"Microcontroller Based Switching Control of Dc Motor Using Gsm Modem"

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Abstract: *The system which can work only when we want is defined as switching control system. The system which can controlled only when we required is known as controlled system otherwise, it is known as uncontrolled machine. This paper is about make this switching control system efficient and dynamic. As the name suggested the switching control is for controlling the motor from remote place, look over its operating conditions; get feedback from the motor itself. Our objective is to control the motor from distant place by mobile SMS and also get feedback by SMS while it is in ON or OFF condition. GSM network is everywhere in our country and also in the world that's why we choose GSM network to operate our motor also the GSM network is used as channel or communicator between user and machine. The GSM network, itself a combination of wide range of different components. By using GSM network, the cost of extra networking equipment is reduced. The automatically generated feedback signal at the motor end got by GSM modem and sent feedback to the user. The feedback sent by SMS because it is very easy to generate SMS by mobile station and send feedback SMS by Modem as well. In industrial sector we hope our project is become handy and cost effective to operate motor and give its protection.*

Keywords: *Gsm Modem, Lcd, Microcontroller, Motor, Motor Driver, Power Supply.*

I. Introduction

"Microcontroller based Switching Control System of DC Motor Using GSM Module" implements the emerging applications of the GSM technology. Using GSM networks, a control system has been proposed that will act as an embedded system which can monitor and control appliances and other devices locally using built-in input and output peripherals. Remotely the system allows the user to effectively monitor and control the house/office appliances and equipment via the mobile phone set by sending commands in the form of SMS messages and receiving the appliances status. The main concept behind the project is receiving the sent SMS and processing it further as required to perform several operations. The type of the operation to be performed depends on the nature of the SMS sent. The principle in which the project is based is fairly simple. First, the sent SMS is stored and polled from the receiver mobile station and then the required control signal is generated and sent to the intermediate hardware that we have designed according to the command received in form of the sent message.

We have selected a particular GSM SIM 300 MODEM for our proposed project. The messages are sent from the mobile set that contains commands in written form. Which are received by the GSM modem? The messages are converted in Hex which is transferred serially through RS232 to the Microcontroller then processed accordingly to perform the required task. A microcontroller based system has been proposed for our project, so it can take decision according requirement to maintain speed. There are several terminologies that are used extensively throughout this project report.

1.   **GSM (Global System for Mobile Communications):** It is a cellular communication standard.
2.   **SMS (Short Message Service):** It is a service available on most digital mobile phones that permit the sending of short messages (also known as text messaging

II. System Architecture

In figure 1 we can see that microcontroller is the heart of this system. SMS can be used as control signal which can be generated by any GSM Mobile of any service provider with no or very less cost. There is no need to design extra equipment for networking due to GSM technology. The GSM is itself a system and we can find GSM network anywhere in country and world. Only we need to design the GSM modem which is used as receiver as well as the transmitter. The SMS sent by the user is converted in hex and decoded by the microcontroller to generate the proper signal which is required to control the DC motor. The decoded message is first displayed on the LCD. After that control action signal is generated by the microcontroller for controlling the motor operation. The system also sends feedback to user. The block diagram of whole system is shown below.
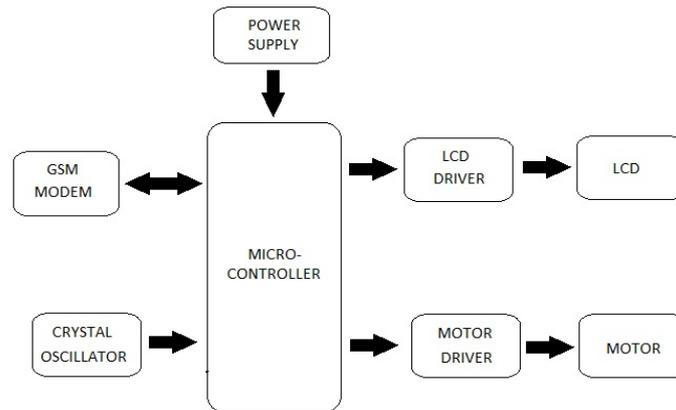
Figure 1 Block Diagram of Project.

III. System Hardware

1. AT89S52 Microcontroller
2. GSM Technology
3. SIM 300 GSM modem
4. GSM Mobile
5. LCD 16x2
6. Power Supply
7. Motor
8. Motor Driver
9. Software (Proteus and Keil)

1. AT89S52Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control .

2. GSM Technology

GSM is a global system for mobile communication GSM is an international digital cellular telecommunication. The GSM standard was released by ETSI (European standard Telecommunication standard) in 1989. The main feature of GSM technology is that is provides the mobility to user. Due to this factor the GSM was most widely adopted and fast growing digital cellular standard. The first commercial services were launched in 1991.After launching the service; it was limited to some providers (Government) only. So that lack of a common mobile system was seen to be a general. But when it free from the government and the private companies are involved then it rapidly grew. And the rate of users of GSM was increased very fast.

Today's providers are using the encryption to provide more secure service. In this network the frequency which has utilized, can be use repeated for the different area. So that frequencies can be used in limited amount. By expanding the GSM network, different type of services are introduced such as SMS, MMS, and Data etc. On the basis of limitation of frequencies the GSM network has known as GSM 900, GSM 1800 and GSM 1900.
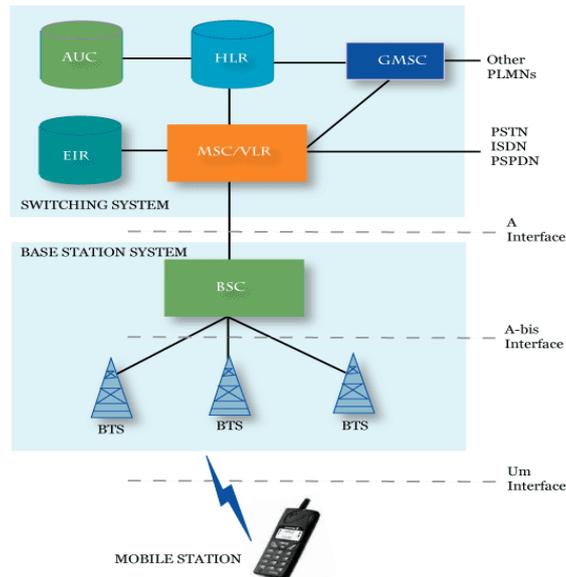
Figure 2: Block Diagram of GSM Network

3.   SIM 300 GSM Modem

This is Modem is prepared with the GSM 300 module which offers the AT's command. AT's command used to perform different operation available in this module. By using AT's command we can send SMS and can call someone. This is just like a GSM mobile only difference is that it has only basic function. It can accept any GSM network operator SIM card. The SIM card of this modem also has unique number for different operator SIM. A MAX232 IC is inserted in this modem which is used for RS232 port. This port offers a serial communication between the Modem and Embedded system and computer. It can be used to send and receive SMS or make/receive voice calls through the microcontroller or by using computer. This GSM modem is a highly flexible plug and play quad band GSM modem for direct and easy integration to RS232 applications. Supports features like Voice, SMS, Data/Fax, GPRS and integrated TCP/IP stack.

Figure 3: GSM Module sim (300)

Features:-
• 		Highly Reliable for 24x7 operation with Matched Antenna
• 		Status of Modem Indicated by LED
• 		Simple to Use & Low Cost
• 		Quad Band Modem supports all GSM operator SIM cards
Applications:-
• 		SMS based Remote Control & Alerts
• 		Security Applications
• 		Sensor Monitoring
• 		GPRS Mode Remote Data Logging

4. Regulated power supply

A regulated power supply is an electronic circuit that is designed to provide a constant dc voltage of predetermined value across load terminals irrespective of ac mains fluctuations or voltage variations.

A regulated power supply essentially consists of an ordinary power supply and a voltage regulating device. The output from the ordinary power supply is fed to the voltage regulating device that provides the final output. The output voltage remains constants irrespective of variations in the ac input voltage or variations in output (or load) current.
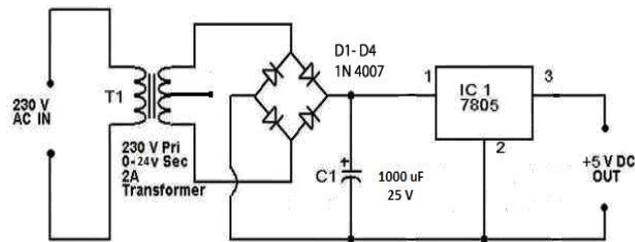

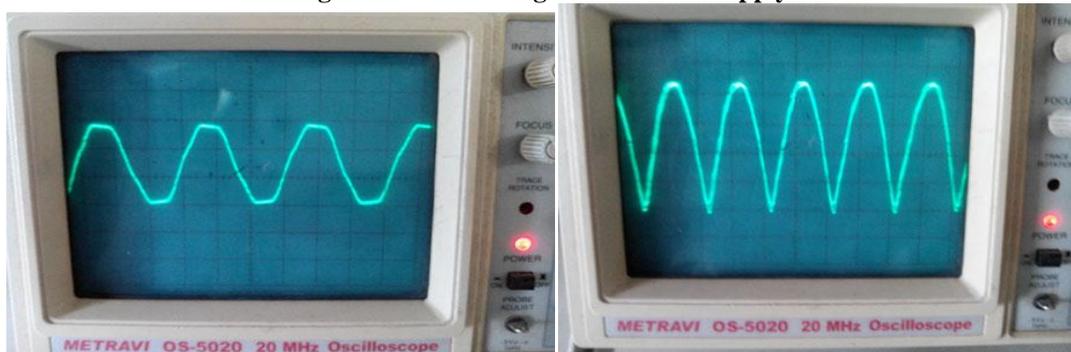
Figure 4: Circuit Diagram of Power Supply

Figure 5: Graph after TransformerFigure 6:Graph after Bridge Rectifier

5. Dc Motor

In the DC machine the rotating part is known as armature. The winding through which a current is passed and produce the main flux is called the field winding. Most of the DC motors are PM types. To perform basic operation by any electrical machine three major factors are necessary

i. Conductor
ii. Magnetic flux
iii. Relative motion between conductor & flux

6. Software

Proteus:

Proteus is most popular software used for simulation. There are many software available but no anyone user friendly and simple. Proteus offers a user friendly environment. It also offers a variety range of the microcontrollers, electrical components, electronics components and other connecting components. Proteus offers the platform where different components are arranged or connected according to the circuit diagram and PCB layout can be created as per the proposed project. After the arranging the component the simulation operation perform and the errors are identified and rectified. The architecture of the Proteus has been made according to different user. There is no requirement of extra equipment and lab facilities because it is implemented this facilities itself. The graphical view and the different wave form can be seen in this software. The size of this software is not more than 200 MB and system requirement is also less, so it can use in different computer and laptop very easily.

Keil:

Keil is software based on the microcontroller. It is globally popular software. It also offers simulation but it has limitation in simulation and library of components. The architecture of this software is designed for microcontroller. This offers the assembly language as well as the C language Programming. The Proteus doesn't have this type of compiler based on C language. This is an advantage over Proteus and also a most important feature of this software.
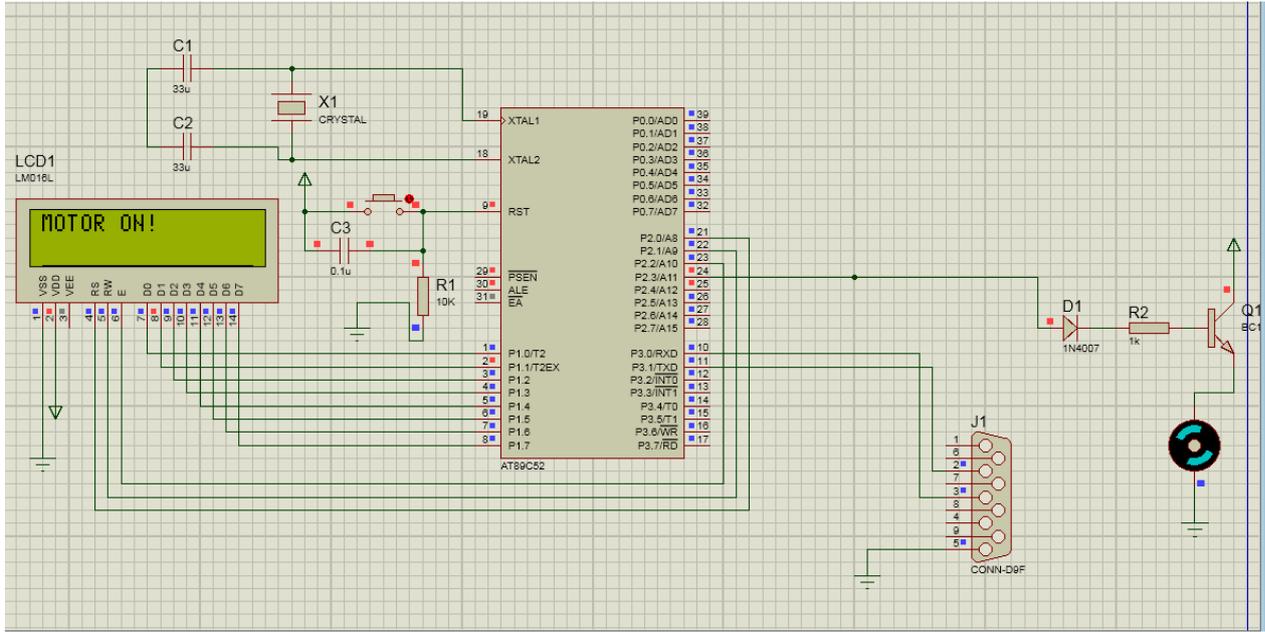
Figure 7: Proteus Simulation

IV.   Simulation Result

The simulation is done in the Proteus software to see that the program written for the circuit is working properly. This is easiest way to check the circuit arrangement and compatibility of the software.In the above fig, the microcontroller is connected to d-type connector which is connected to GSM modem. The driver for the motor is very simple. The motor operated by using PWM pulse. PWM wave generate very less harmonics. So that it is best for control signal.

When a SMS is sent by the mobile then SMS is decoded by the GSM modem. The signal is sent serially by using D-connector. Then Microcontroller generate control signal. The generated signal displayed on LCD and after delay of 1 sec the Motor is operated.The PWM signal which is generated by the Microcontroller is shown below
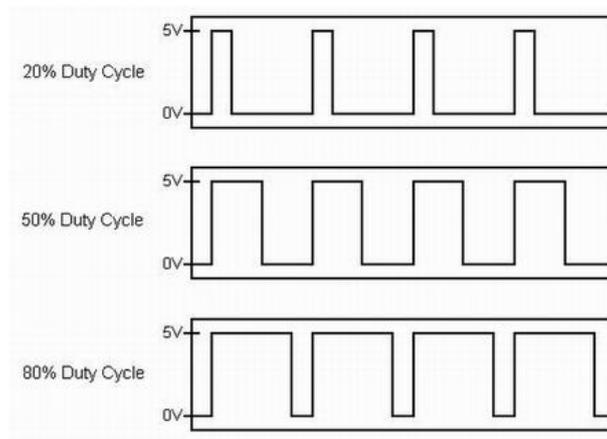

Figure 8: PWM Wave form

The 20% duty cycle is applied for slow speed and by increasing the duty cycle we can increase the speed of the motor.

V.   Conclusion

After successfully completion of this project, the whole simulated project is drawn on the project board by using hardware. The hardware was connected through the single core wire. Power supply of the circuit is switch ON. After the initialising of the microcontroller and GSM Modem, A Motor ON signal is sent through the mobile. The "Motor ON" were written in LCD first and after 2 sec motor started. Microcontroller done this work properly and also responds to the other code, sent by mobile. After completion of last task Microcontroller is waiting for next SMS or Code

Hence a modest attempt is made to bring in a low cost and effective switching control of DC motor. The major advantage of this system is that the whole work can be made with a very less investment and can be used in anywhere and thus bringing in less sophisticated and simple technology. It concludes that DC motor can be controlled by using simple mobile. There is only we required very less equipment.

VI.   Future Scope

This project has very large scope and can be used in different field. We can implement this project in industries, Where manpower and Time are more crucial resources. The implementation of purposed project with single phase and three phase machine can make better and effective work. Only some changes are required in the Motor Driver. And then large machine can be easily controlled by using simple mobile.In college where student left the lights and fans switched ON. So that there is manpower required who have to go room to room to switched off lights and fans. But by installing this project he can turn OFF power of whole building by using only a mobile.

We know that protection device for Electrical Device is much more costly. One of these devices is transformer. Transformers are installed at the generation end and also at the distribution end. The protection for the generation end available but at the distribution end it is difficult due to large number of transformer. But by some changing in this we can use it as relay which detect temperature rise of transformer. The rise in temperature may be caused by fault. So that it sends signal to operator and it can trip the transformer

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