

DC Motor Speed and Direction Control using Zigbee Technology

R. R. Patil¹, Prajakta R. Kothale², Shweta B. Patil³, Gitanjali S. Nalawade⁴, Priyanka K. Patil⁵

¹Professor, Department of Electrical Engineering, SIT Polytechnic, Ichalkaranji, India

^{2,3,4,5}Student, Department of Electrical Engineering, SIT Polytechnic, Ichalkaranji, 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 system are doing better performance. Now-a-days, there are lots of good quality motor speed controls on the market. However, there costs are relatively high. A speed control with both low cost and good performance will be highly marketable, especially for small mobility application. On the other hand the wireless connectivity has a nature of low cost and less environment limitation. Combining these ideas together, we came up with this paper.

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

1. 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 and electronic technique called pulse width modulation is used which generates high and low pulse. 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 economic point of view, has an advantage of running motor of high rating. 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.

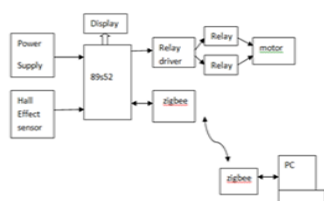


Fig. 1. Block diagram

A. Block diagram description

The basic block diagram of DC motor speed and direction control using Zigbee technology is shown in the above figure. Mainly this block diagram consist of the following essential blocks.

- Power Supply
- Hall Effect Sensor
- 89s52 Microcontroller
- Zigbee
- Relay

B. Working

In this project central part is controller, here we use 89s52 controller. This project control the speed of DC motor wirelessly. We use the wireless technology Zigbee. There are two zigbee pair one zigbee interface with the controller and another zigbee connected on PC. We send command one zigbee to other zigbee. When we send the command PC side zigbee to controller side zigbee. After receiving the controller take the action and control the speed and direction of the DC motor.

C. Hardware requirements

- Zigbee
- Transformer
- Voltage regulator
- AT 89s52 microcontroller
- LCD display
- Relays
- Relay driver
- Hall Effect Sensor
- DC Motor
- Rectifier

D. Microcontroller at 89S52

The AT89C52 provides the following standard features: 8Kbytes of Flash, 256 bytes of RAM, 32 I/O lines, three 16-bittimer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89C52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU

while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power down Mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next hardware reset.

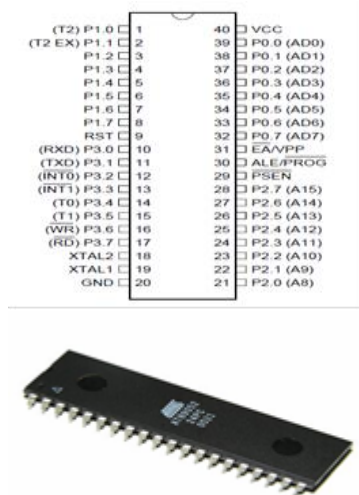


Fig. 2. Microcontroller

E. 16X2 LCD:

LCD indicates different mode settings & set point adjustment. Also 16 char are divided to indicate speed output. The LCD Display used here is 16 character by 2 line display. The 16 characters in both lines are equally divided to indicate commands and speed. In sub routines ‘Enter Speed’ and ‘Current Speed’ message, set Speed value is indicated on screen.



Fig. 3. LCD display

F. Zigbee

ZigBee is a protocol that uses the 802.15.4 standard as a baseline and adds additional routing and networking functionality. The ZigBee protocol was used in a variety of commercial and industrial low data rate applications. Because ZigBee was designed for low power applications, it fits well into embedded systems.

2. Applications of Zigbee technology

- *Industrial Automation:* In manufacturing and production industries, a communication link continually monitors various parameters and critical equipment’s. Hence Zigbee considerably reduce this communication cost as well as optimizes the control process for greater reliability.

- *Home Automation:* Zigbee is perfectly suited for controlling home appliances remotely as a lighting system control, appliance control, heating and cooling system control, safety equipment operations and control, surveillance, and so on.
- *Smart Metering:* Zigbee remote operations in smart metering include energy consumption response, pricing support, security over power theft, etc.
- *Smart Grid monitoring:* Zigbee operations in this smart grid involve remote temperature monitoring, fault locating, reactive power management, and so on.

A. Software requirements

- Keil 3
- X-CTU
- Proteus

1) Advantages

- Fully automatic System
- Low Cost system with excellent features

2) Features

- 500-mA-Rated Collector Current (Single Output)
- High-Voltage Outputs: 50 V
- Output Clamp Diodes
- Inputs Compatible with Various Types of Logic.

3) Applications

- Relay Drivers
- Stepper and DC Brushed Motor Drivers
- Lamp Drivers
- Display Drivers (LED and Gas Discharge)
- Line Drivers
- Logic Buffers

3. 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.

Acknowledgement

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