Wireless based DC motor speed control using Zigbee

Parthsarthi[1], M. B. Patel [2], S. J. Bora[3], B. U. Parihar[4]

[1,2,3,4]*(Department of E&TC , KVNNIEER Nasik (MH), SPPUniv India)*

Abstract: *Every system is automated in order to face new challenges in the present day situation. Automated systems have less manual operations, so that the flexibility, reliabilities are high and accurate. Hence every field prefers automated control systems. Especially in the field of electronics automated systems are doing better performance. Nowadays, there are lots of good-quality motor speed controls on the market. However, their costs are relatively high. A speed control with both low cost and good performance will be highly marketable, especially for small mobility applications. On the other hand, the wireless connectivity has a nature of low cost and less environmental limitations. Combining these ideas together, we came up with this paper.*

***Keywords:** Computer, Microcontroller AT89s52, USB to serial converter, Zigbee receiver, Zigbee transmitter*

I. Introduction

The aim of developing this paper to control the speed of DC motor. The main advantage in using a DC motor is that the Speed-Torque relationship can be varied to almost any useful form. To achieve the speed control an electronic technique called Pulse Width Modulation is used which generates High and Low pulses. These pulses vary the speed in the motor. For the generation of these pulses a microcontroller (AT89s52) is used. As a microcontroller is used setting the speed ranges as per the requirement is easy which is done by changing the duty cycles time period in the program. This paper is practical and highly feasible in economic point of view, and has an advantage of running motors of higher ratings. This project gives a reliable, durable, accurate and efficient way of speed control of a DC motor. The objective of this paper to design and build a wireless Speed and direction control of DC motor using Zigbee. The user will be able to do the operations like accelerate and decelerate the motor, move clockwise and anti -clockwise by giving command from a distance. This is realized with the help of microcontroller and Zigbee.

II. System Design

This paper is practical and highly feasible in economic point of view, and has an advantage of running motors of higher ratings. This project gives a reliable, durable, accurate and efficient way of speed control of a DC motor**.** The Transmitter Module (fig.1) of Project by which we can transmit the data at the rate of 250mbps, Near about 10 to 100 meters distance .In this module we are using Zigbee technique to control the speed as well as direction of motor.This Zigbee module can be connected with the computer by using RS 232 protocol. We can control the DC Motor speed by using Com-Check Software. Now At the Receiver side we have receiving module by which transmitted data can be received. Again at receiver side we are using Zigbee receiver module by which we are receiving the transmitted signal.

Here we are using same step down transformer for same Purpose we are using RS232 cable for communication between microcontroller and motor. In the receiver section two parameters we are controlling speed and direction. The Receiver module (fig.2) we have receiving module by which transmitted data can be received. Again at receiver side we are using Zigbee receiver module by which we are receiving the transmitted signal. Here we are using same step down transformer for same Purpose we are using RS232 cable for communication between microcontroller and motor. In the receiver section two parameters we are controlling speed and direction.
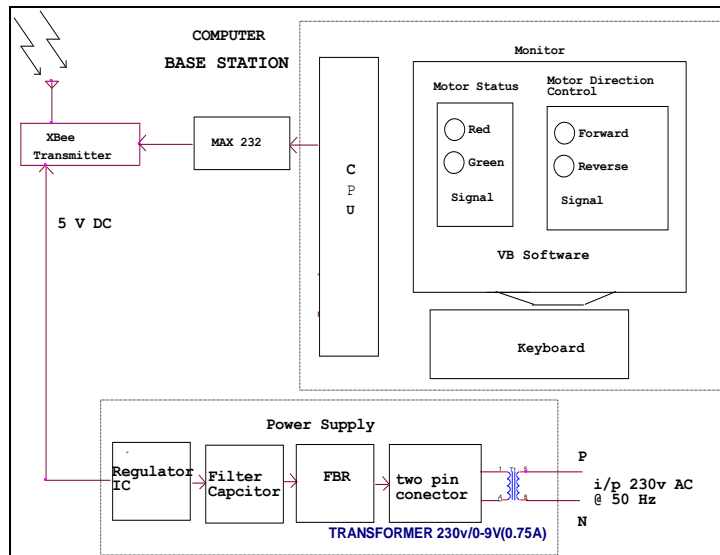
2.1 Transmitter

Fig 1: Zigbee Transmitter

This is the Transmitter Module of Project by which we can transmit the data at the rate of 250mbps, Near about 10 to 100 meters distance .In this module we are using Zigbee technique to control the speed as well as direction of motor. Zigbee module need 5V supply so for that we are using step down transformer to convert 230V into 5V .This Zigbee module can be connected with the computer by using RS 232 protocol. We can control the DC Motor speed by using Com-Check Software.

2.2 Receiver

Now At the Receiver side we have receiving module by which transmitted data can be received. Again at receiver side we are using Zigbee receiver module by which we are receiving the transmitted signal. Here we are using same step down transformer for same Purpose we are using RS232 cable for communication between microcontroller and motor. In the receiver section two parameters we are controlling speed and direction.
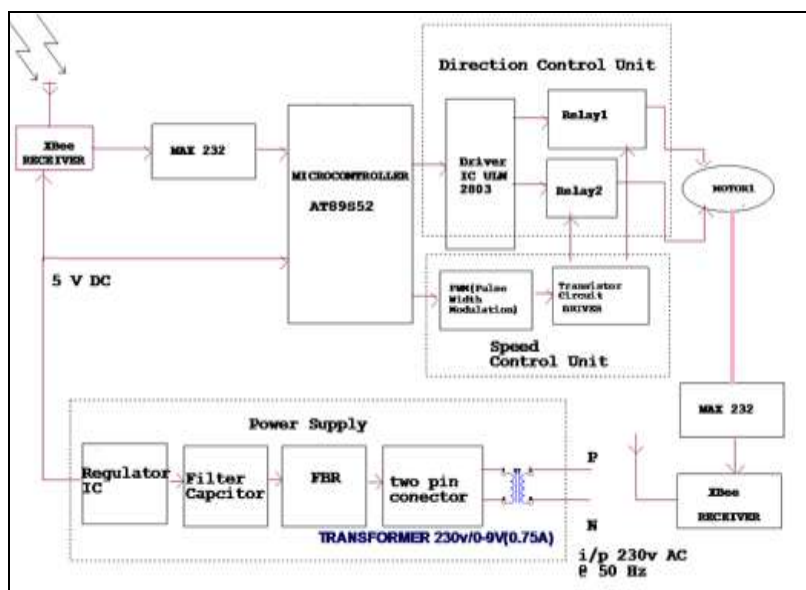

Fig 2: Zigbee Receiver

III. System Implementation

Every system is automated in order to face new challenges in the present day situation. Automated systems have less manual operations, so that the flexibility, reliabilities are high and accurate. Hence every field prefers automated control systems. Especially in the field of electronics automated systems are doing better performance.
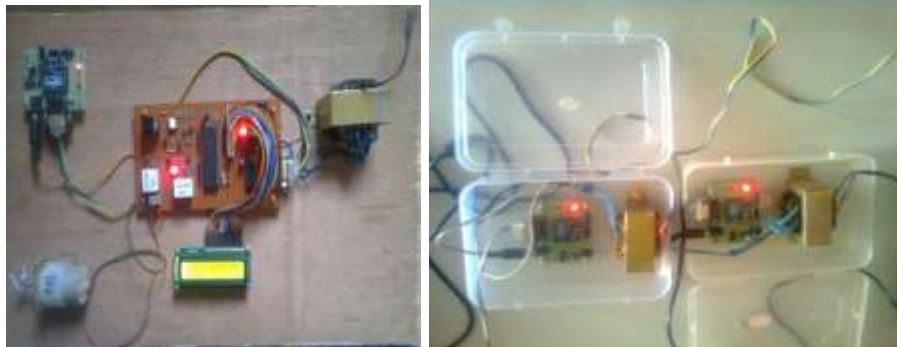
3.1 Hardware Development

Hardware is developed by using some different tools. As further specified as like microcontroller,diection control unit,zigbee,tacometer,dc motor.

3.1.1 Microcontroller (89s52)

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8Kbytes of in-system programmable Flash memory.The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a full duplex serial port, on-chip oscillator,and clock circuitry.

3.1.2 Direction Control Unit

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal or where several circuits must be controlled by one signal. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching.

3.1.3 Zigbee

ZIGBEE is a specification for a suite of high level communication protocols. ZIGBEE is based on an IEEE 802.15 standard. Though low-powered, ZIGBEE devices often transmit data over longer distances by passing data through intermediate devices to reach more distant ones.ZIGBEE is used in applications that require a low data rate, long battery life, and secure networking. ZIGBEE has a defined rate of 250 Kbit/s.

3.1.4 Dc Motor

The device that converts electrical energy into mechanical energy is called as a motor. The motor that utilizes a DC supply to produce mechanical output is DC Motor. The advantages of using these types of motors over conventionally used AC motors are : DC motors have higher controller efficiency,DC motors have typical 98% efficiency, DC motors have better overload and peak voltage characteristics. As a result of all these advantages these motors have a wide range of applications in places where constant speed is to be maintained at varying loads. Conveyor belts, elevators, cranes, ski lifts, extruders, mixers, sewing machines are few such applications where DC motors are used. So controlling the speed of a DC motor is a purposeful and required place to work on.It provide higher efficiency, greater reliability, quick response, higher efficiency. One such technique is Pulse Width Modulation. We apply this technique in our project so as to control the speed of the DC motor.

3.1.5 Tachometer

A tachometer is an instrument which is used to measure the revolution speed of any rotating object such as a shaft or motor

IV. Result

In this project we have design and build a wireless Speed and direction control of DC motor. The user will be able to do the operations like accelerate and decelerate the DC motor by pushing a button or switch from a distance. The main advancement of this project is wireless speed control and direction control using zigbee. The motor can be controlled from a distance of 50 meter for which the operating frequency is 2.4 MHz. These can be used where we require precise speed control in applications such as Conveyer belts, drilling machine etc.

V. Conclusion

Our Paper is wireless based dc motor speed control unit using zigbee.by using this system The user will be able to perform the operation like acceleration and deceleration of the DC motor by pushing button or switch from distance. The main advancement of this paper is wireless based speed control and direction control using Zigbee technique.

Acknowledgements

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