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FOUR QUADRANT OPERATION OF DC MOTOR REMOTELY CONTROLLED BY ANDROID APPLICATIONS

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Abstract - *The project is designed to develop a four quadrant operation of Dc motor remotely controlled by Android application. This system could also be a really sustainable system for controlling the DC motor in four directions like clock-wise, counter-wise, reverse brake and forward brake It additionally features of high speed mode and low speed mode in speed control. The four quadrant operation of the dc motor is used to many industries where motors are used and as per demand as they're getting to rotate in clockwise, counter-clockwise and also immediately apply brakes in both of the direction. In case of a specific operation in industrial environment, the motor must be stopped immediately. In such scenario, proposed system is extremely apt as forward brake and reverse brake are its integral features. Instant brake in each the directions happens as a results of applying a reverse voltage across the running motor for a fast and thus the speed control of the motor getting to be achieved with the PWM pulses generated by the PIC microcontroller. The remotely controlled operation of the PIC microcontroller utilized during this project is achieved by GUI 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 gives an input and successively controls the speed of the motor.*

***Key Words*: DC motor, Four quadrant motor, Wi-fi control, speed control, Remote Dc motor**.

1. INTRODUCTION

Today most of the industries use DC motors. So, speed controlling of DC motors plays a really vital role. This project concentrates on controlling the speed of DC motor using Android mobile application, with the help of IoT technology.. number in the running text. The order of reference in the running text should match with the list of references at the end of the paper.

The IoT module is externally interfaced with the microcontroller unit for wireless communication. The IoT module receives command from the mobile android application. So, according to the input, with the assistance of microcontroller, L298 are often wont to vary the voltage also because the speed of the DC motor using PWM technique. Direction of the DC motor also can are often varied with the assistance of relay circuit. The project is designed to controlled the speed of a DC motor using an PIC16F877A series microcontroller with android application device.

The project is implemented to develop a four quadrant operation of Dc motor. The Four quadrant operation of dc motor remotely controlled by android application system could also be a really sustainable system for controlling the DC motor in four directions like clock-wise,counter-wise, reverse brake and forward brake It also have a features of minimize and maximize the dc motor speed. In this project remotely access is allowed of Mobile Phones with android OS, upon a GUI based touch screen operation. The project uses IoT device, interfaced to the microcontroller, which are used to control the speed of motor. This project are often enhanced by using higher power electronic devices to work high capacity DC motor. Regenerative braking for optimizing the facility of power consumption can also be incorporated.

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2. EXISTING SYSTEM

The foremost widely used motor in industry and other sector is induction motor. This project works on controlling the speed of induction motor with forward and reverse direction. this is often achieved by using Android phones remotely by the help of Bluetooth technology. Android is open source software, manufacturers can modify the OS to suit their respective needs and phones. Bluetooth, which is interfaced with microcontroller, is employed to attach to the Bluetooth modem of negative feedback circuit which is connected to the motor. Here the microcontroller used is AVR microcontroller which is advanced version of 8051.Every time signal data is sent by android application as per the program written is executed by microcontroller to deliver supply signal to TRIAC through optical isolation. And hence using Wi-Fi technology achieved the Dc motor controlled by four quadrant operation.

A. Disadvantage Of Existing System

- It permits solely short vary communication between device.
- It has low bandwidth compared to Wi-Fi.
- There isn't any forward and reverse brake.

3. PROPOSED SYSTEM

The Four quadrant operation of dc motor remotely controlled by android application system could also be a really sustainable system for controlling the DC motor in four directions like clock-wise,counter-wise, reverse brake and forward brake. This specific system could even be utilized therein applications where we must to manage the motor in four or two directions like in auto industry, textile industry or robotics industry.

The users can control their desired motor from anywhere and anytime from his smart mobile by using android application. By using this technique, the user can easily save our precious time and energy consumption. Different peoples and corporations are still working on this system, but their system cost remains relatively above our system. Here, we've proposed a system that's called, four quadrant operation of DC motor remotely controlled by android application system, with the help of transformer, motor driver IC, Wifi device, android application device and PIC16F877A Microcontroller. This project are often enhanced by using high power electronic devices to work high capacity DC motor.

4. IMPLEMENTATION

The diagram given in our proposed system demonstrates our overall system architecture which consists of simpler features and allows a crucial function of portability.

The architecture of the proposed system consists of following devices**:**

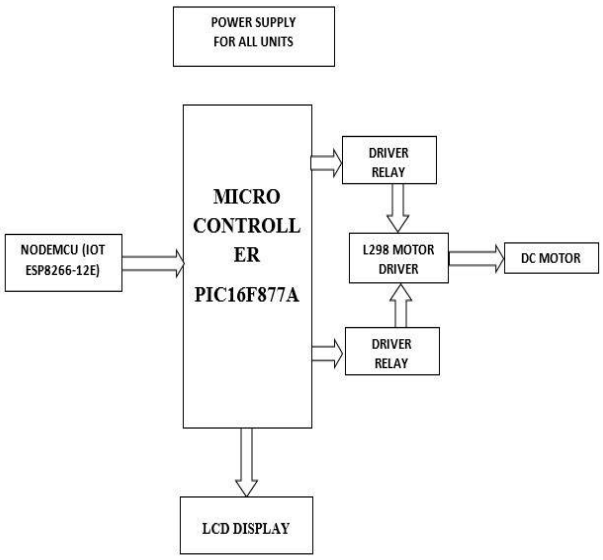

Fig.1. Block diagram

The system architecture modules as following:

- LCD Interfaced with LCD.
- Wifi Interfacing with PIC.
- DC Motor Driver Connection.

A. LCD INTERFACED WITH LCD

We interface the LCD displayer with PIC microcontroller.16×2 Character LCD could also be a really basic and low cost LCD module which is typically utilized in electronic products and projects. 16×2 means it contains 2 rows which may display 16 characters.

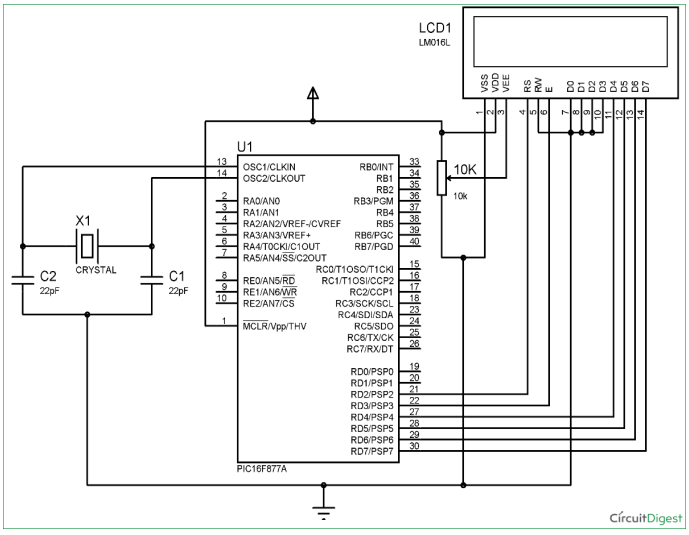

Fig.2. LCD Interface With PIC

The first two pins VCC and Gnd(VSS and VDD) are for providing power to LCD display. 3ed pin vee is employed to manage the contrast of the LCD display. A 10KΩ preset whose fixed ends connected to vdd, vss and variable end connected to vee are often used to control contrast of the LCD. A microcontroller or microprocessor got to send sorts of information for operating this LCD Module, Data Information and Command Information. The ASCII is the value of data informataion to be displayed in LCD screen and Command Information determines other operations like position to be displayed, clear screen, shift etc. the same data lines (DB0 – DB7) have sent the data information and command to LCD ,which are multiplexed using RS (Register Select) pin of LCD. The LCD treats DB0 – DB7 data pins information as Data to be displayed at when the RS value is high and when it's low LCD treats it as Command Information. Enable (E) input of the LCD is employed to provide data strobe. The high (5v) indicates the voltage level within the Enable (E) pin tells LCD that DB0 – DB7 contains valid information.The input of RS determine the whether the data from the LCD is read or write. In normal cases we'd like only writing hence it's tied to ground. The interface between this LCD and Microcontroller are often 8 bit or 4 bit and thus the difference between them is in how the data or commands are send to LCD.

B. WIFI INTERFACING WITH PIC

ESP8266 Wi-Fi module could also be a self-ESP8266 Wi-Fi module could even be a self-contained system on chip (SoC) with an integrated TCP/IP protocol stack which may give any MCU access to your Wi-Fi network. ESP8266 is used of either offloading or hosting application all Wi-Fi networking functions from another application processor. We integrate the Wi-Fi module with PIC controller.PIC microcontroller and esp8266 wifi module communicate with each other through UART serial communication. ESP8266 instruction modules to ascertain for each and every AT command then find how to transmit them to the ESP module.

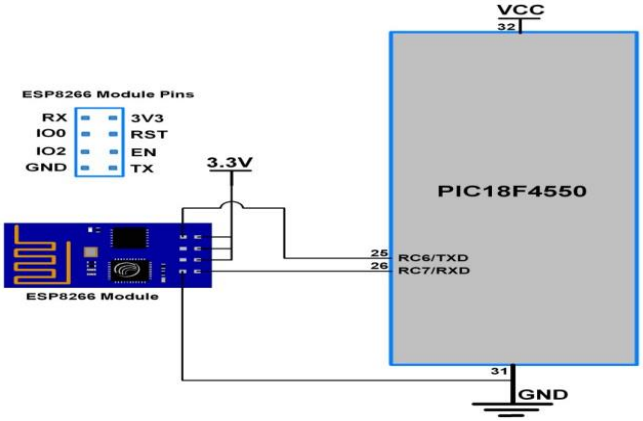

Fig.3 Wifi Interfacing With Pic

C. DC MOTOR DRIVER CONNECTION

Many application has L298N motor driver, especially on the robotics side. Most of the microcontrollers operate very low voltage (5v) and current while the motors require higher voltages and current So, the microcontrollers cannot provide them such higher current, so we use motor Ics.The motor driver could even be slightly current amplifier. It takes a coffee current signal and provides out a high current signal which can drive a motor. It control the direction of the motor. Motor drives are of the many kinds depending upon the utmost supply voltage, maximum output current, rated power dissipation, load voltage, and number outputs, etc.

The H-bridge configuration is followed by L298N motor driver, which is handy when controlling the direction of rotation of a DC motor. Here, the motor rotates within the direction dictated by the switches. When S1 and S4 are on, the left motor terminal is more positive than the right terminal, and thus the motor rotates during a particular direction. On the opposite hand, when S2 and S3 are on, the proper motor terminal is more positive than the left motor terminal, making the motor rotate within the opposite direction. To use logic '0' to stop the motor and to modify ON the Motor Clockwise, a logic '1' should be applied to RB0 and RB2 while leaving RB1 and RB3 on logic '0'. To Reverse clockwise the Motor, RB0 and RB2 set low (0),while RB1 and RB3 should be set high (1).Because a motor is an inductive load, a back emf could destroy the transistors when the motor switches OFF, the four Diodes are wont to suppress the back emf.

Fig.4 LCD Interface With PIC

5. SOFTWARE REQUIREMENT

- MPLAB Ide Software
- Android studio

6. HARDWARE REQUIREMENT

- PIC Microcontroller (16f877A)
- IOT module
- Power supply
- DC Motor
- LED display

7. OUTPUT

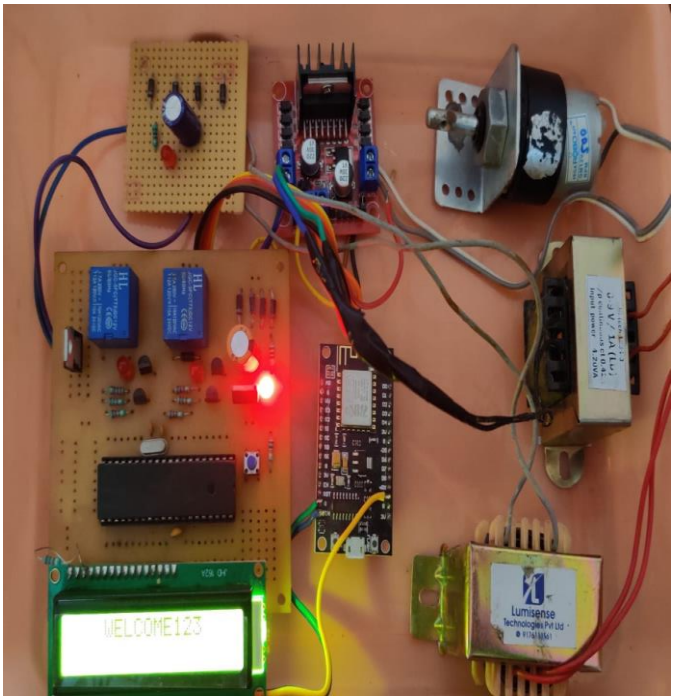

Fig.5 LCD Interface With PIC

- The following procedures are administered for the four quadrant DC motor speed control function using microcontroller.
- Starts rotating the motor with full speed driven by a L298N that receives control signal continuously from the microcontroller.
- When pressed the clockwise switch, the motor rotate in forward direction as per logic provide by the program from the microcontroller to motor driver ICs.
- When pressed the forward brake switch, reverse voltage is applied to the motor.

8. ADVANTAGE

- Long range wireless communication.
- Requires least maintenance.
- It is user-friendly.
- Safer to use.

9. CONCLUSION

This project demonstrate the successful implementation of a four quadrant speed control system for a DC motor. This system could also be a really sustainable system for controlling the DC motor in four directions like clock-wise, counter-wise, reverse brake and forward brake. The demand for wireless operating device increases it's more preferable over wired devices. We are controlling speed of induction motor using wifi and android application wirelessly.

10. REFERENCE

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