**WIRELESS DC MOTOR SPEED AND DIRECTION CONTROL USING RF COMMUNICATION**

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<th>Title of the project</th>
<th>Wireless DC motor speed and direction control using RF (PWM)</th>
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<td>Domain</td>
<td>Wireless Communication, Electrical &amp; Embedded Design</td>
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<tr>
<td>Software</td>
<td>Embedded C, Keil, Proload</td>
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<td>Microcontroller</td>
<td>AT89S52</td>
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<tr>
<td>Power Supply</td>
<td>+5V, 500mA Regulated Power Supply</td>
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<tr>
<td>Display</td>
<td>16 X 2 LCD</td>
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<tr>
<td>Crystal</td>
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<td>Communication Device</td>
<td>RF Module</td>
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<td>Transmitter</td>
<td>STT – 433MHz</td>
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<tr>
<td>Receiver</td>
<td>STR – 433MHz</td>
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<td>Applications</td>
<td>Industries, Process Control, Domestic and Automotives</td>
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<td>Developed By</td>
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WIRELESS DC MOTOR SPEED AND DIRECTION CONTROL USING RF COMMUNICATION

ABSTRACT:

A pulse width modulator (PWM) is a device that may be used as an efficient DC motor speed controller or light dimmer. This project is a versatile device that can control DC devices which draw up to a few amps of current. The circuit may be used in either 12 or 24 Volt systems with only a few minor wiring changes. This device has been used to control the speed of the DC motor and to control brightness of an automotive tail lamp.

A PWM circuit works by making a square wave with a variable on-to-off ratio, the average on time may be varied from 0 to 100 percent. In this manner, a variable amount of power is transferred to the load. The main advantage of a PWM circuit over a resistive power controller is the efficiency, at a 50% level, the PWM will use about 50% of full power, almost all of which is transferred to the load, a resistive controller at 50% load power would consume about 71% of full power, 50% of the power goes to the load and the other 21% is wasted heating the series resistor.

One additional advantage of pulse width modulation is that the pulses reach the full supply voltage and will produce more torque in a motor by being able to overcome the internal motor resistances more easily.

The RF modules used here are STT-433 MHz Transmitter, STR-433 MHz Receiver, HT640 RF Encoder and HT648 RF Decoder. Four switches are provided
at the transmitter end, to control the speed and direction of the dc motor which is connected at the receiver side. Two push-to-on switches are provided for increasing / decreasing the speed of the motor. Two more push-to-on switches are provided to rotate the motor in Clock wise / Counter clock wise direction.

The four switches are interfaced to the RF transmitter through RF Encoder. The encoder continuously reads the status of the switches, passes the data to the RF transmitter and the transmitter transmits the data. At the receiving end, the RF receiver receives this data, gives it to RF decoder. This decoder converts the single bit data into 8-bit data and presents it to the microcontroller. Now, it is the job of the controller to read the data and perform the corresponding action i.e., to rotate the dc motor clockwise, anticlockwise, increase or decrease the speed of the dc motor.

16X2 LCD is connected at the receiver end to display the speed level of the motor and the direction. LED indication is also provided for visual indication.

This project uses regulated 5V, 500mA & 12V, 500mA power supply. 7805 and 7812 three terminal voltage regulators are used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.
BLOCK DIAGRAM

Transmitter - Wireless DC motor speed and direction control using RF (PWM)

SW1

SW2

SW3

SW4

RF Encoder HT640

RF Transmitter STT - 433

Step down T/F

Bridge Rectifier

Filter Circuit

Regulator

Power supply to all sections
Block Diagram:

Receiver - Wireless DC motor speed and direction control using RF (PWM)
Advantages:
Speed and direction control from remote place
Speed level and direction display on LCD
Reliable and Easy to operate

Scopes for Advancement:
Tachometer can be developed to measure the speed using reed switch

Applications
- Industries are using RF solutions for monitoring, process, control, inventory tracking, data links and bar code reading devices.
- Commercial wireless applications such as door announcers, security and access systems, gate control, remote activation, score board and paging systems.
- Automotive companies employing RF for wireless remote control, remote keyless entry and safety applications.
- Consumer products including electronic toys, home security, gate and garage door openers, intercom, fire and safety systems and irrigation controllers.
- Medical products like patient call and monitoring, handicap assistance device, surgery communication system, remote patient data logging and ECG monitor.