PC BASED MOTOR CONTROL WITH SMS APPLICATION

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Dedicated to my beloved family especially my father and mother, lecturer, and also to all my friends

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ABSTRACT

PC-based motor control with SMS (Short Message Service) application is a system created to control the speed and direction of DC and AC motor by sending a specific SMS from mobile phone. The objective of this project is to bring conveniences to the motor user that can control the motor anywhere by using this SMS application. To achieve the objective, LabVIEW is used to design a virtual instrument for front panel. By using the design panel, the message send by the user can be display on the screen of PC for monitoring purpose. Upon to it, the speed and direction of AC motor and DC motor can be control by the design front panel with SMS notification. To implement this, GSM modem is used to connect LabVIEW front panel to receive the SMS from mobile phone. The utilization of GSM modem in this project as it ubiquity standard which enable subscribers to use their phones in many parts of the world, and make international roaming very common between mobile phone operators. This system is extremely handy and convenience to operate at any place by controlling the speed and direction of motor. AT command is used to control the function of the modem. Apart from that, data acquisition module (USB-6221) is used for real time monitoring and interfacing between hardware and software. Then, the physical value was converts to the readable data by front panel.

ABSTRAK

PC-based motor control with SMS (Short Message Service) application merupakan satu sistem yang dicipta untuk mengawal kelajuan dan arah memusing motor dengan penghantaran satu spesifikasi *Short Message Service (SMS)* melalui telefon bimbit. Objektif sistem ini adalah untuk membawa kemudahan kepada pengguna motor yang boleh mengawal motor di mana-mana tempat dengan mengguanakan applikasi SMS. Sebagai langkah untuk mencapai objektif projek, *LabVIEW* digunakan sebagai aturcara bergrafik untuk mencipta panel paparan peralatan maya. Oleh itu, mesej yang dihatar oleh pengguna dapat dipaparkan pada komputer untuk tujuan pengawasan. Setelah itu, kelajuan dan arah memusing motor dapat dikawal dengan menggunakan panel paparan *LabVIEW* melalui sistem *SMS*. Untuk melaksanakanya, satu *GSM modem* dihubungkan dengan panel paparan *LabVIEW* di mana ia boleh menerima *SMS* daripada satu rujukan nombor telefon bimbit. Projek ini memilih untuk menggunakan *GSM modem* kerana ia merupakan satu peralatan komunikasi yang mudah diperolehi di merata tempat. Ini adalah untuk membolehkan manusia berhubung antara satu sama lain dengan menggunakan telefon bimbit yang sedia ada di dunia ini. Sistem ini boleh dikawal dari jauh di mana manusia boleh mengawal kelajuan dan arah memusing motor tanpa menggunakan wayar. *AT commands* merupakan satu kod isyarat kawalan yang membolehkan *modem* tersebut berfungsi. Di samping itu, *Data Acquisition Module* (USB-6221) digunakan untuk pengawasan masa nyata dan ia merupakan pengantaramuka di antara perisian dan perkakasan supaya nilai-nilai fizikal yang diukur dapat ditukarkan ke bentuk data yang dapat dibaca melalui panel paparan.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

xiv

xv

LIST OF ABBREVIATION

PC	-	Personal Computer
VI	-	Virtual Instrument
LabVIEW	-	Laboratory Virtual Instrumentation Engineering Workbench
DAQ	-	Data Acquisition
NI	-	National Instrument
AC	-	Alternating Current
DC	-	Direct Current
GSM	-	Global System for Mobile
SMS	-	Short Message Service
PWM	-	Pulse Width Modulation
I/O	-	Input/ Output
USB	-	Universal Serial Bus
RPM	-	Revolution Per Minute

LIST OF APPENDIX

CHAPTER I

INTRODUCTION

This chapter will give reader a basic introduction to how the idea of this project generated. The chapter contains introduction, objective of the project, problem statement, scopes of work, brief methodology, and report structure.

1.1 Introduction PC-Based Motor Control System with SMS Application

At the end of August 2000, there were a total number of 6.3 million GSM (Global System for Mobile communications) users in the world. GSM technology makes it possible to wirelessly communicate, monitor and control nearly every aspect of a modern business and is regarded as the technology of the future. GSM monitoring and control is a new technology era [13].

SMS Control Systems (Pty) Ltd specializes in the application of the locally developed and operationally stable Cell secure and global remote GSM technologies which make it possible to monitor and control agricultural and industrial applications using SMS (Short Message Service). A potential user only need to use his cell phone

(any type or brand, only contract phones) in order to monitor and control agricultural and industrial applications.

The systems from SMS Control Systems which incorporate the GSM technology operate by sending and receiving SMS.

This project is an upgraded version of the current project. Current project only achieved up controlling the speed and direction of DC and AC motor on the screen of PC. In order to improve current project, GSM modem will be implemented to send notification via SMS to control the speed and direction of DC and AC motor. This project is to develop a PC-based motor control by using SMS (Short Message Service) application.

This developed system controls the PWM signal by using NI LabVIEW software and NI DAQ device (USB-6221) to monitor digitally and control the duty cycle as well as display the exact speed of the rotation. Besides, the GSM modem and mobile phone support the use of AT commands to send, receive and read SMS messages to monitor and control the DC and AC motor. The system can be used to monitor and control agricultural and industrial application using SMS (Short Message Service). Besides, this wireless system also can be monitoring and controls the motor in anytime, anywhere just by send a SMS. Furthermore, this wireless system can be save the cost for the wiring machine.
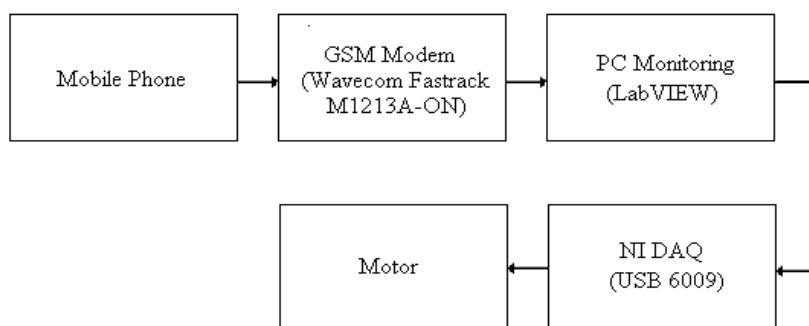
Figure 1.1: System Block Diagram

1.2   Objectives

The main purposed of this project are to design PC-Based Motor Control System via SMS system. Therefore, the objectives as below should be achieved. The objectives that need to be achieved at the end of project are:

i. To upgrade the current project PC-Based Motor Speed and Direction with SMS Application.

ii. To bring conveniences to the motor user that can control the motor anywhere by using this SMS application.

1.3   Problem Statement

This project is an upgraded version of the current project. Current project only achieved up controlling the speed and direction of DC and AC motor on the screen of PC. In order to improve current project, GSM modem will be implemented to send notification via SMS to control the speed and direction of DC and AC motor. By these GSM technologies which can make it possible to monitor and control agricultural and industrial application using SMS (Short Message Service). Besides, this wireless system also can be monitoring and controls the motor in anytime, anywhere by send a SMS. Besides, the wireless system can be save the cost for the wiring machine.

**1.4   Scope of Work**

The scopes of works in this project are:

i. Front panel:

This project use NI LabVIEW programming, and the front panel of virtual instrument is created and simulated by this software. This graphical

programming language can be used to handle data acquisition in easier way compared to text based programming language.

ii. DAQ

The data acquisition module, NI DAQ (USB 6009) device is used for real time monitoring and it provides interfacing between hardware and software. The NI USB-6009 is a USB-based data acquisition (DAQ) and control device with analog input and output and digital input and output.

iii. GSM Modem

GSM modem is used to interface between the PC and the mobile phone. AT commands is used for controlling the functionality of modem.

iv. Interfacing

Process interfacing and debugging will be repeated until the hardware and software are been interfaced correctly.

1.5   Report Structure

This thesis is a documented report of the ideas generated, the theories and concepts applied, the activities performed and the final product of this project produced. The thesis consists of five chapters and each chapter is described as below:

Chapter 1 is the introduction of PC-Based motor control with SMS Application. The block diagram gave the general ideas on this project. In addition, objectives, problem statement of the project and the report structure is included as well.

Chapter 2 is a literature review on theoretical concepts applied in this project. The chapter concludes the background study of LabView, PC-based motor control system. Besides that, this chapter also explains how the PC-based motor control with SMS notification work, what is LabVIEW, what is DAQ, what is GSM modem and application of others component. Then, why choose the specific DAQ, GSM modem, and related components.

Chapter 3 is the introduction of methodology for the project, design flow and construction of the project. Brief description is given about each procedure in the completion of the project.

Chapter 4 shows overall result and discussion of the result as well as the comparison with the conventional method. The developed LabVIEW Virtual Instrument front panels, the created LabVIEW block diagrams about the project are shown in order to strengthen the result.

Chapter 5 is the final part of the thesis which concludes the Final Year Project. This chapter includes the application of the project and the recommendation that can be implemented for future references.

CHAPTER II

LITERATURE REVIEW

This chapter is a literature review on theoretical concepts applied in this project. The chapter concludes the background study of PC-based Motor Control system. Besides that, this chapter also explains why need to improve the PC-based motor control system to becomes a system can be using SMS notification work, what is LabVIEW, what is DAQ, what is GSM modem and application of others component. Then, why choose the specific DAQ, GSM modem, and related components.

2.1 Introduction

Literature reviews are based in information obtained from valid sources such as books, articles of relevance, published paper or any other source deemed appropriate. One of the more famous sources for literature reviews from IEEE, denoting the Institute of Electrical and Electronics Engineers which is based in New York, USA. The forms of literature include standards of practice, proceeding paper or conference papers such as those from the Power Engineering Conference.

2.2   Improvement of Current Project

This project is an improvement of the current project, the table below show the comparison between the current project and the improved current project.

Table 2.1: Comparison of the Current Project and the improved Current Project

Current Project	Improve Current Project
• Only can control the speed of motor in front of the control PC.	• Can control the motor via SMS application anytime and anywhere.

Current project only achieved up controlling the speed and direction of DC and AC motor on the screen of PC. In order to improve current project, GSM modem will be implemented to send notification via SMS to control the speed and direction of DC and AC motor. This project is to develop a PC-based motor control by using SMS Short Message Service) application.

2.3   Introduction to SMS

SMS appeared on the wireless scene in 1991 in Europe. The European standard for digital wireless, now known as the Global System for Mobile Communications (GSM),   included   short   messaging   services   from   the   outset.

In North America, SMS was made available initially on digital wireless networks built by early pioneers such as BellSouth Mobility, PrimeCo, and Nextel, among others. These digital wireless networks are based on GSM, code division multiple access

(CDMA), and time division multiple access (TDMA) standards.

Network consolidation from mergers and acquisitions has resulted in large wireless networks having nationwide or international coverage and sometimes supporting more than one wireless technology. These new classes of service provider's demands network-grade products that can easily provide a uniform solution, enable ease of operation and administration, and accommodate existing subscriber capacity, message throughput, future growth, and services reliably. Short messaging service center (SMSC) solutions based on an intelligent network (IN) approach are well suited to satisfy these requirements, while adding all the benefits of IN implementations.

SMS provides a mechanism for transmitting short messages to and from wireless devices. The service makes use of an SMSC, which acts as a store-and-forward system for short messages. The wireless network provides the mechanisms required to find the destination station(s) and transports short messages between the SMSCs and wireless stations. In contrast to other existing text-message transmission services such as alphanumeric paging, the service elements are designed to provide guaranteed delivery of text messages to the destination. Additionally, SMS supports several input mechanisms that allow interconnection with different message sources and destinations.

2.3.1 SMS Applications

SMS was initially designed to support limited-size messages, mostly notifications and numeric or alphanumeric pages. While these applications are and will continue to be widely used, there are more recent niches that SMS still can exploit.

Short bursts of data are at the heart of many applications that were restricted to the world of data networks with fixed terminals attached to a local-area network (LAN) or wide-area network (WAN). However, many of these applications are better served if the data communication capabilities could be added to the mobility of the station. Thus,