Abstract:
Today most widely used systems are wireless because these systems are less in cost and more efficient than wired systems. In wireless systems we do not use wires so these systems are light in weight and free from line losses i.e. losses due to current flowing in the wires. Wires are easily affected by environmental conditions, so wired systems are not so good. In wireless systems, the data transmitted through the Electromagnetic Waves and these waves are not affected by the environmental conditions. Also the environment is not affected by these waves. Hence this is a eco-friendly method. Today motors are everywhere. In every industry motors are playing a great role. In home appliances motors are playing a common role. So the use of this project will reduce a number of wires which are being used daily. And the reduction in number of wires will reduce the electrical losses.

I. INTRODUCTION
This project is all about the wireless operation of a DC Motor. In this project, we will control the speed of a DC Motor. Direction of the rotation will also be controlled. Wireless facility is provided with the help of Bluetooth connectivity. An android handset is required to control the operation. As the name suggests that “Speed Control of DC Motor with Mobile Phone” is controlling the speed of a DC motor with android handset. Wireless facility is provided with the help of Bluetooth. Various terms related to this project can be discussed as follows. So the question is why should we use a mobile phone? Which is the most suitable mobile phone? So the answer is that mobile is used only for a Bluetooth connection. We need not to carry an extra device for transmitting the data. This transmitter is already built in a mobile phone. Now come with the question of most suitable mobile phone, so it can be observed that Android phones are the most widely used phones. Android phones are very easy from the operating point of view. I-phones and windows phones are not as popular as the Android phones. So the Android phone will be used here. We will use a permanent 12V DC motor. In this motor the stator is of permanent magnet and the rotor consists of winding. A Permanent Magnet DC Motor consists of permanent magnets to produce magnetic field. So field cannot be varied since magnets are fixed. But speed of this type of DC Motor can be varied by varying the Main Supply Voltage. This Supply Voltage can be varied with the help of a microcontroller. We will send command to microcontroller to control the speed. Microcontroller will receive commands from Android Phone by Bluetooth. It will send command to a motor driver IC and this IC will control the speed of the motor. This is true that the microcontroller can run the motor alone but the output of the microcontroller is 5V and this is not sufficient to run the motor. That is why have used the motor driver IC. This IC gets the command from the microcontroller and give output to the motor as 12V. This 12V is sufficient to run the motor. There are 3 main terminals on a motor driver IC to connect with the microcontroller and two output terminals to connect the motor. The project is designed to control the speed of a DC motor using an 8051 series microcontroller with android application device. The speed of a DC motor is directly proportional to the voltage applied across its terminals. Hence, if voltage across motor terminals is varied, then speed can also be varied. This project uses the above principle to control the speed of the motor by varying the duty cycle of the pulse applied to it (known as PWM Control). Remote operation is achieved by any smart phone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation. The project uses Bluetooth Device, interfaced to the microcontroller, which are used to control the speed of the motor. PWM (Pulse Width Modulation) is generated at the output by the microcontroller as per the program. The program can be written in Assembly language or in Embedded C. The average voltage given or the average current flowing through the motor will change depending on the duty cycle (ON and OFF time of the pulses), so the speed of the motor will change. A motor driver IC is interfaced to the microcontroller for receiving PWM signals and delivering output for speed control of a small DC motor. Further the project can be enhanced by using power electronics devices such as IGBTs to achieve speed control higher capacity industrial motors.

II. BLOCK DIAGRAM

[Diagram of the whole system]
This block diagram consists of various blocks included in this system. It is easier to understand the block diagram rather than analysing the whole circuit diagram. So the block diagram shown above has been discussed here to understand the whole operation. The basic need of any system is input power. In this system 230V AC is used as the input power for the system. Now it is necessary to feed the power to every block of the system. The main block is microcontroller which needs only 5V DC. For this a step down transformer is used to step down the voltage.

![Figure 2. Outlook of model Blocks](image1)

After that a bridge rectifier is used to convert AC to DC. And converted DC is regulated at 5V with the help of a voltage regulator IC 7805. This 5V DC is safe to be applied to the microcontroller. Now the second block is related to the motor. The motor needs 12V DC to operate but the output of microcontroller is only 5V DC. Hence a motor driver circuit is used to operate the motor. This motor driver needs 12V DC supply and this 12V DC supply is directly fed from the output of the bridge rectifier because its output is 12V DC. Android device has been used to send the control signal to the microcontroller. When we will click on a button on Android device, the device will execute the command related to that button. This command will be encoded to an electromagnetic signal and sent to the microcontroller with the Bluetooth signal. This encode command will be received at the receiver end of the microcontroller i.e. HC-05 Bluetooth module receiver. Here this command will be decoded to the instructions and these instructions will be sent the microcontroller to perform the related operation. Microcontroller will execute the instruction and send the command to motor driver IC. Microcontroller will send the command to also the LCD. LCD will indicate all the ongoing processes on its display to make the project more user-friendly. Motor driver will receive the signals from the microcontroller and perform the related operation such as to increase the speed and to decrease the and also to convert the direction of rotation. The motor driver will take commands from microcontroller in 5V but it will give the motor 12V. Hence the motor will run successfully.

![Figure 3. 8051 Microcontroller](image2)

### III. COMPONENTS USED

1) **Microcontroller:**
A Microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals.

2) **Bluetooth Module:** The Bluetooth Module is used to communicate between mobile phone and any other device. It is used to send and receive data to/from other device. The other is referring here microcontroller. So Bluetooth Module will communicate here with Android Device. HC-05 Bluetooth module is used here in this project. The Bluetooth Module enables us to communicate between the microcontroller and the Mobile Phone. Many other modules are also available in the market for a better range of wireless operation and good signal strength and also a better connectivity. HC-05 Bluetooth is the most suitable Bluetooth Module because it needs very less power and it is operated only at +5V supply. Connections are very easy because only four terminals are there i.e. two for supply; one is for transmission of data and other is for receiving of data.
3) **Motor Driver IC**: Motor Driver is an Integrated Circuit on a single chip. Microcontrollers work on +5V supply. Motor may need above +5V supply. Motor Driver IC synchronizes the motors with microcontrollers at a higher supply voltage. L298N motor driver is used in this system. Two motors at a time can be connected to this IC.

4) **LCD Display**: LCD Display is used as a monitor for small systems. Also in this system the LCD Display is used as a monitor. This LCD will display the speed of the motor. This is a 16x2 LCD. It will display 16 characters per line in two lines.

### IV. CIRCUIT DIAGRAM

1) **MICROCONTROLLER CIRCUIT**:

![Microcontroller circuit](image)

2) **Bluetooth module connection**:

![Bluetooth module connection diagram](image)

3) **Motor Driver Connection**:

![Motor Driver Connection Diagram](image)

4) **Power Supply Connection**:

![Power Supply Connection Diagram](image)
5) LCD Display Connection:

Figure 12. Power Supply arrangement in project

V. PROGRAMMING

Programmer Boards are available to program the microcontrollers. We write the program in any programming language and this program is needed to be installed into the microcontroller. This installation of program into the microcontroller is known as “Burning the program”. Microcontroller is connected to the programmer board and this board is connected to the Personal Computer.

1) FLOW CHART:

![Flow Chart]

2) Control Algorithm:

Step 1: START
Step 2: L: SCAN FOR BYTE RECEIVED
Step 3: Switch (received Byte)
Step 4: Case 1 ON the motor
Step 5: Case 2 OFF the motor
Step 6: Case 3 Rotate Clockwise
Step 7: Case 4 Rotate Anticlockwise
Step 8: Case 5 Increase the speed
Step 9: Case 6 Decrease the speed
Step 10: Go to L

VI. REFERENCES

[1]. Ajay v Deshmukh, “Microcontroller Theory and Application,”


[5]. www.wikipedia.org

[6]. www.nevonprojects.com