowing it. As we can see, many technologies develop the system that using wireless connection or know as Wi-Fi where the control the system from a far without any wire connection. The objective of this project is to design a dial gauge for CTRM company that can perform wireless data logging based on microcontroller, to monitoring the data taken from measurement direct from microcontroller and to prevent the losing data taken that can be save directly to Microsoft Excel. This digital dial gauge wireless system used an ESP8266 as a microcontroller to control input and output of the system and Wi-Fi module as a transmitter to transmit the data to the personal computer. Digital dial gauge is used to calculate the measurement and the data will be transfer to ESP8266 as a microcontroller by using wireless system through Wi-Fi module. This project is easy to used and handle as it a better improvement for measuring and data logging system.

DEDICATION

To my beloved parents, thank you for supporting and believing in me for everything I like to do since first ever I start in learning process. This kind of support really important for me to make me becoming more confident in doing something until archive the successful.

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LIST OF SYMBOLS

sec	-	second
k	-	kilo
V	-	volt
%	-	Percentage

LIST OF ABBREVIATIONS

IoT	Internet of Thing
PLX-DAQ	Parallax microcontroller data acquisition
ESP	Espressif
PC	Personal computer
R	Resistor
IR	Infrared
Ho	Null hypostasis
GR&R	Gage Repeatability and Reproducibility

CHAPTER 1

INTRODUCTION

1.1 Project Background

This project has been conducted to improve the system that being used in CTRM company where they used to measure and collect the data manually by using man power. The purpose of this project is to reduce the time taken, cost and number of workers used for measuring and recording process using dial gauge. The time taken, cost and number of workers that had been reduced in this measurement process can be used in other work which can increase the company production and profits.

The data logging that is performed automatically will reduce human error. Besides that, an analysis that is performed with the data of the measured reading can be used as backup record for emergency situation or for development and improvement purpose. For this project, electronic dial gauge is used because digital reading can be easily transferred to the microcontroller and this digital dial gauge is more accurate than the analogue dial gauge.

1.2 Problem Statement

As we can see, nowadays, most of the industry used to make a measurement and recording the data manually. This problem happened to CTRM company where they are looking for a solution to overcome this problem to increase their productivity. They also need to find the solution for their problem regarding of minimizing the time taken for the

measuring process. It is because that will help them to minimizing time taken for measuring and recording data where it also will give effect to the next process in that company and productivity will also increase.

Other than that, data that been measured and recorded had possibly to loss when it recorded manually. So, the CTRM company need to have a proper document to save and compile the data taken in a proper way which can be save and easy to find and most importantly secure from the loss the data. By directly save the data to the personal computer, it will solve the problem, and that person only needs to keep update with each incoming data.

1.3 Objective

List of objectives for the project:

1. To design a system to integrate with existing dial gauge that can perform wireless data logging and recording data automatically.
2. To eliminate error while taking data directly from dial gauge measurement.
3. To develop the system that prevent the losing data taken that can be save directly to Microsoft Excel.

1.4 Scope of Research

This is list for the scope of research for this project:

1. The scope of the project is using ESP8266 microcontroller as a brain to control all the components used in this project.
2. This ESP8266 was equipped with Wi-Fi modules that used for communication
3. between the microcontroller and the computer can help to reduce time taken for the process.
4. The data taken by the dial gauge will be transfer to the computer with wireless system by using the interfacing that we will develop.
5. This project is dedicated to CTRM company because this project is focusing to their measurement.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss in many areas the overview of the recently conceived project. The work that had been performed on the project is gathered together so that it is possible to refer the idea of the new technologies. It also provides the information and comparison of the equipment that will be used in the development of the project. The surveys for literature review were done from source such as Mendeley, google scholar, dissertation and other source. Literature for this project were divided several main topics such as measurement, wireless device and data logging system.

2.2 Dial Gauge

The use of dial gauge is commonly used as one of measuring instrument equipment in a company and industry in a fast-growing industry now days. The dial gauge is used to check surface flatness, bar and rod parallelism, and to detect any difference of smalls in linear measurement of identical objects. Measurement methods have been of massive significance as far back as the beginning of human progress when estimations were first expected to control the movement of merchandise in deal exchange request to guarantee that trade were reasonable. In using the dial gauge, it can measure a small difference of dimension of surface where the tolerance of accepted value more accurate compare to another device. (Schlesinger, 2009)

2.2.1 Machine Vision Based Automatic Detection Method of Indicating Values of a Pointer Gauge.

Electronic technology is one of important thing and currently widely applied in manufacturing purpose and also in daily life. The mechanical technology is widely use before this were most of the application using pointer gauge in their system because it built in low price, high reliability, simple structure and easy to operate. When the development of information technology was rapidly growing, the system was introduced to digital meter where it becoming new technology and modern. But some of industry still using the pointer gauge system in their manufacture but this system cannot communicate directly to a computer to perform collecting and transmission of the data collected when using pointer gauge. By using the latest information of technology, development of the system that can interface pointer gauge with digital future are necessary so that the system can perform an automatic reading and transforming the collected value into the digital signal and store to personal computer. This system helped the industry to reduce their man power to collect data manually and reduce mistake when record the data. In this process, first growing method are used to allocated its pointer gauge centre and its dial region. Next adaptive threshold method used to determine the circular scale region under the polar coordinate system. Next, the improved central projection had been used to produce the scale marks distribution diagram in the circular region. To obtain the direction and detect the pointer in the dial region the Hough transformation had been used in that process. For the final process, to find the indicating value of the gauge the distance method is applied by doing a comparison of the pointer direction with the position of the scale marks. (Chi et al., 2015)