Speed Control of DC Motors Using Wireless Technology

1Nayana V.N, 2G Sandhya Raj, 3Nagasandhya K V Umadevi Sreedhar.D
B.E(Electrical & Electronics Engineering) in Dr.T. Thimmaiah Institute of Technology, K.G.F.VTU

Abstract— There are lots of good-quality motors with varieties of speed controls is available in 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 this concept of a High-performable low-cost low-loss wireless speed control of dc motor is developed.

Index Terms- wireless, speed control, mobility applications, dc motors.

I. INTRODUCTION

The wireless remote controller is simple: start, stop, accelerate and decelerate. The source of the speed control is a 12 V battery and control currents over a range of 0 to 50 A. The controller has a high efficiency for motor loads in the range of 50 to 150 W. It should deliver the nominal power continuously and be able to tolerate slight overloading for a short period of time. For strong overloading, it should protect the motor from being damaged for a few seconds, then shut down the motor and request a reset from the user simultaneously. Finally, the total parts cost of the converter does not to exceed $12.

Almost every mechanical movement that we see around us is accomplished by an electric motor. Electric machines are a means of converting energy. Motors take electrical energy and produce mechanical energy. Electric motors are used to power hundreds of devices we use in everyday life. Motors come in various sizes. Huge motors that can take loads of 1000’s of Horsepower are typically used in the industry. Some examples of large motor applications include elevators, electric trains, hoists, and heavy metal rolling mills. Examples of small motor applications include motors used in automobiles, robots, hand power tools and food blenders. Micro-machines are electric machines with parts the size of red blood cells, and find many applications in medicine many researchers have worked in the field of intelligent motion control and power electronics and have developed microcontroller and digital signal processing based controller for three phase induction motor. They have studied the need, the benefits and applications of intelligent motion control in the field of power electronics and drives, on the basis of which, they have published several articles.

The researchers have given several theoretical, experimental and simulation investigations which are found to be very much useful in understanding the different techniques in the field of controller for three phase induction motor. The following is a brief discussion of the exhaustive review of past work carried out in the area of intelligent motion control, power electronics and their applications from the year 1968 to till 2012.

1.1 BLOCK DIAGRAM OF SPEED CONTROL

A.TRANSMITTER SECTION

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. The goal of the project is to develop a system, which uses RF communication to
control the speed of dc motor without any wired communication, which executes with respect to the signal sent by the RF TX. There are several applications with dc motors in our daily life.

B. RECEIVER SECTION.

II. CIRCUIT DIAGRAM

Obviously there exists many applications where there might be a need to control the speed of dc motors. There exist many ways of controlling the speed of DC motor. Of the available ones, PWM technique is the most efficient one and the same technique is used here in this project. TX. By pressing the keys available at the RF TX the speed of the DC motor is varied by making use of the PWM technique.

III. FLOW CHARTS AND TABLES

A. TRANSMITTER FLOW CHART

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

B. Receiver Section

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Fig 5.5 Flow Chart for transmitter

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A. TRANSMITTER SECTION

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.
There are a couple of other pins on the board:

- AREF: Reference voltage for the analog inputs. Used with analog Reference (A).
- Reset: Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board. See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical.

Communication: The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.
E. WORKING MODULE.

Programming:
The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials.

The ATmega328 on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).

You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details.

F. MAIN PROGRAM

Constant pot+A0

Void setup ()
{
  Serial.begin (9600);
}

Void loop ()
{
  Int temp;
  temp=analog Read(pot);// any value b/w 0to 1023(read)
  temp=temp14;//PWM=8bit, ADC=10 bit(divide)
  Serial. pointln(temp);// to give to next line (not going for delay so that we need to wait)(send)
}

Automatic (software) reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega328 via a 100 Nano farad capacitor.

When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

IV. CONCLUSION:

DC motors are finding various applications one technique is more suitable & economic with less power loss & more efficiency improves efficiency up to 80% by reducing losses such as

1) switching losses

2) Machine losses

Remote itself is a stator (made of resistances) including resistances to armature so heat is reduced with increased efficiency.

REFERENCES


