

## Wireless Industrial Machine Speed Control using GSM

**<sup>1</sup>Kethe Umamaheshwari; <sup>2</sup>G. Santhosh Reddy & <sup>3</sup>M. Shyam sundar**

1. M.Tech, SVS Institute of Technology, Warangal, Hasanparthy, Bheemaram, Hanamkonda, Telangana 506015.
2. Asst. Prof, SVS Institute of Technology, Warangal, Hasanparthy, Bheemaram, Hanamkonda, Telangana 506015.
3. Associate Prof, SVS Institute of Technology, Warangal, Hasanparthy, Bheemaram, Hanamkonda, Telangana 506015.

### **ABSTRACT—**

*In many industry such as paper mills, rolling mills, printing machine machine tools, excavators and cranes etc the dc motor is used for waying a product from one place to another on the conveyer belt . So due to these the speed and direction control of the dc motor is very important. purpose. Motor speed controller is to take a signal representing the required speed and to drive a motor at that speed For that purpose wireless speed and direction control of dc motor by radio frequency technique is very crucial with pulse width modulation and H-Bridge converter. The microcontroller is used to control the dc motor speed and Transistorised h-bridge converter is used for direction control. By adjusting the duty cycle of pulse from Pulse Width Modulation technique simultaneously the terminal voltage of motor is change and hence speed will be vary with terminal voltage. H-Bridge is a DC to DC converter used for direction and made by 4 transistor switch across it a diode are connected. This system is designed to bring convenience to the user to control the motor speed from anywhere by using SMS application.*

### **I. INTRODUCTION :**

For speed control of dc motor many methods are available which are either be a mechanical or electrical for example armature control, field control, flux control method etc but this methods required large size hardware to implement. So for

easy control of speed and the direction control of dc motor the wireless speed and direction control of dc motor by using radio frequency technique is very much essential and economical to used. For variable dc voltage we can used a controlled rectifiers which are converted a variable dc voltage from fixed dc voltage. Due to their ability to supply a continuously variable dc voltage. Many analoge and digital chips are used in firing or controlling circuits but transistor and thyristor control are more accessible due to their innumerable application in various industry. Recent development in the area of semiconductor technology have made faster ,very small size microprocessors and microcontroller are available at in much reduced cost. The microcontroller can provide a controlling of width of pulse provide to a controlling a voltage of motor terminal simultaneously the speed of motor can controlled. For that purpose the Pulse Width Modulation phenomena is used for controlling the width of pulse. Pulse Width Modulation variable speed drives are fast applied in various new industrial application that required higher performance, reliable ,easy control as well as economical purpose. In most of the application sinusoidal Pulse Width Modulation have been used. For direction control of dc motor we can simply change the input terminal of dc motor the direction will be change but this is not possible at running time as well as not safety operation. So for these direction control of dc motor we can

used a H-Bridge circuit. It is made up from four transistor switches. Hence the microcontroller can send a signal to constant voltage supply and h-bridge can control the direction of dc motor.

## ARM7

The ARM7 family includes the ARM7TDMI, ARM7TDMI-S, ARM720T, and ARM7EJ-S processors. The ARM7TDMI core is the industry's most widely used 32-bit embedded RISC microprocessor solution. Optimized for cost and power-sensitive applications, the ARM7TDMI solution provides the low power consumption, small size, and high performance needed in portable, embedded applications.

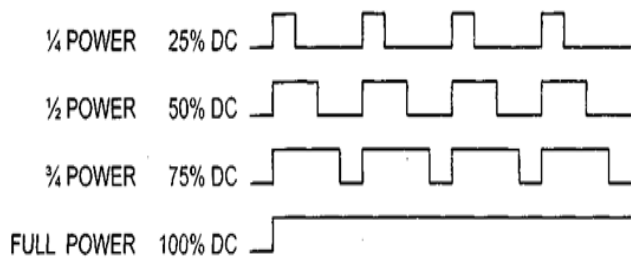
The ARM7EJ-S processor is a synthesizable core that provides all the benefits of the ARM7TDMI low power consumption, small size, and the thumb instruction set while also incorporating ARM's latest DSP extensions and enabling acceleration of java-based applications. Compatible with the ARM9™, ARM9E™, and ARM10™ families, and Strong-Arm® architecture software written for the ARM7TDMI processor is 100% binary-compatible with other members of the ARM7 family and forwards-compatible with the ARM9, ARM9E, and ARM10 families, as well as products in Intel's Strong ARM and x scale architectures. This gives designers a choice of software-compatible processors with strong price-performance points. Support for the ARM architecture today includes:

- Operating systems such as Windows CE, Linux, palm and SYMBIAN OS.
- More than 40 real-time operating systems, including qnx, Wind River's vxworks and mentor graphics' vrtx.
- Co simulation tools from leading eda vendors

- A variety of software development tools.

## III. Pulse Width Modulation:

PWM is an effective method for adjusting the amount of power delivered to the load. PWM technique allows a very smooth operation and reliable in nature. The microcontroller can generated PWM signal to adjusting the duty cycle of pulse simultaneously the motor terminal voltage can vary with duty cycle and also speed will be a vary. The ratio of on time to off time is called as duty cycle. The desired speed can be obtained by changing the duty cycle. The Pulse-Width-Modulation (PWM) in microcontroller is used to control duty cycle of DC motor drive. PWM is an entirely different approach to controlling the speed of a DC motor. Power is supplied to the motor in square wave of constant voltage but varying pulse-width or duty cycle. Duty cycle refers to the percentage of one cycle during which duty cycle of a continuous train of pulses. Since the frequency is held constant while the on-off time is varied, the duty cycle of PWM is determined by the pulse width. The figure shown below the change of duty cycle of the PWM microcontroller. The microcontroller having a 25% duty cycle then it provide a  $\frac{1}{4}$  of power to the motor, when microcontroller having a 50% duty cycle then microcontroller provide a  $\frac{1}{2}$  of power to the motor, when microcontroller having a 75% duty cycle then microcontroller provide a  $\frac{3}{4}$  of power to the motor and finally the microcontroller provide a 100% duty cycle then microcontroller provide a full power to the motor.



#### IV. H-Bridge

H-Bridge is used for the purpose of the direction control of dc motor. It is made up from four transistor switches. The four transistor are connected in bridge type manner that's why it is

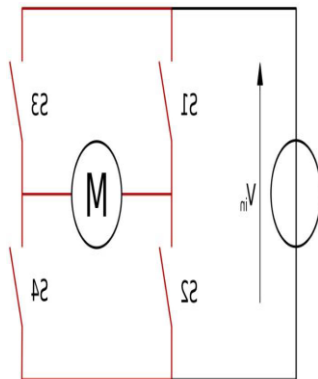


Fig. 2: Circuit diagram H-Bridge

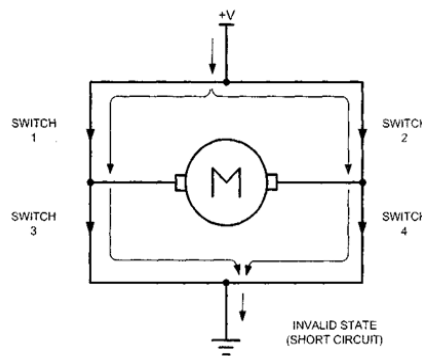


Fig.3: H-Bridge in an Invalid Configuration

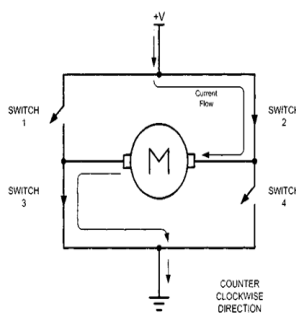


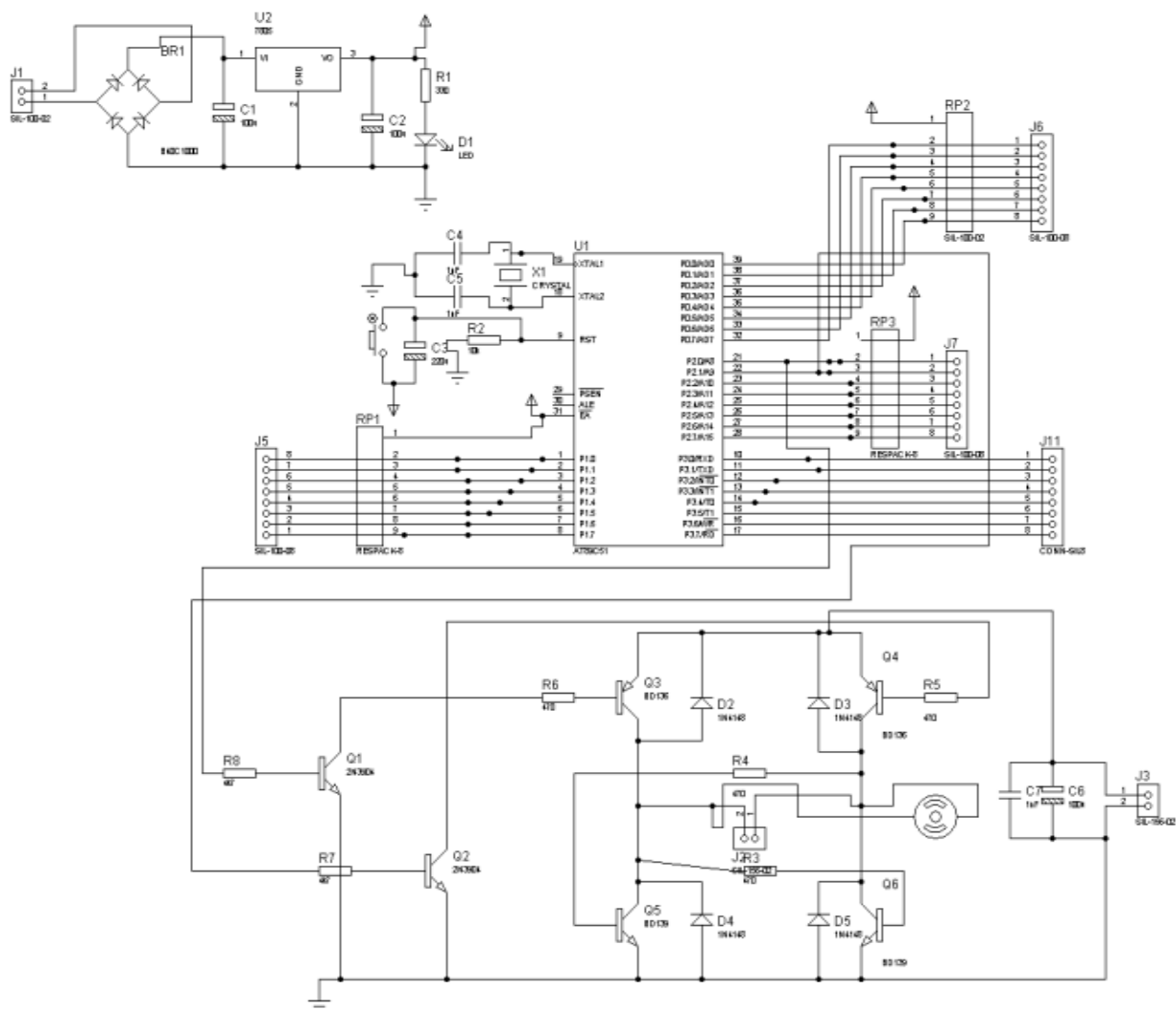
Fig.4: H-Bridge Motor Counter clockwise Configuration

#### V. Wireless Monitoring And Control The software program:

Major role of this project is to receive the SMS to speed control of motor. the wireless transference of industrial monitoring messages discussed in this paper is built on the SMS of the GSM network. Data messages produced at one end of the monitoring system are encapsulated into a short message by the gateway and sent to remote monitoring devices at another end. When a short message is received, it can be

restored to its original industrial form by removing the SMS PDU head. This is also conducted by the gateway of the monitoring system. If needed, the message content can be put into Gateway. In this project we are using the GSM technology. A micro controller (also micro controller unit, MCU or  $\mu C$ ) is a small computer on a single integrated circuit consisting of a relatively simple CPU combined with support functions such as a crystal oscillator, timers and microcontroller control the Induction motor. The LCD will give displays the current operation of the system. The micro controller is used to control the relay drivers depending upon the software program. Major role of this project is to receive the SMS to speed control of dc motor and control of induction motor and control for circuit. Initially the SMS is received from the person authorized to use this setup (destination) by the GSM modem (SIM300 MODEM) & is transferred to the microcontroller

**Circuit Diagram:**



## Conclusion

The speed control and the direction control of the dc motor is achieved from the wireless and radio frequency technology with Pulse Width Modulation and H-Bridge. By using microcontroller programming speed control has been achieved with higher performance, reliable operation, easy control and better protection.

## REFERENCES

[1].A.K.Dewangan,NChakraborty,SShukla,VYadu, “PWM Based Automatic Closed loop Speed Control Of DC Motor”, International Journal of Engineering Trends and Technology, vol.3,pp.110-112.

[2] Muhammad H. Rashid, “Power Electronics Circuits Devices and Applications”, Prentice Hall, publication New Delhi 2008, 3rd edition, pp.226-294.

[3] Shruti Shrivastava, Jageshwar Rawat, Amit Agrawal ,“Controlling DC Motor Using Microcontroller(PIC16F72) With PWM”, International Journal of Engineering Research, Volume No .1,Issue No. 2,pp.45-47.

[4] Sandeep Kumar Singh, Harish Kumar, Kamal Singh, Amit Patel, “A Survey And Study Of Different Types Of PWM Techniques Used In Induction Motor Drive” International Journal of Engineering Science & Advanced Technology, Volume-4, Issue-1, 018-122

[5] I. MOAZZEM, S. RAHMAN, M A MATIN,” Microcontroller based closed-loop automatic speed control of DC motor using PWM”.

[6] 1Jeetender Singh Chauhan, 2Dr. Rajesh Singh, 3Sunil Semwal, 4Shashank Mishra ,”PWM Based Speed Control of DC Geared Motor Using 802.15.4 LAN Standard Protocal”, IJECT Vol. 3, Issue 4, Oct - Dec 2012.