



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DIGITAL STOPWATCH WATER CROPS WITH GSM

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

by

AHMAD LOTFFI BIN ZAKARIA

B071210273

920114-03-5343

FACULTY OF ENGINEERING TECHNOLOGY

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DECLARATION

“I hereby, declare that this ‘Digital Stopwatch Water Crops With GSM’ report is result of my own effort except for works that have been cited clearly in the references.”

Signature :

Name : **Ahmad Lotffi Bin Zakaria**

Matric Number : **B071210273**

Date :

APPROVAL

“I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the quality for Bachelor of Electronic Engineering (Telecommunications) With Honours”

Signature :

Supervisor’s Name : **Mrs. Ika Dewi Binti Saiful Bahri**

Date :

DEDICATION

Special to my beloved parents and family

ABSTRACT

Watering is the most important cultural practice in daily greenhouse operation. In past few years, there is a rapid growth has been observed in requesting an automatic irrigation system. The automatic watering systems ease the burden of farmer from getting water to plant when they need it. In order to make the gardener works easily, the water crops featured by GSM system is invented. This project uses GSM SIM900A, Arduino UNO, LCD display, a relay and mini water pump which can directly controlled by a user. A GSM module is interfaced with the main microcontroller which is Arduino Uno. A countdown timer will be displayed on the LCD screen display which functioning likes a stopwatch when the irrigation starts. The system can be applied either onto neither small nor large farm field. By using the advantageous system like this, a farmer can save a cost, can avoid the water from be wasted besides can increase the production of the crops.

ABSTRAK

Penyiraman adalah amalan yang paling penting budaya dalam operasi rumah hijau setiap hari. Dalam tahun-tahun kebelakangan ini, terdapat pertumbuhan yang pesat telah diperhatikan dalam meminta sistem pengairan automatik. Sistem penyiraman automatik meringankan beban petani dari mendapatkan air kepada tumbuhan apabila mereka memerlukannya. Dalam usaha untuk membuat kerja-kerja tukang kebun dengan mudah, tanaman air dipaparkan oleh sistem GSM adalah dicipta. Projek ini menggunakan GSM SIM900A, Arduino UNO, paparan LCD, geganti dan pam air mini yang boleh dikawal secara langsung oleh pengguna. Satu modul GSM muka dengan mikropengawal utama iaitu Arduino Uno. A pemasa undur akan dipaparkan pada skrin paparan LCD yang berfungsi seperti jam randik apabila pengairan bermula. Sistem ini boleh digunakan sama ada keatas kawasan pertanian kecil atau besar. Dengan menggunakan sistem berfaedah seperti ini, seorang petani boleh menjimatkan kos, boleh mengelakkan air daripada menjadi sia-sia selain dapat meningkatkan pengeluaran tanaman.

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LIST OF SYMBOLS AND ABBREVIATIONS

GDP	=	Gross Domestic Product
GSM	=	Global System for Mobile
TDMA	=	Time Division Multiple Access
CDMA	=	Code Division Multiple Access
GPRS	=	General Packet Radio Service
TTL	=	Time-To-Live
TTP	=	Transmission Control Protocol
IP	=	Internet Protocol
USART	=	Universal Synchronous Asynchronous Receiver and Transmitter
SMA	=	SubMiniature version A
SIM	=	(Subscriber Identity Module
LED	=	Light Emitting Diode
EEPROM	=	Electrically Erasable Programmable Read-Only Memory
RFID	=	Radio Frequency Identification

CHAPTER 1

INTRODUCTION

1.0 Introduction

Nowadays, a research related to a wireless technology for an automatic watering system has become a top research with the greenhouse effect plus a continuous increasing request in agriculture requires an emerge enhancement in crops production technology. As I know, agriculture is very important sector of Malaysia's economy by contributing 15 percent to the national GDP. And there are several factors which affecting the agriculture sector such as Labour, Finance, Technology and Markets. The technology such as machine and irrigation is very important in this sector as it can increase the production of yields. Irrigation is needed to supply enough water for the growth of crops. Water is supplied within a prescribed time depends on the type of crop and the condition of soil. This project is focus on the automatic crops watering system powered by Global System for Mobile (GSM).

1.1 Project Background

A digital stopwatch is designed to measure the amount of the time elapsed from a particular time when it is activated to the time when the piece is deactivated. For this project, the digital stopwatch is designed to be controlled by GSM system which can be controlled in long distance and anytime. GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its

own time slot. It operates at either the 900 MHz or 1800 MHz frequency band. It can be used in agriculture field which can triggering irrigation equipment to ensure the crops is always in good condition and keep its freshness. It is the most important part in the agriculture field. It is because plants need large quantities of water for growth. The most important factor driving water movement in plants is a process known as transpiration. Transpiration is the loss of water from plants in the form of vapor (evaporation). Plants utilize most of the water absorbed from the soil for transpiration (95%), but a small portion of the water absorbed is used during photosynthesis for producing the carbohydrates necessary for plant growth (5%). The rate of transpiration is dependent on water availability within the plant (and soil) and on sufficient energy to vaporize water. Most energy supporting transpiration is derived directly from the sun (solar radiation). Sunny, hot weather increases the rate of transpiration and thus the risk for wilting if adequate water is not available. Thus this system can help a human to watering the crops whenever it needs water.

1.2 Problem Statement

The workers in farming field did not perform their job well and did skip their duty causes the production of the crops decrease, wasting water when they irrigate but did not monitor and wasting a cost when hired a workers with bad attitude

1.3 Objective

This project will be able to :

1. To implement crops watering system equipped with GSM that can be controlled in a long distance.
2. The system should regulate water.
3. The crops watering system should operate on 5-12 volt DC power supply.
4. To minimize a using of physical effort and distress.

1.4 Scope of Project

This project is to design a system which is can be controlled in long distance and in easiest way which is just by sending a message to the watering equipment to enable it to watering a corps or not. It is called a Global System of Communication mobile (GSM) system which enable farmer to digitize and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. Besides, it also can saving a farmers time as the watering equipment can be turn ON and OFF by using a single hand phone. So the farmers does not have to rushing to triggering the ON and OFF button of watering equipment and the same time a farmers can do another work. Other than that, this project also can increase the efficiency of watering crops and system as a farmer can set the specific time when the crops will be watered and the water is sufficiently supplied to the crops.

CHAPTER 2

LITERATURE REVIEWS

2.0 Introduction

Literature reviews are all about carried out the information for whole project in order to completing this project. The sources that been used was from previous projects done by scientist and other such as books, journal and article where we obtained from the library and internet. This chapter is to introduce about the projects that build in Stopwatch Water Crops Using GSM.

2.1 GSM SIM900A (Campus Component Pvt. Ltd, 2011)



Figure 2.1 : GSM SIM900A

Global System for Mobile (GSM) or General Packet Radio Service (GPRS) TTL – Modem is SIM900 Quad-band GSM or GPRS device which works on frequencies 850 MHz, 900 MHz, 1800 MHz and 1900 MHz. It is very compact in size and easy to use as plug in GSM Modem. The Modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows user to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051, etc.) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, etc.). The baud rate can be configurable from 9600- 115200 bps through AT (Attention) commands. This GSM or GPRS TTL Modem has internal TCP/IP stack to enable User to connect with internet through GPRS feature. It is suitable for SMS as well as data transfer application in mobile phone to mobile phone interface.

The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature serial communication. Its features is Quad Band GSM/GPRS : 850 / 900 / 1800 / 1900 MHz. It also built in RS232 to TTL or viceversa logic converter (MAX232) and configurable baud rate. It is SMA (SubMiniature version A) connector with GSM L type antenna beside had built in SIM (Subscriber Identity Module) Card holder and built in network status LED also. Its inbuilt Powerful TCP / IP (Transfer Control Protocol / Internet Protocol) stack for internet data transfer through GPRS (General Packet Radio Service). Have an Audio Interface Connectors (Audio in and Audio out). The Most Status and Controlling pins are available. Its normal operation temperature is -20 °C to +55 °C and its input voltage is between 5V to 12V DC. It has LDB9 connector (Serial Port) which provided for easy interfacing. For this project, the GSM were used to give an instruction wherever farmer is.

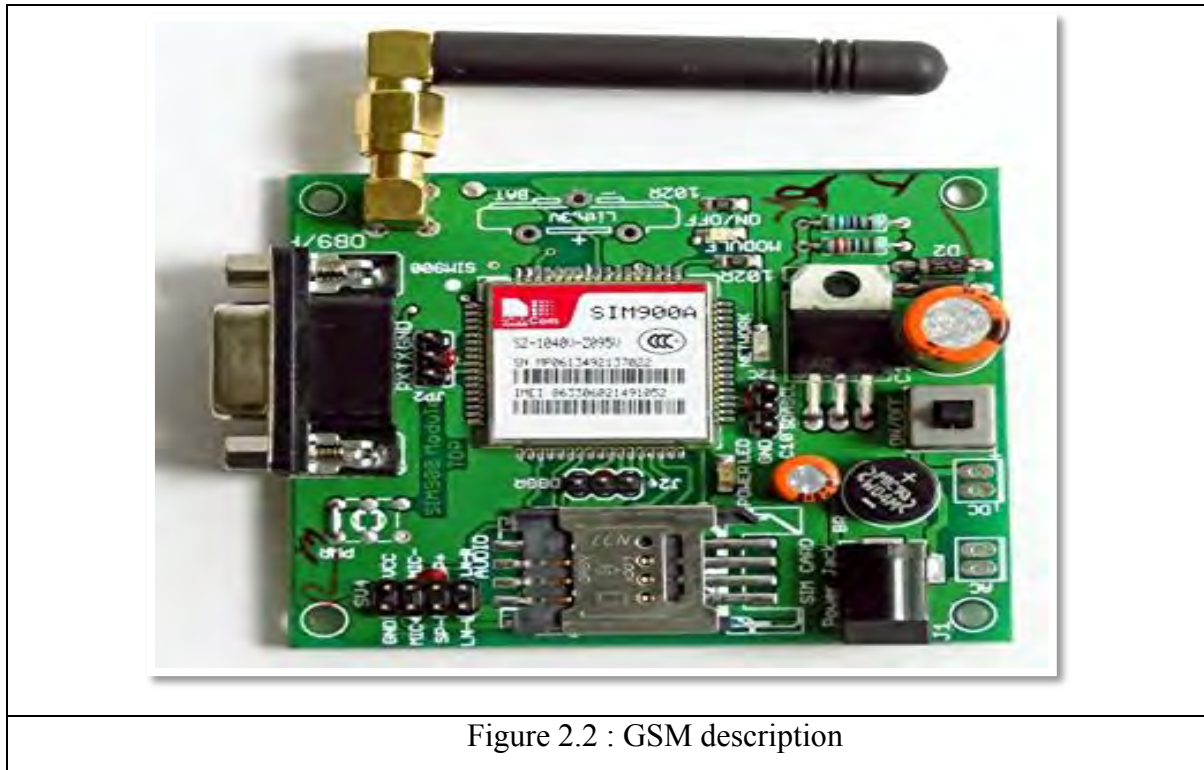


Figure 2.2 : GSM description

2.1.1 SIMCom SIM900A GSM Module

This is actual SIM900 GSM module which is manufactured by SIMCom. Designed for global market, SIM900 is a quad-band GSM/GPRS engine that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM900 features GPRS multislot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 24mm x 24mm x 3mm, SIM900 can meet almost all the space requirements in User's applications, such as M2M, smart phone, PDA and other mobile devices.



Figure 2.3 : SIMCom SIM900A GSM Module

2.1.2 MAX232 IC

The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits, so that devices works on TTL logic can share the data with devices connected through Serial port (DB9 Connector).



Figure 2.4 : MAX232 IC

2.1.3 Serial port / DB9 connector

User just needs to attach RS232 cable here so that it can be connected to a device which has Serial port / DB9 Connector.

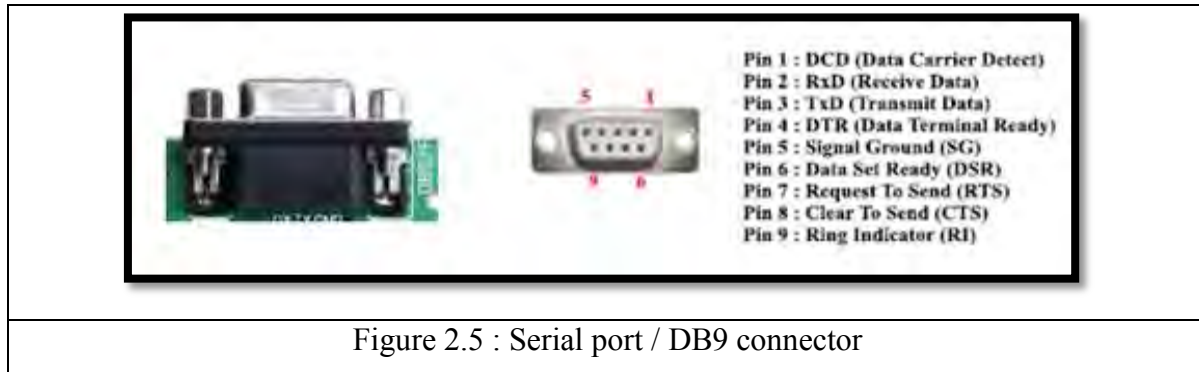


Figure 2.5 : Serial port / DB9 connector

2.1.4 Power Supply Socket

This power supply socket which actually named as AC/DC Socket provides the functionality to user to connect external power supply from transformer, battery or adapter through DC jack. User can provide maximum of 12V AC/DC power supply through AC/DC socket. This is power supply designed into maximum protection consideration so that it can even prevent reverse polarity DC power supply as well as DC conversion from AC power Supply. It also includes LM317 Voltage Regulator which provides an output voltage adjustable over a1.2V to 37V.