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Speed Control of Dc Motors Using Wireless Technology

Nayana V.N, G Sandhya raj and Nagasandhya K V
Final year students,Department of E&E Engineering
Dr.T.Thimmaiah Institute of Technology,
Kolar Gold Fields,India
nayanahoney12329@gmail.com,sonuraj2127@gmail.com and nagasandhyakv@gmail.com

Umadevi Sreedhar.D
Assistant professors,Department of E&E Engineering
Dr.T.Thimmaiah Institute of Technology,
Kolar Gold Fields,India
umasree@rediffmail.com

Abstract **–**Now a days there are large number of good-quality motors and there speed controls available in the market but it is of cost effective. A speed control with both low cost and good performance will be highly marketable.On the other hand, the wireless technology 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.

Keywords— *wireless, speed control, mobility applications, dc motors.*

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Introduction [2]

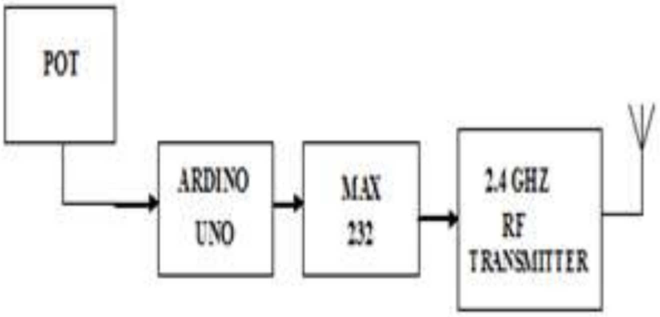
The wireless remote controller is simple: start, stop, accelerate and decelerate. The source of the speed control is a 12V battery and control currents over a range of 0 to 50A. The controller has a high efficiency for motor loads in the range of 50 to 150 W. It should deliver the nominal power continuously 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.

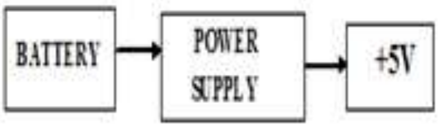
All the mechanical movement that we see around us is accomplished by an electric motor. Electric machines are a means of conversion. Motors take electrical input and produce mechanical output. Electric motors are used to power hundreds of devices we use in daily life. Motors come in various sizes. Huge motors that can take loads of 1000's of Horsepower is being used in the industry. Some examples of large motor applications include elevators, electric trains, hoists, and heavy metal rolling mills 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 have developed microcontroller and digital signal processing based controller for three phase induction motor. The need have been studied, the benefits and applications of intelligent motion control in the field of power electronics and drives, several articles have been published on this basis.

The researchers gave several theoretical, experimental and simulation investigations which are found to be very much useful in understanding the different methods in the field of controller for three phase induction motor. The following is a brief discussion of the possible 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.

I. BLOCK DIAGRAM OF SPEED CONTROL

A.TRANSMITTER SECTION [4]





All system is automated in order to face new challenges in the present day situation. Automated systems have less manual operations, so that comfort, reliabilities are high and accurate. Hence every field prefers automated control systems. Especially in the field of power electronics automated systems are doing better performance. The goal of the project is to do a system, which uses RF communication to control the speed of dc motor without any wired communication, which produces output with respect to the signal sent by the RF TX. There are several applications with dc motors in our daily life.

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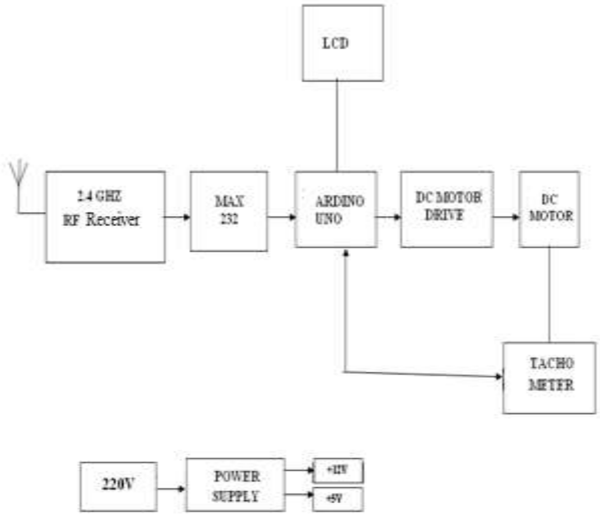
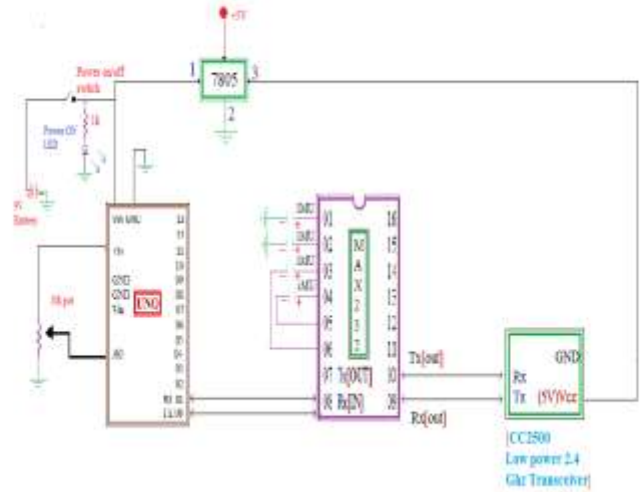
B. RECIVER SECTION[3]



Usually there exists many applications where there might be a need to control the speed of dc motors. There are many ways of controlling the speed of DC motor. The available ones are 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.

II. CIRCUIT DIAGRAM

A.TRANSMITTER SECTION[4]

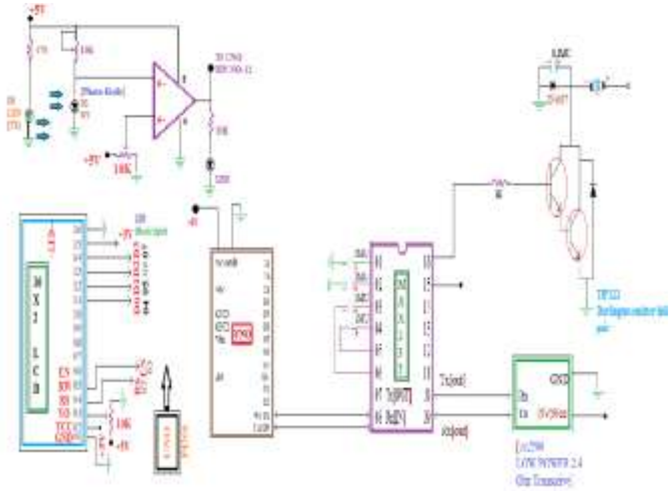


The Arduino UNO is a microcontroller software based on the ATmega328. It has 14 digital input/output pins (out of which 6 pins is used to produce PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power pin point, an Adapter , and a reset push button.

It contains all tools which requires to support the microcontroller are simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The UNO is very different from all preceding boards as it does not use the FTDI USB-to-serial driver chip. Instead it has a features of Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial port converter.

B.RECIVER SECTION[3]



III.FLOW CHATRS AND TABLES

A.TRANSMITTER FLOW CHART

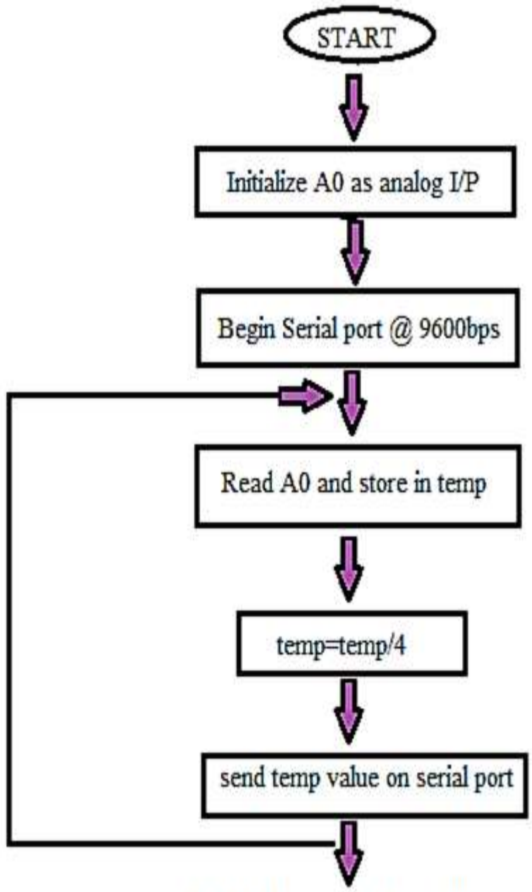


Fig 5.5 Flow chart for transmitter

B.FLOW CHART FOR RECIVER

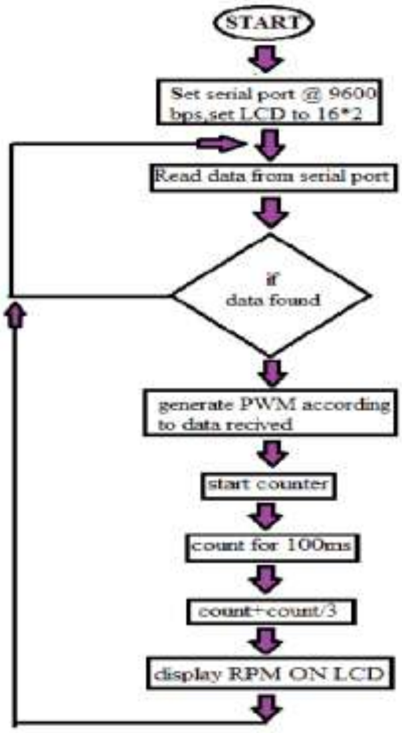


FIGURE V-2FLOW CHART

C. TABLE FOR SPEED CONTROL RANGE

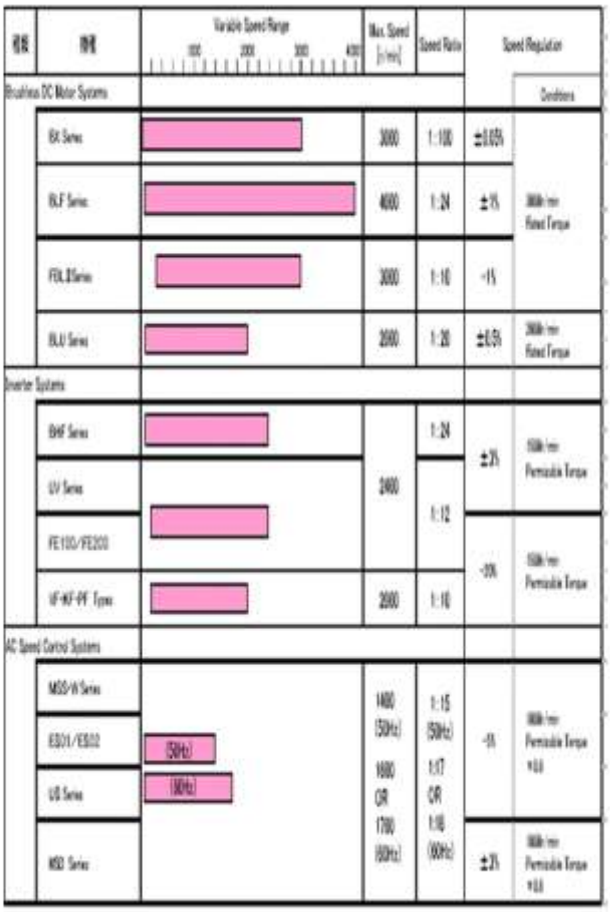


Fig. speed control and ranges

D. Experimental setup

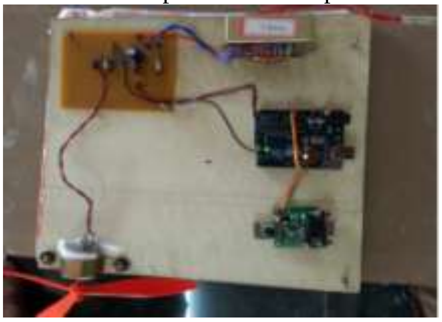


Figure III. Experimental set up

There are a couple of other pins on the board:

AREF. Is used as reference voltage for the analog inputs. Used with analogReference().

Reset.

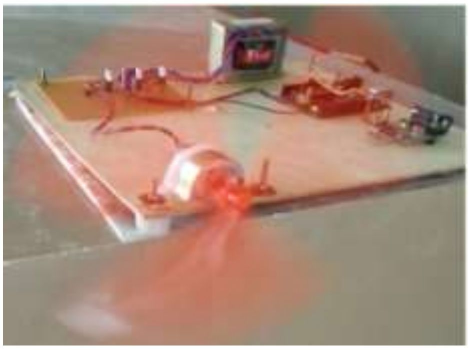
Bring this line low to reset the microcontroller. Usually used to add a reset push button to shields which block the one end on the board. See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical.

Communication

The Arduino UNO has number of facilities for communication with a computer or another Arduino or other microcontrollers. The ATmega328 has a UART TTL (5V) serial communication port, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 uses serial communication over USB and appears as a virtual com port software on the computer. The '16U2 uses the USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino has 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 blink when data is being transmitted via the USB-to-serial chip and USB connection to the computer .

A Software has a 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 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 done with the sketch language (download). Select "Arduino Uno from the **Tools > Board** menu.

The ATmega328 is a Arduino Uno with a boot loader that allows you to upload new code to it without using an external hardware programmer. It proceeds using the origi STK500 protocol.

You can also bypass the boot loader and program microcontroller through the ICSP header; see th 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 properties of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset button of the ATmega328 via a 100 Nano farad capacitor.

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

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

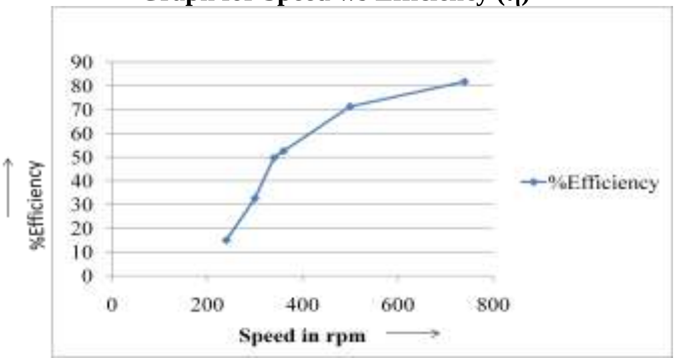
Remote it is a stator (made of resistances) including resistances to armature so heat is reduced with increased efficiency.

OUTPUT

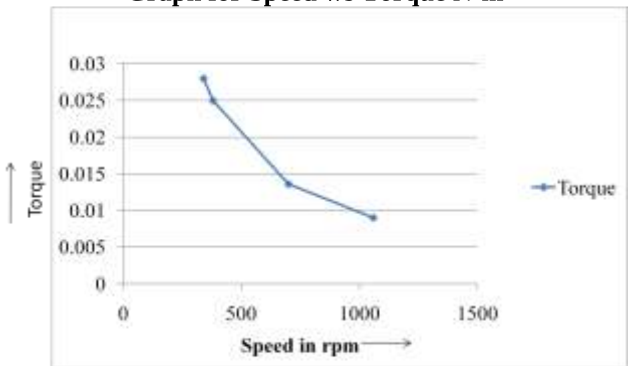
NO LOAD CONDITION

Sl.no	Pot value (R) in ohm	Speed (N) in rpm	Torque in N-m	Current (I) in amps	P=VI in watts	%Efficiency
1	2500	340	0.028	0.167	2.01	49.722
2	5000	380	0.025	0.158	1.902	52.56
3	7500	700	0.136	0.116	1.401	71.34
4	10000	1060	0.009	0.094	1.138	87.71

Graph for Speed v/s Efficiency (η)



Graph for Speed v/s Torque N-m



LOADED CONDITION

1. WEIGHT 50

Sl.no	Pot value (R) in ohm	Speed (N) in rpm	Torque (T)in N-m	Current (I) in amps	P=VI in watts	%Efficiency
1	2500	340	0.028	0.167	2.00	50.00
2	5000	380	0.025	0.150	1.90	52.63
3	7500	700	0.013	0.116	1.39	71.94
4	10000	928	0.010	0.100	1.21	82.57

2. WEIGHT 100g

Sl.no	Pot value (R) in ohm	Speed (N) in rpm	Torque (T) in N-m	Current (I) in amps	P=VI in watts	%Efficiency
1	2500	700	0.0136	0.116	1.23	52.65
2	5000	828	0.0115	0.107	1.2	54.89
3	7500	984	0.009	0.094	1.13	62.89
4	10000	1200	0.007	0.089	1.1	77.89

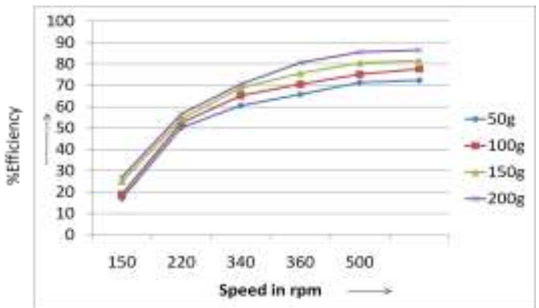
3. WEIGHT 150g

Sl.no	Pot value (R) in ohm	Speed (N) in rpm	Torque (T) in N-m	Current (I) in amps	P=VI in watts	%Efficiency
1	2500	380	0.025	0.18	1.90	52.5
2	5000	660	0.014	0.12	1.44	69.2
3	7500	768	0.012	0.11	1.33	74.7
4	10000	928	0.010	0.10	1.21	82.14

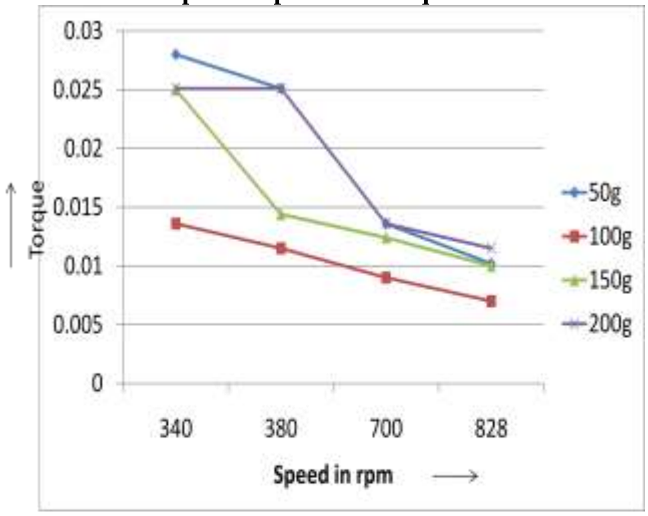
4. WEIGHT 200g

Sl.no	Pot value (R) in ohm	Speed (N) in rpm	Torque (T)in N-m	Current (I) in amps	P=VI in watts	%Efficiency
1	2500	380	0.025	0.158	1.9	52.56
2	5000	380	0.025	0.158	1.9	52.56
3	7500	768	0.013	0.116	1.4	71.34
4	10000	828	0.011	0.107	1.28	77.59

Graph for Speed v/s Efficiency(η)



Graph for Speed v/s Torque N-m



CALCULATION:

1. $T = \frac{P*60}{2\pi N}$=(1*60)/(2*3.14*340)=0.028
2. $T \propto Ia^2$
   $Ia = \sqrt{T} = \sqrt{0.028}$=0.167
3. $P = VI = 12 * 0.167 = 2.007$
4. $\%\eta = \frac{output}{input} = \frac{1}{VI} = \frac{1}{2.007}$=0.498*100=49.80%

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AUTHORS

Nayana V.N pursuing (8th sem) B.E(Electrical & Electronics Engineering) in Dr.T.Thimmaiah Institute of Technology, K.G.F.VTU

G Sandhya raj pursuing (8th sem) B.E (Electrical & lectronics Engineering) in Dr.T.Thimmaiah Institute of Technology, K.G.F.VTU

Nagasandhya K.V pursuing (8th sem) B.E (Electrical & Electronics Engineering) in Dr.T.Thimmaiah Institute of Technology,K.G.F.VTU

Umadevi Sreedhar.D received B.E degree (Electrical & Electronics Engineering) in Golden Valley Institute of Technology, K.G. Funder Bangalore University and M.E in Sathyadama DEEMED University (Autonomous).