UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INDUSTRY MONITORING USING GSM

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

by

MOHD HANAFIAH BIN AMIR HUSSEIN
B071410590
921109126405

FACULTY OF ENGINEERING TECHNOLOGY

2017

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **Industry Monitoring Using GSM**

SESI PENGAJIAN: **2017/18 SEMESTER 1**

Saya **MOHD HANAFIAH BIN AMIR HUSSEIN**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (✓)

☐ SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)

☐ TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

☐ TIDAK TERHAD

Disahkan oleh:

_____   _____

Alamat Tetap:

No 159 Lorong megah 9, Taman Megah,

KM 12 Jalan Lintas Labuk, 90000

Sandakan, Sabah.

Tarikh: _____

Cop Rasmi:

** Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this report title "Industry Monitoring Using GSM" is the results of my own research except as cited in references.

Signature   : …………………………………………………………
Author's Name : MOHD HANAFIAH BIN AMIR HUSSEIN
Date   :…………………………

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfilment of the requirements for the award of Bachelor of Engineering Technology (Telecommunication) with Hours. The member of the supervisory is as follow

……………………………………………………………

(PUAN WAN HASZERILA BINTI WAN HASSAN)

ABSTRAK

Laporan projek ini menerangkan tentang pelaksanaan pemantauan industri menggunakan sistem GSM. Rangka kerja ini bertujuan untuk membantu dan memberi bantuan bagi memenuhi keperluan juruteknik atau orang yang bertugas mengendalikan automasi berat. Tambahan, idea bagi alat pemantauan industri menggunakan sistem GSM ini dapat meningkat tahap kesedaran di tempat kerja. Asas kepada sistem pemberitahuan ini menggunakan alat GSM memberi akses untuk memberitahu perkara kepada seseorang menggunakan telefon mudah alih dari jauh. Sistem ini tidak menggantikan suis elektrik yang sedia ada dan memberi pengawalan yang selamat kepada suis dengan suis yang menggunakan voltan rendah. Status suis disegerakkan dimana mana dan setelah itu setiap orang tunjukkan perantara muka dengan status suis yang sedia ada. Sistem ini direka bentuk untuk memantau alat elektrikal dan juga mekanikal melalui semua industri dengan pemasangan dan juga reka bentuk yang kos efektif dengan penggunaan yang mudah.

ABSTRACT

This project presents implementation of industry monitoring by using GSM module. This framework is created to help and to satisfy the needs of technician or person in charge in the industry with heavy automation. Additionally, the idea of industry monitoring by using GSM system is that it will improve the awareness at workplace. The fundamental notification system uses a GSM device gives access to notify a person by using mobile phones remotely. The system design will provides a safer control over the switches with low voltage usage technique and it does not remove the existing electrical switches. The switches status are synchronized everywhere then each person interface demonstrates the current existing switch status. This system is designed for monitoring electrical and mechanical devices in the industries area with ease of installing it, cost effective design and ease of use.

DEDICATIONS

Special dedicated to

My beloved father and beloved mother,

To my family, lectures and friends

For whom after all mighty Allah I owe my success

Thanks for all the encouragement and support

viii

ACKNOLEDGEMENT

Alhamdulillah, praised to Allah, finally the Bachelor Degree Project (BDP) is completed with eased of the difficulty and cleared the obscurity for me to fulfil this final year project.

Firstly, It has been my honour to be a student under Madam Wan Haszerila Binti Wan Hassan supervision and also I would like to thank her my final year project as a supervisor for the guidance, support and encouragement she provided to me throughout the entire duration while I was doing and preparing my biggest project yet which is my Bachelor Degree Project (BDP).

I would also like to take a moment thank my academic supervisor, Mr Farees Ezwan Bin Mohd Sani @ Ariffin for the support and throughout my four years as an Electrical-Electronics Engineering student whenever I needed him.

Lastly, I would like to thank my Mother, Father, siblings, family and colleagues for the constant encouragement and constant support that they gave me throughout the entire period as a university student.

TABLE OF CONTENT

CHAPTER 3: METHODOLOGY

CHAPTER 4: RESULT AND DISCUSSION

CHAPTER 5: CONCLUSION AND FUTURE WORK

REFERENCES

APPENDICES

A Gantt Chart

B Program coding

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

Cm	-	Centimetre
DC	-	Direct Current
Hz	-	Hertz
IO	-	Input Output
LCD	-	Liquid Crystal Display
RPM	-	Rotation per Minute
TTL	-	Transistor-Transistor Logic
GSM	-	Global System For Mobile Communication
GPRS	-	General Packet Radio Service
LDR	-	Light Dependent Resistor
V	-	Volt
OS	-	Operating System
m	-	Meter
us	-	Micro Second
mA	-	mili Ampere
m/s	-	meter per second
%	-	Percentage
<	-	less than
°	-	degree

CHAPTER 1

INTRODUCTION

1.1   Project Background

Global System Mobile communication is the most popular telecommunication system standard before entering VoIP era. Every mobile phone or smartphone are equipped with GSM for basic voice communication and also for receiving text messages. The advantages of using GSM as a notification in the industries equipment with heavy automation is it can avoid danger if something unwanted happens. Industry monitoring using GSM uses wireless medium to stay connected where Arduino uses to control the sensor reading then feed the Arduino with data to stay alert.

Industrial monitoring includes the real time of detecting accident or hazards that might occur immediately and resolves it instantly, the ability to monitor in the industrial facility gives the industrial capability to continuously insure the health of environment and welfare of the person in the facility. The only way to insure confidence in an unmonitored facility system is to provide a monitoring system which will notify and shut down the facility if some unwanted event occur. This includes not only testing the protective sensors, but also testing the overall protection and monitoring system which will reach to the end user which is human to take action on the event.

In this modern era, mobile phone or smartphone is a must have to stay connected and also to get the latest information. By using mobile phone any person are getting messages or notification faster anywhere, so it is the suitable medium between the sensors in this project and human to get notify. GSM is used for this project because the reception of the signal for this type of communication is better than the newer technology GPRS and also the latest technology 4G.

1.2 Problem Statement

In every department of industries and facilities it will involve a big area of heavy automation and equipment where the technician were not enough to provide full monitoring and checking for all the equipment and machineries thus leads to a situation where any equipment and machineries could not be check and maintenance properly leads to human and machine error.

1.3 Objective of the study

The objectives are as follow:

1. To understand the GSM module and Arduino for industries.
2. To design an Industry Monitoring using GSM system.
3. To analyse the performance of the Industry Monitoring using GSM system.

1.4 Scope of the study

This project is about industrial equipment monitoring, where it is suitable to be used in the area like industries with heavy automation equipment. The focus is to prevent further damage in the equipment if any accidents happens. Furthermore, it will also help human in detecting problems on the equipment faster and resolve it quickly once they get the notification from the GSM module on the circuit thus reducing human and machine error. Arduino Atmega328 is used for controlling sensors, relay, and the GSM modem. This project uses both software and hardware components. For the software part, it will apply for activation of the components and also run the application of GSM's for the connection between equipment and human. The message will be send and notify to the person in charge on the area if any particular problem detected for further action taken. For the hardware part, it will use three sensor which is gas sensor to detect gas leakage, temperature sensor to detect the operating temperature of the equipment and light sensor to detect light illumination in the area other than Arduino Uno is used as controlling the process for the whole device, then there are also other several devices that will also be used.

The limitation of the project:

- This project are focus on the industry with heavy automation with equipment that turned on for long hours of time.
- This system will operate when any of three sensors trigger or exceed the maximum level, thus GSM will send the message to the person in charge at that area.
- This system will only send the message as a warning to the person in charge and shutdown the machine or equipment as a precaution if sensors is trigger.

1.5 Significance of this study

This study will be undertaken to create a system which is low cost, easy to create, and will benefit both the manufacturer and the client. Industry monitoring using GSM system is a system where it will help the manufacturer by making it easier and cheaper to apply, and it will also benefit the clients by making it cost effective. The most important advantage is that it will make the workplace a safer place for the workers especially for the one who attend the machinery and the maintenance.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

In this chapter, it will cover and discuss about the component that will be use and the previous researches that uses the component for Industry monitoring using GSM. From the previous research there are rough information regards to the Industry monitoring using GSM, it also utilize different methods, material and experiment design to overcome the problem in industry heavy equipment. Other than that this chapter will include writing about the details of GSM system, several type of sensors and Arduino that have been used in the previous researches.

2.2   Gas sensor

Gas sensor is a device that used to detect any change or presence of gases in the area that it detects, it is often used as a detection device for gas leakage or other type of emission and can be interface with various control system such as microcontroller to shut down any system in the area monitored. This sensor is important for detecting mostly any type of gases because there are many types of gases that are harmful to the living life especially human and animal. Arduino uno does not have built in sensor for detecting gases, so a medium for detecting gases is needed for this project. [1] Based on the Portable Equipment for Acquiring Data from New Types of Gas Sensors it stated the equipment described in this journal has been developed as part of a research project which had the aim of developing an "electronic nose" to detect pollutants and explosive gases in very low concentrations (CO, C3H8, NOx, CH4, NH3). In order to obtain such a device, a network of microsensors was manufactured, using micro-miniaturized transducers integrated on a silicon base. The

micro-transducers, are composed of a micro-heater (on the bottom side) and interdigital electrodes (on the top side). They are an order of magnitude more sensitive than "common materials" and are able to detect very small amounts of gas. The network of microsensors was embedded and linked with an electronic equipment that enables a computer interface. Using microsensors integrated with information technology will lead to improving quality and safety microclimate and reduce energy consumption. For this project, two equipment were developed: a laboratory test platform and a portable equipment for outdoor measurements. The aim was that the portable device developed under this project will be more complex, cheaper and easier to use than those on the market. This paper covers the design and development of the portable equipment, which monitors the gas concentrations, stores all the data and makes it available in digital format. Figure 2.2.1 shows the Gas sensor with a model number of MQ-2 which use to detect the concentration of the air particle by referring the air particle level as a threshold.

Figure 2.2.1: Gas Sensor

2.3   Light sensor

Basically, it will generates an output signal which indicates the intensity of the light by measuring spectrum or radiant of energy that exists in a very narrow range of frequencies. This light range extent from visible light to Infrared and Ultraviolet light spectrum.

2.3.1 LDR (Light Dependent Resistor)

LDR or Light Dependent Resistor is a gadget whose resistivity is a component of the episode electromagnetic radiation. So they are light delicate gadgets. It otherwise called photograph conductors, photograph conductive cells or essentially photocells. The material for LDR made up of semiconductor making it an electronic segment that is high protection. The normal working standard of LDR is it chips away at the photograph conductivity rule where it is an optical marvel in which it materials conductivity is expanded when light is consumed by the material. The qualities of this sensor is it light ward gadget whose protection is diminished once the light falls and expanded when kept in dull. [2] Based on Optimal light power utilization utilizing LDR sensor it expressed that LDR sensor can be utilized as shrewd lighting framework since it gives the coveted illuminance circulations in real office condition. The framework gives wanted illuminance conveyances at a low electrical power and this was developed and tried in the genuine real office condition. Illuminance sensors were introduced on the workplaces work areas to detect the environment light force and in like manner. The framework gave appropriate lumen by controlling the lighting for reasonable office condition by controlling the lighting shading, and upgrades the power utilization. Operation of the proposed framework is as per the following, after the LDR sensor measures the encompassing's light force, the flag will be in the simple shape, henceforth it will be changed over to advanced and sent to the microcontroller, accordingly the relating of this article towards this task is that, the LDR sensor can be utilized as a sensor for recognizing light intensity of the work environment region.
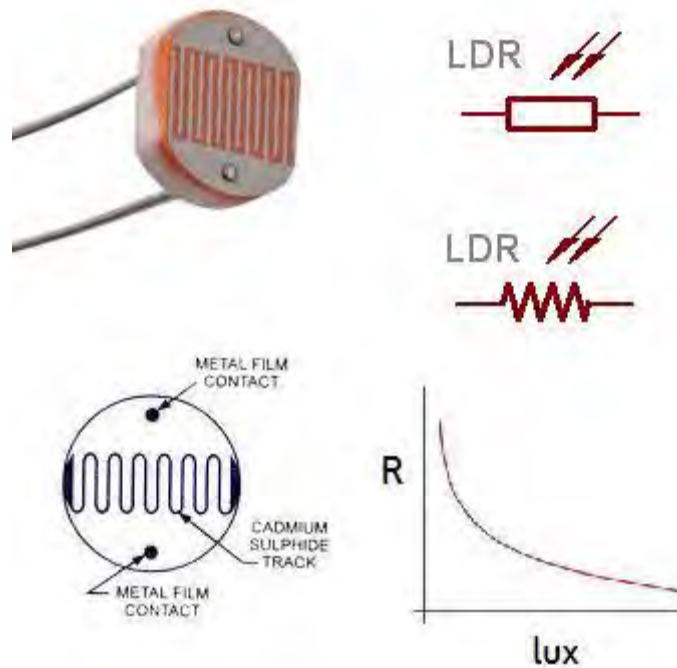
Figure 2.3.1 shows the light dependent resistor actual device
and symbol for the schematic circuit.

2.4   Temperature sensor

In general, a temperature sensor is a gadget which is outlined particularly to
gauge the temperature of a protest accommodates temperature estimation through an
electrical flag. A Thermocouple (T/C) is produced using two disparate metals that
create electrical voltage in guide extent to changes in temperature. A RTD (Resistance
Temperature Detector) is a variable resistor that will change its electrical protection in
guide extent to changes in temperature in an exact, repeatable and about direct way.

2.4.1 LM35 temperature sensor

The LM35 arrangement are accuracy coordinated – circuit temperature
sensors, whose yield voltage is relative to the Celsius (Centigrade)
temperature. The LM35 in this way has leverage over straight temperature
sensors adjusted in 0 Kelvin, as the client isn't required to subtract a substantial
steady voltage from its yield to get helpful Centigrade scaling. The LM35 does
not require any outer alignment or trimming to give normal accuracy of +_-

1/40C at room temperature and +-8/40C over a full - 55 to +1500C temperature extend. Ease is guaranteed by trimming and adjustment at the wafer level. The LM35's low yield impedance, straight yield, and exact natural adjustment make interfacing to readout or control hardware particularly simple. It can be utilized with single power supplies, or with in addition to and less supplies. As it draws just 60μA from its supply, it has low self-warming, under 0.10 in still air. The LM35 is appraised to work over a - 550 to +1500 temperature extend.

2.5   GSM module

GSM (Global system for mobile communication) is a cellular network. GSM arrange works in four diverse recurrence ranges. The transmission control in the handset is constrained at the highest of 2 watts GSM 850/900/300 and 1watt of every 1800/1900. Most GSM works in 900 MHz or 1800 MHz recurrence groups.. The longest separation the GSM particular backings in useful utilize is 35Km (22 mi). In this project, SIM900A is utilized for based GSM modem to get and send short message to client and framework.

2.5.1 GSM SIM900A

The SIM900A is a total Dual-band GSM/GPRS arrangement in a SMT module which can be implanted in the client applications enabling you to profit by little measurements and financially savvy arrangements. Highlighting an industry-standard interface, the SIM900A conveys GSM/GPRS 900/1800MHz execution for voice, SMS, Data, and Fax in a little shape factor and with low power utilization. With a small setup of 24mm x 24mm x 3 mm, SIM900A can fit all the space prerequisites in your applications, particularly for thin and smaller request of outline. Figure 2.5.1 demonstrates the illustration picture of the genuine GSM SIM 900A that will be use in the task as a specialized gadget.

Figure 2.5.1: GSM SIM 900A

2.6 Relay

It is a device which permit a low-control circuit to switch a moderately high current on and off, or to control flags that must be electrically separated from the controlling circuit itself. Newcomers or beginner to electronic hardware in some cases need to utilize a relay for this kind of use and uncertain about the points of interest of doing as such. Fundamental operation to influence a relay to work, you to need to pass a reasonable 'draw in' and 'holding' current (DC) through its energized coil. By and large relay coils are intended to work from a specific supply voltage frequently 12V or 5V, on account of a large number of the little transfers utilized for gadgets application.

2.7 Arduino Uno Board

The Arduino Uno board is an electronic device which that can be easily programmed. For the Arduino board to function, programmed or software that is built specifically for Arduino which is IDE is needed to operate the microcontroller. There many type of Arduino board but for this type of board it is different from all preceding boards where it does not use the FTDI USB-to-serial driver chip. The Arduino philosophy is based on designing, it is continues for the search of faster and more powerful ways to build a better prototypes techniques then developed ways of thinking with our hands [3][4].

9

Arduino is open source system which depends on a microcontroller board and a consolidated improvement condition for the board to be modified. Arduino picks up a couple of contributions, for instance, switches or sensors and control a couple of numerous yields, for instance, lights, motor and others. Arduino program can be run on Windows, Macintosh and Linux operating system (OS) inverse to most microcontrollers' systems which run just on Windows. Arduino writing computer programs is anything but difficult to learn and apply to tenderfoots and beginners. Arduino is an instrument used to manufacture a superior rendition of a PC which can control, associate and sense more than an ordinary personal computer. It's an open-source physical handling stage centered on a clear microcontroller board, and a domain for forming programs for the board. Arduino can be used to make intuitive things, taking contributions from a different gathering of switches or sensors, and controlling an arrangement of lights, motors, and other physical yields. Arduino exercises can stay lone, or they can be related with programs running on your machine (Flash, Processing and Maxmsp.) The board can be amassed by hand or purchased preassembled; the open-source IDE can be downloaded for nothing out of pocket [5].

Based on figure 2.7.1 on the interactive device, all of the objects that are built by utilizing Arduino take after an extremely straightforward example that we call the "Intelligent Device". This intelligent gadget is essentially an electronic gadget or circuit that can detect the earth utilizing sensors (hardware segments that change over genuine estimations into electric signs). The gadget forms data it gets from the sensors with conduct that is actualized as programming. The gadget at that point have the capacity to associate with the world by utilizing actuators (essentially human).