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Wireless Controlling of DC Motor using Android Application

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Abstract: ***The project is designed to develop a four quadrant speed control system for a DC motor. The motor is operated in for quadrants i.e. clockwise; counter clock-wise, forward brake and reverse brake. It also has a future of speed control. The four quadrant operation of the DC motor is best suited for industries where motors are used and as per requirement as they can rotate in clockwise, counter-clockwise and also apply brakes immediately in both the directions. In case of a specific operation in industrial environment, the motor needs to stop immediately. In such scenario, this proposed system is very apt as forward brakes are its integral features. Instantaneous brake in both the directions happens as a result of applying a reverse voltage across the running motor for a brief period and the speed control of the motor can be achieved with the PWM pulses generated by the microcontroller. The microcontroller used in this project is from 8051 family. Remote operation is achieved by any smart-phone/Tablet etc. with Android OS, upon a GUI (Graphical User Interface) based touch screen operation. Bluetooth device is provided to connect with android application device for the operation of the motor which are interfaced to the microcontroller that provides an input signal to it and in turn controls the speed of the motor through a motor driver IC. This project can be enhanced by using higher power electronic devices to operate high capacity DC motors. Regenerative braking for optimizing the power consumption can also be incorporated.***

Keywords: DC Motor, Android Applicaion, Controlling, speed, Bluetooth etc

I. INTRODUCTION

Today most of the industries use DC motors. So, speed controlling of DC motors plays a very vital role. Therefore our paper concentrates on monitoring and controlling the speed of DC motor using Android mobile application, with the help of Bluetooth technology. Smart phones have in-built Bluetooth technology, so and external Bluetooth module is interfaced with the microcontroller unit for wireless communication. The Bluetooth module receives command from the mobile phone android application. So, according to the input signal, with the help of microcontroller, MOSFET can be used to vary the voltage as well as the speed of the DC motor using PWM technique. Direction of the DC motor can also be varied with the help of relay circuit or H-Bridge network. The project is designed to control the speed of a DC motor using an 8051 series microcontroller with android application device.The speed of DC motor is directly proportional to the voltage applied across its terminals.The project is designed to develop a four quadrant speed control system for a DC motor.

The motor is operated in four quadrants i.e. clockwise; counter clock-wise, forward brake and reverse brake. It also has a feature of seed 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 motor. This project can be enhanced by using higher power electronic devices to operate high capacity DC motor. Regenerative braking for optimizing the power consumption can also be incorporated.This project is best suited for industries where motor is used and as per requirement as they can rotate in clockwise, counter clockwise and also apply brakes immediately in both the directions. In case of a specific operation in industrial environment, the motor needs to be stopped immediately. In such scenario, this proposed system is very apt as forward brake and reverse brake are its integral features.Instantaneous brake in both the directions happens as a result of applying a reverse voltage across the running motor for a brief period and the speed control of the motor can be achieved with the PWM pulses generated by the controller. The microcontroller used in this project is from 8051 family. In this project using blue control android apps in an available at play store in android phone and making connection between android app and Bluetooth chip.

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II. BLOCK DIAGRAM

A. The major elements of block diagram are

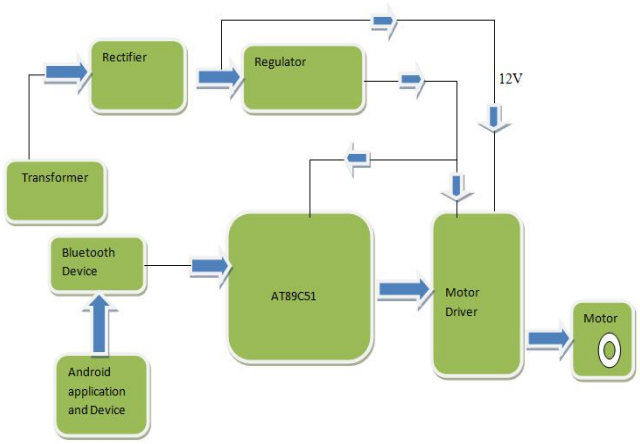


Figure 1: Block Diagram Of Implemented Project

A. Microcontroller: The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. The ATmega328 on the Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer.

B. Bluetooth Module: Bluetooth serial communication module has two work modes: order-response work mode and automatic connection work mode. And there are three work roles at the automatic connection work mode. When the module is at the automatic connection work mode, it will follow the default way set lastly to transmit the data automatically. When the module is at the orderresponse work mode, user can send the AT command to the module to set the control parameters and sent control order. The work mode of this Module can be switched by controlling the module PIN (PIO11) input level. In this project Bluetooth module is used to send signals from the Microcontroller.

C. DC Motor: Almost every mechanical movement that we see around us is accomplished by an electric motor. Electrical machines are used for the converting energy. Motors take electrical energy and produce mechanical energy. Electric motor is used to power hundreds of devices we use in everyday life. An example of small motor applications includes motors used in automobiles, robot, hand power tools and food blenders.

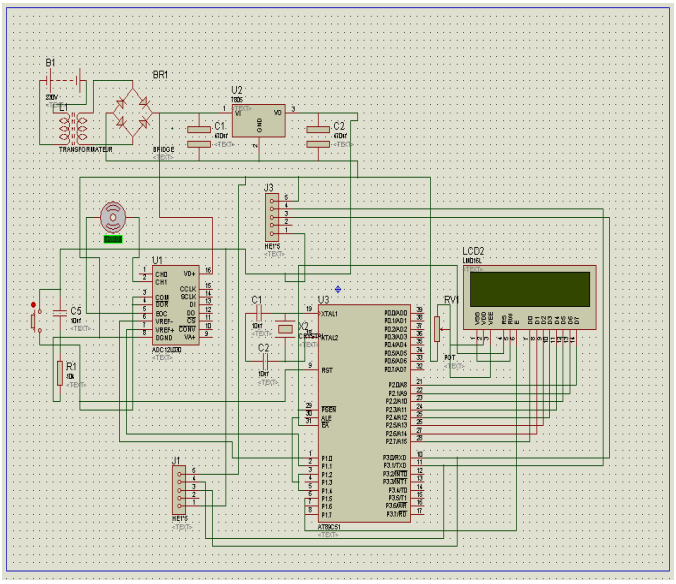


Figure 2: Schematic Diagram of Implemented Project in PROTEUS

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III. WORKING OF IMPLEMENTED PROJECT

Signal from Android device will be sent through Bluetooth. This signal will be communicated with a microcontroller with the help of transmitter and receiver of both the devices. This signal will be represented by a single letter which denotes the speed and direction of the motor. There are three different direction of rotation: clockwise, anti-clockwise and stopping of the motor and these will be represented by different letters. This letter will vary the speed with reference to the Microcontroller code. For forward direction the transistor Q1 and Q4 will be ON and for the reverse direction Q2 and Q3 will ON. Q1 and Q2 are PNP transistors which becomes ON when low signal is sent and Q3 and Q4 are NPN transistors which becomes ON when high signal. PWM pins 5 and 6 are used to control the speed of the in both directions, they use the concept of varying the duty cycle (PWM Technique). Duty cycle varies from 0 - 225. So by choosing different duty cycle speed can be varied. Direction is controlled with the concept of having H-Bridge.

IV. SOFTWARE IMPLEMENTATION: ANDRROID APPLICATION OPERATED BLUETOOTH

A. The Android platform includes support for the Bluetooth network stack, which allows a device to wirelessly exchange data with other Bluetooth devices.
B. The application framework provides access to the Bluetooth functionality through the Android Bluetooth APIs.
C. Make a connection between this app and Bluetooth chip of HC-05 through Bluetooth.
D. Then using this app operates DC motor as our required.
E. First this app seen notification of Bluetooth turn ON (Allow or Deny).
F. After that notify HC-05 is connected to this app through Bluetooth.

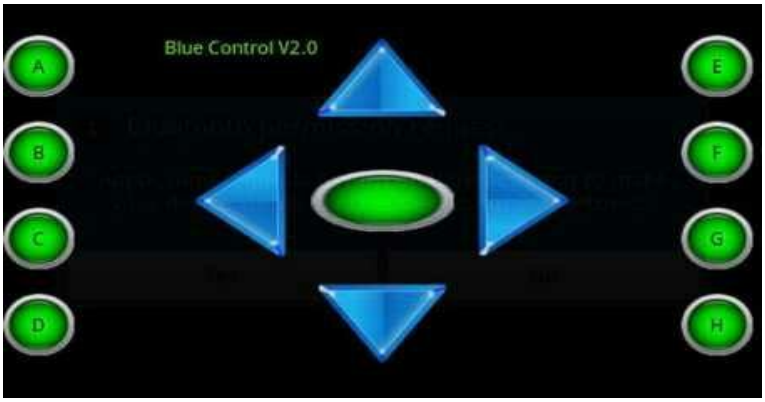
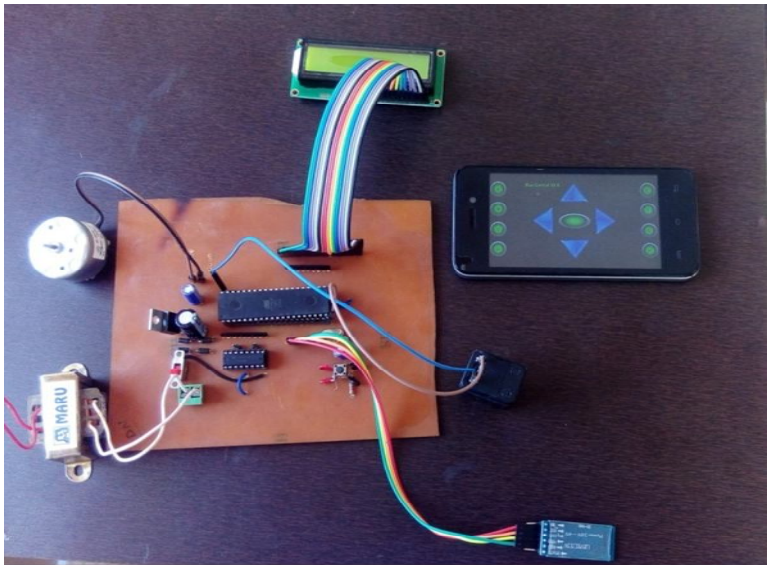


Figure 3 : Android App-Blue-control Software

V. RESULT ANALYSIS


Figure 4 : Android based controlled DC Motor

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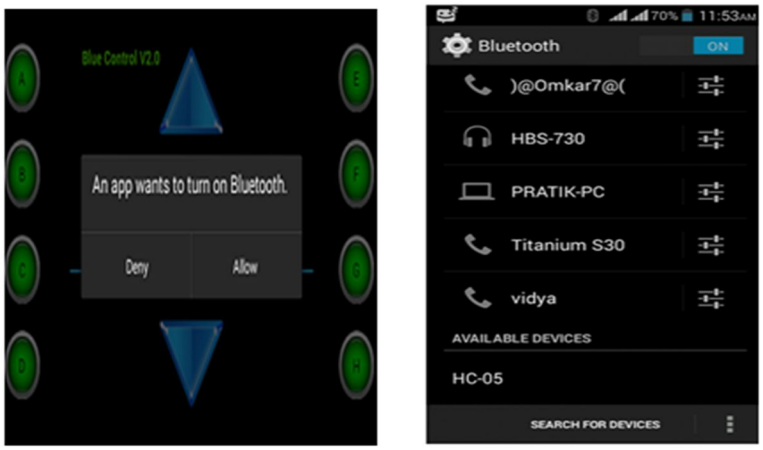


Figure 5 : Application in Android Phone for controlling DC Motor

VI. ADVANTAGES

A. Bluetooth consumes less power than other devices.
B. Android application is user-friendly.
C. Technically expert persons are not required.
D. Wireless communication is enhanced.
E. Programming is simpler.

VII. APPLICATIONS

A. Home automation.
B. Many industrial applications require adjustable speed drive and constant speed for improving the quality product.
C. Intensity of light can also be controlled with the help of android app.

VIII. CONCLUS ION

In this project has been achieved by developing hardware and software for controlling speed of induction motor using android application.The demand for wireless operating device increases it is more preferable over wired devices.We are controlling speed of induction motor using Bluetooth and android application wirelessly.

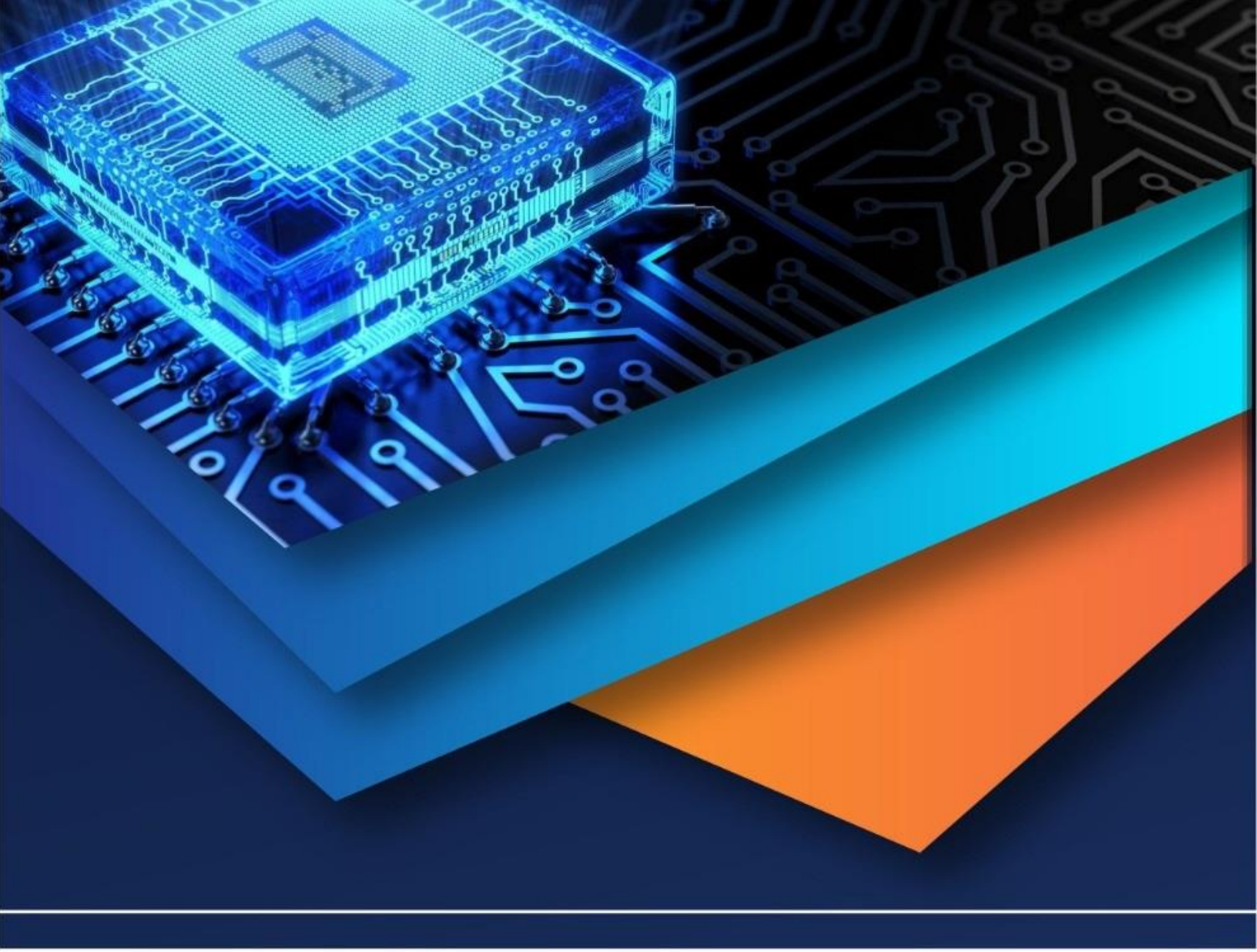
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