

# Speed Control of DC Motor using Mobile Phone (GSM)

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**Abstract**—An armature voltage control is used to control the supplied voltage of an armature of a 2kw separately excited DC motor. A buckregulator is used to vary the supplied voltage of the motor. A pulse width modulation (PWM) generator is implemented to supply the signal to the gate of the switch of the buck regulator. A series or cascade compensator is placed to control the duty cyclone of the pulse width modulation (PWM) generator in the closed loop control system. Pulse width modulation has one additional advantage which is that the pulse reaches the full supply voltage. It will produce more torque in a motor easily overcome motor resistance.SST 433 MHZ transmitter and STR 433MHZ receiver are the RF module used here.AT the end of the transmitter, four switches are provided to control the speed and direction of the DC motor which is located at the receiver side.

## **INTRODUCTION :**

This system is designed to control the speed and direction of DC motor using ARM-7.For speed control we used ARM-7 processor. DC motor is electronic motor and voltage of DC motor is directly proportional to the speed and hence if we increase the voltage level of motor, speed is also increased. DC motor is controlled to the ARM processor. Speed of DC motor

or control direction of DC motor can be achieved bychanging the duty cycle.

In real time development control system design technique is very useful.in domestic and industrial purpose DC motors are widely used. DC motor can be used in various applications and also can be used in various size and rates. In this system, we are going to control the speed and direction of dc motors. Productivity of material can be increased by increasing the speed of DC motor.

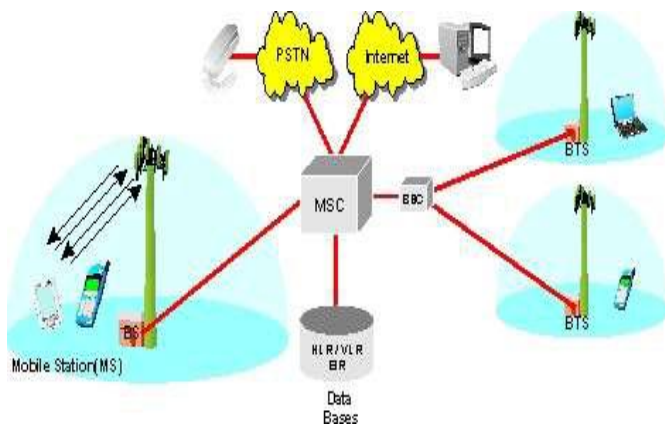
As per our requirements we control speed & this can be achieved by using ARM-7.In this, firstly supply voltage is given to the ARM- microprocessor.5V DC pulse is generated by processor which is called PWM signal.PWMsignals then given to the driver circuit.Funtion of driver circuit is generate 12V DC pulse and this is necessary to switch or trigger the MOSFET.Using duty cycle speed of DC motor is control. In this control system we used MATLAB software for speed and direction control of DC motor.

DC motors are used in different ways as per their performance. For example the DC motor is used as anapplication for automobiles, boats, computers, airplanestractation motors, and printers. DC motors are strongly needed in the extensive usage of DC motors in different applications.

## INTRODUCTION TO GSM :

Global system for mobile communication (GSM) is a **wide area wireless communications** system that uses digital radio transmission to provide voice, data, and multimedia communication services. A GSM system **coordinates** the communication between a mobile telephones (**mobile stations**), **base stations** (cell sites), and **switching systems**. Each GSM radio channel is 200 kHz wide channels that are further divided into frames that hold 8 time slots. GSM was originally named Groupe Special Mobile. The GSM system includes mobile telephones (mobile stations), radio towers (base stations), and interconnecting switching systems.

This figure shows an overview of a GSM radio system. This diagram shows that the GSM system includes mobile communication devices that communicate through base stations (BS) and a mobile switching center (MSC) to connect to other mobile telephones, public telephones, or to the Internet. This diagram shows that the MSC connects to databases of customers. This example shows that the GSM system mobile devices can include mobile telephones or data communication devices such as laptop computers.



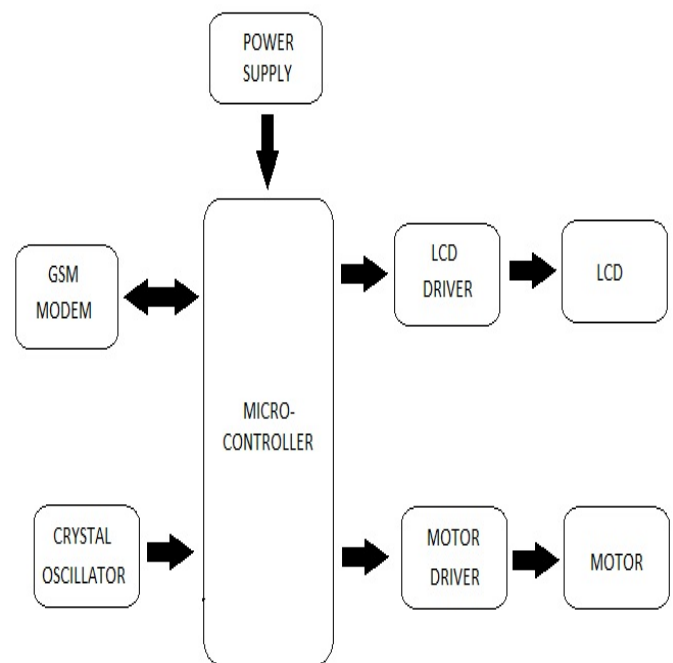
**Fig.1:Global System for Mobile Communication - GSM System Diagram**

## 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.

## BLOCK DIAGRAM:

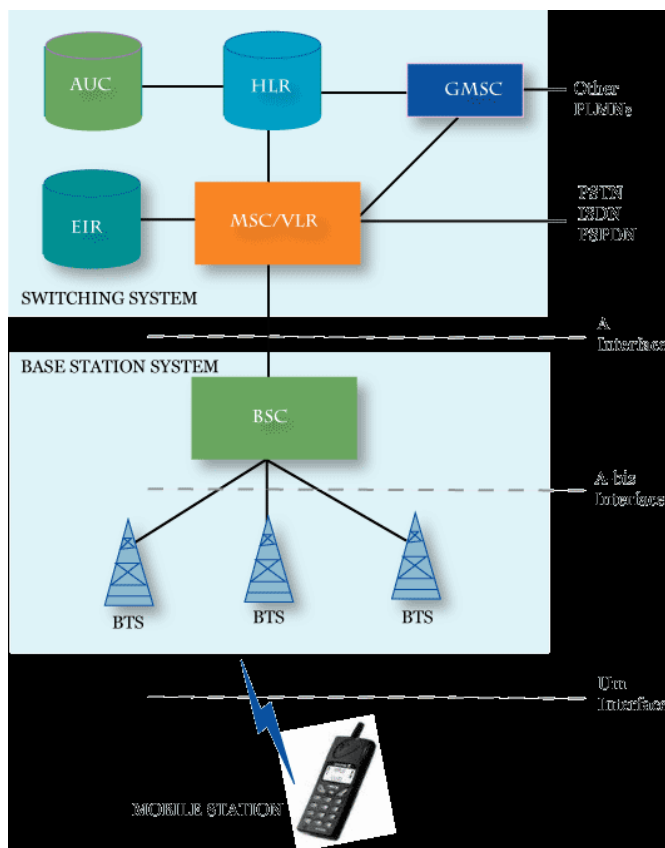


**Fig 2: Block Diagram of Speed Control Of DC Motor**

## 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 it 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.



**Figure 3: Block Diagram of GSM Network**

### SIM 300 GSM Modem :

This Modem is prepared with the GSM300 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.

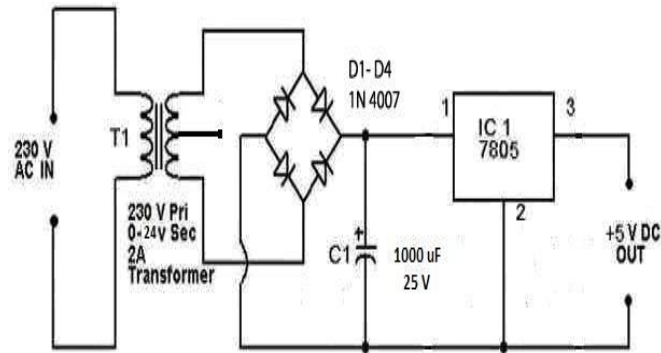


**Figure 4: GSM Module sim (300)**

### 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 current.



**Fig 5: Circuit Diagram of Power Supply**

### 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

### WORKING :

The binary form of amplitude modulation is on off keying(OOK).As he fully supressing the carrier the transmitter is off and the logical 0(data line low) should be sent at that time. IN this form the transmitter current in this form the transmitter current is very low i.e. less than 1MA at the stage when logical is sent the carrier must be fully on as the modulecurrent consumption goes highest about 11MA with a 3v power supply.

For the remote control application where power consumption and cost are the primary factors the on off keying method is to be used Hence they transmit a 0, the transmitter draws no power they exhibits significantly better power consumption than the fsk transmitter. As the high oscillators which have very stable centrefrequencies they take longer to start up than low Q oscillators. The oscillator can send a maximum data rate.

### ADVANTAGES :

- Control of speed and direction by remote
- LCD displays speed level and direction
- Errors related with humans are minimized
- Human related risks are eliminated
- Time variant and cost effective
- It is highly reliable and consumes less Power.
- Installation of operation is easy.

### APPLICATION:

Process, control, inventory tracking, data links and bar code reading devices are used for RF solutions in the industries.

Security and access systems, gate control, remote activation, score board and paging systems these are the commercial wireless applications.

Wireless remote control, remote keyless entry and safety applications these are employed RF by the automotive companies.

Gate and garage door openers, home security are known as consumer products.

Medical products-

1. patient call and monitoring
2. surgery communication system
3. ECG monitor
4. Handicap assistance device
5. Remote patient data logging

Uses-

1. Domestic and industrial application

2. In mines and geological department for explosives
3. R&D department
4. in process control industries
5. for handicapped people.

## 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.

## 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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