

ABSTRACT

Most of the electrical circuits or electrical devices are affected by the atmospheric temperature. The main cause of atmospheric temperature such as failure of insulation short circuited and also decreases the efficiency of electrical circuits or devices. Day by day this problem can increase. In order to overcome this problem of temperature level, an electric circuit has been designed. There are some components which are used in for designing of the electrical circuits. Such components are : Temperature Sensor , Arduino microcontroller , , MATLAB Simulation , Inverter, rectifier , auto transformer , step down transformer which is connected to the load . The main aim that connected an temperature sensor with Arduino Microcontroller and interface with simulation and verify the result in the hardware implementation.

Keywords – Temperature sensor, Arduino microcontroller, Pulse Width Modulation, Centre Tapped Inverter , Full Bridge rectifier, Induction Motor.

INTRODUCTION

This paper controls the temperature value. Temperature sensor plays important role. The temperature sensor is connected to the Arduino microcontroller. This Arduino microcontroller is interfaced with MATLAB. Temperature sensor converts the value of temperature into the value of electrical value. Arduino microcontroller is used for generating PWM pulse. The PWM pulse depends upon the signal of Temperature sensor. The live data is recorded in MATLAB simulation .These pulses are given to the centre tapped inverter for switching purposes of MOSFETs. A centre tapped inverter converter dc into ac. A. C. Signal is very low voltage so for controlling the speed of single phase induction motor, there is a requirement of step up transformer .This step up transformer will step up the voltage in secondary side of the transformer and the speed of the single phase induction motor will controlled. The designing circuit is simulated on MATLAB Simulation and result is verified on hardware also.

PROPOSED SCHEME

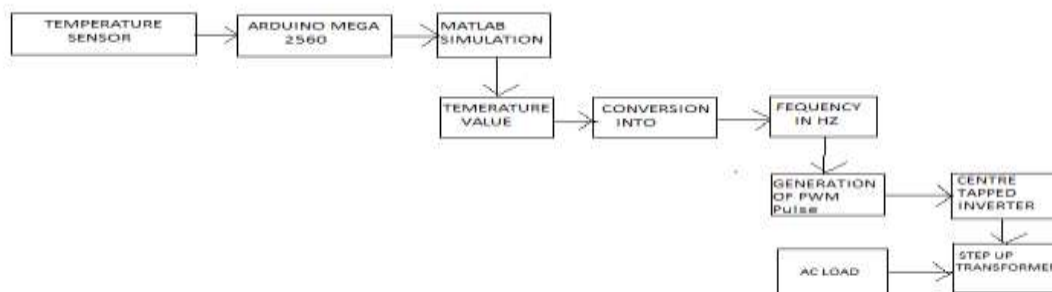


Fig.1. Block diagram of proposed scheme

SYSTEM SPECIFICATION

A. Temperature Sensor:

Temperature sensor is a device which its used to control the value of temperature into an electrical value .temperature sensor is key to read temperature correctly and used this reading of temperature in industrial applications .there are various types of temperature sensor . all these sensor are differ a lot in properties such as temperature range , calibrating method and sensor elements .temperature sensors contain a sensing element. With the help of conditioning circuit, the sensor will give a reflection of change of temperature .temperature sensors are LM34 and LM35.

B. Arduino Microcontroller:

Arduino is an open source physical computing platform based on simple input / output board Arduino is that which used for design and manufacture signal .this arduino board is easily interface with MATLAB Simulation software . Arduino microcontroller consists of 54 digital input/ output pins:

- 15 pins can be used as PWM Output.
- 16 pins can use as analog input.
- 4 pins as hardware serial port
- 16 MHZ crystal oscillator, a USB connection, power jack and reset button.

S.No.	Microcontroller	AT mega2560
1.	Input voltage (recom.)	7-12 Volts
2.	Input Voltage (limits)	6-20 Volts
3.	Operating Voltage	5 Volts
4.	Clock Speed	16 MHz
5.	Digital I/O Pins	54
6.	Analogue Input Pins	16
7.	DC Current per I/O Pins	49 milliAmpere
8.	DC Current for 3.3.Volts Pins	50 milliAmpere
9.	SRAM	8 KB
10.	EEPROM	4 KB
11.	Flash Memory	256KB

Table 1: Arduino At Mega 2560 microcontroller specification

The incoming dc voltage is converter into the form of PWM Pulse through Arduino microcontroller. PWM pulse signal used switching purpose of MOSFETs.

C. Centre Tapped Inverter:

A Centre tapped inverter consists of two MOSFETs switching. The drain terminal of two MOSFETs is connected with a transformer. The neutral winding of transformer is positive terminal of battery and the negative terminal of battery is connected with source terminal of the both MOSFET. There connected two extra MOSFET which gives a protection MOSFET. The different two MOSFET are connected in parallel the gate terminals are connected together. When the PWM Pulse from Arduino is used for switching of theses MOSFET s. at a time MOSFET are switching and having a 180 degree phase sift between the two pulse .thus this can give a output in form of full AC.

SIMULATION MODEL

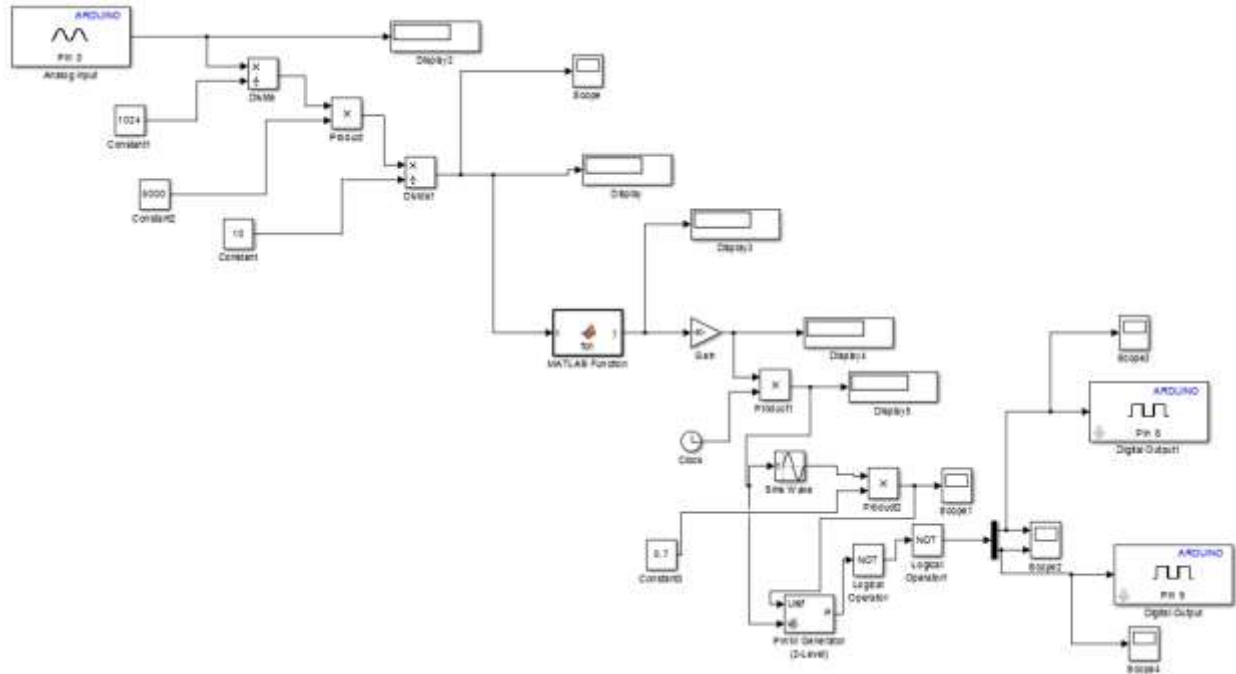


Fig.2. Simulation Mode of generation of PWM pulse generation

SIMULATION MODE

The designing circuit converting the temperature value into electrical value. Electrical value depend upon the level of temperature .temperature varies between 0⁰ C to 100⁰ C. The analog input pin 0 of arduino microcontroller and this will read this dc voltage in the form of bits means 5 Volts read as 1024 bits .Arduino microcontroller is interfaced with MATLAB Simulation .PWM Pulse is generated with the help of Arduino microcontroller on MATLAB Simulation .MALAB function provide the different values of voltages which is dependent upon the level of temperature .

MATLAB Function is shown as ,

Function y = fcn (u)

If u<=30

y=0

Else

If u>30& U<34

y=50

Else

If u>34&u<38

y=55

Else

If u>=40

y=60

else

MATLAB function actually represented the dc voltage in the form of frequency if the value of temperature less then 30⁰C then the output of MATLAB function will be 0 Hertz. If temperature lies 30⁰ C to 34⁰ C then output of MATLAB function will be 50 Hertz. If temperature lies 34⁰ C to 38⁰ C then output of MATLAB function will be 55 Hertz. If temperatures greater than or equal to 40⁰ C then output of MATLAB function will be 60 Hertz. so for

different level of humidity , the MATLAB function will give different value of frequency in Hertz. Next steps that, a gain of 2π is used. The only reason using gain for convert the value of frequency from hertz to radian/second. Then product of clock (t) and frequency (w) for getting (w*t).this (wt) value fed to sine wave block. After that, sinwt is fed to 2-Level PWM generator for getting 2 PWM output signals which are 180° degree shifted and apart after demultiplexer. These two pulse are fed to the digital output pin no. 8 and pin no. 9 of arduino microcontroller.

the PWM output signal of pin no. 8 and pin no. 9 is fed to centre tapped inverter for switching purpose .these pulses helps for switching the MOSFETs .the whole process is only depend upon the value of or level of temperature . if temperature level is less then 30°C then frequency becomes zero. It means no PWM pulses is generated .tht means gate of MOSFET are not triggered as the result zero ac signal available at the secondary side of step up transformer. if temperature is lies between 30 to 34°C then corresponding to the MATLAB function value of frequency will be 50 Hertz. Thus the PWM Pulse generated and help in switching operation of MOSFETs of entre tapped inverter. After this ac signal available at the secondary side of step up transformer this ac signal driving the single phase indu2.ction motor if temperature becomes greater then 40°C then corresponding to the MATLAB function value of frequency will be 60 Hertz. At that time motor will rotate at its full speed.

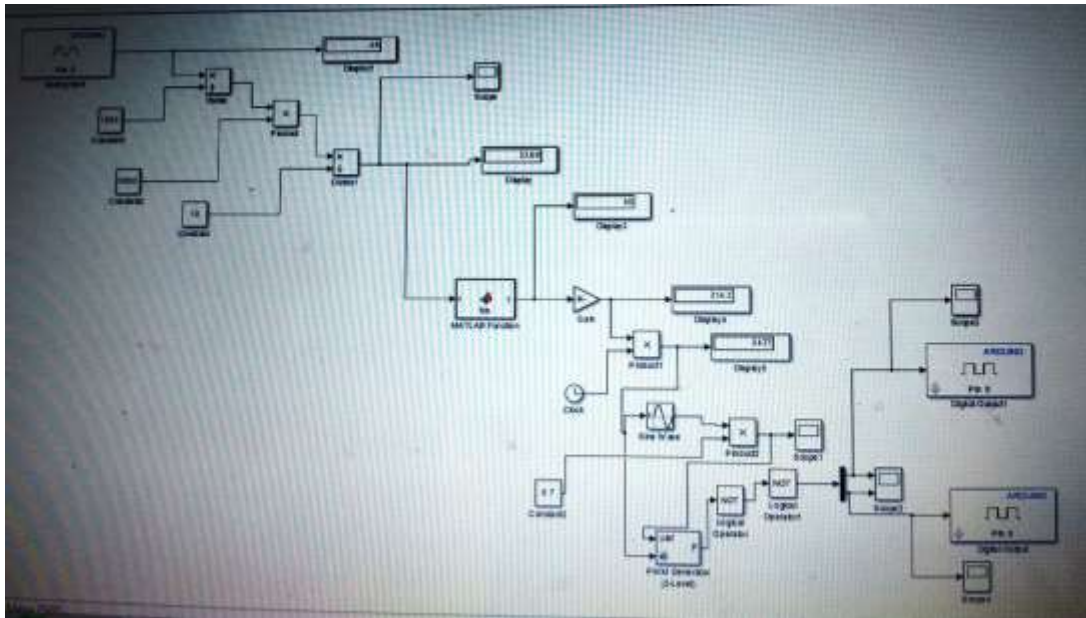


Fig.3. Simulation Model for representation of PWM pulse at temperature Greater then 30°C

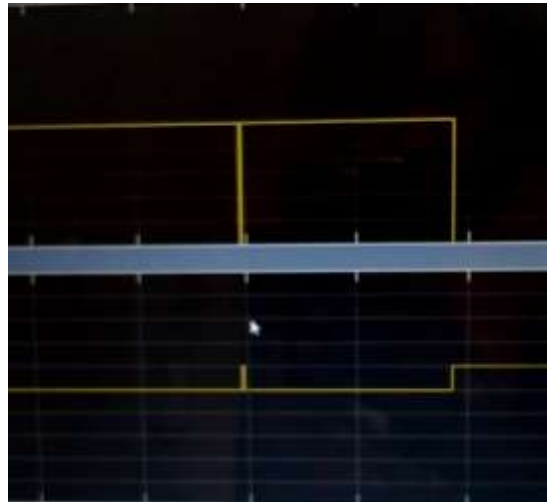


Fig.4.Representation of PWM Pulse generation when temperature greater than 30⁰ C

HARDWARE IMPLEMENTATION

Here the same simulated model is also implemented in real time on hardware .At different level of temperature PWM signal is different.

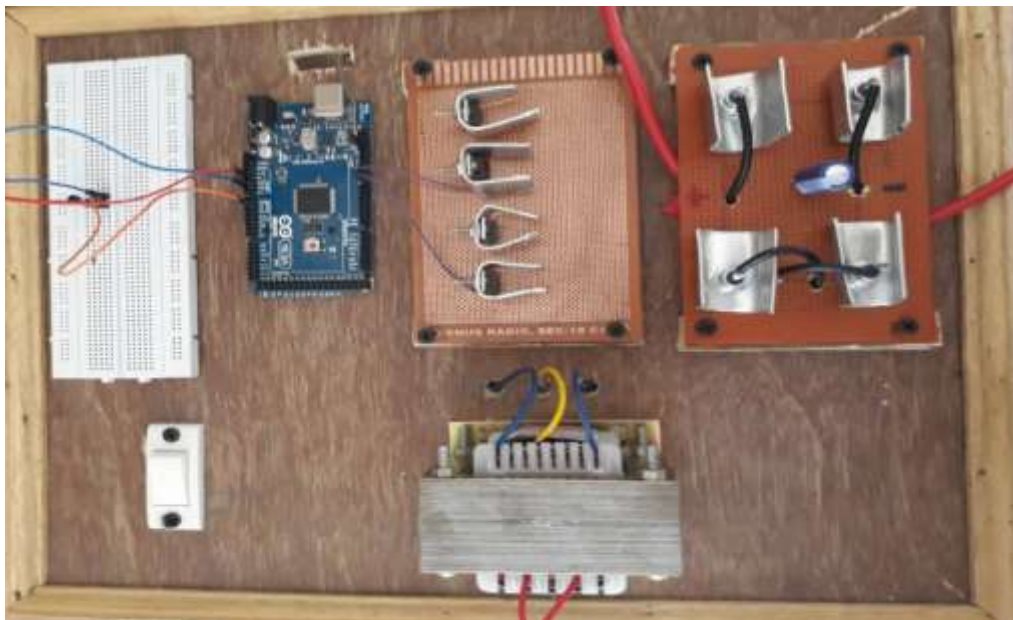


Fig.5.Hardware implementation

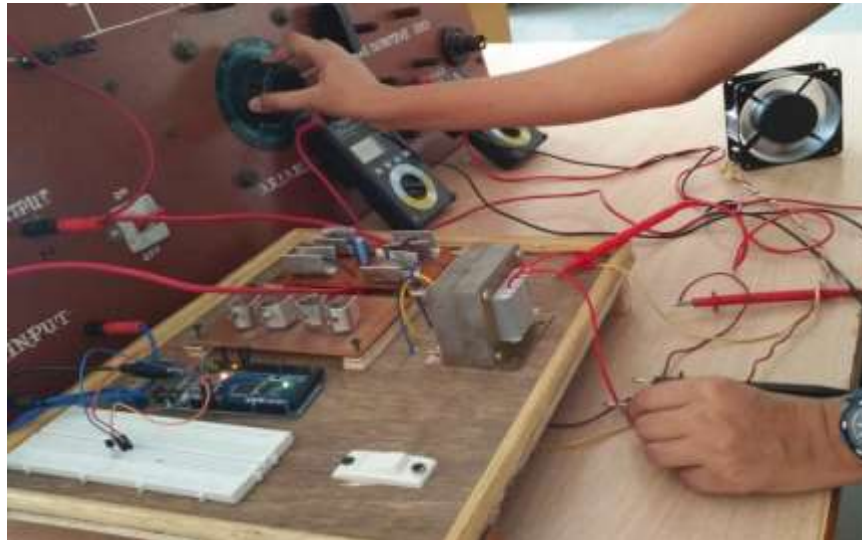


Fig.6. Controlling the speed of single phase induction motor by using Temperature Sensor

CONCLUSION

Basic purpose that to designing anti condensing electrical circuit. The designing of anti condensing of electrical circuit not only read the level of temperature but it also controlling the temperature of environment of the temperature sensor.

- For low installation cost
- Less complexity
- Give Protection against flash over, short circuit and insulation failure.
- Better efficiency and economically good

Arduino microcontroller is used for provide the PWM pulses based upon the level of temperature .the designing of anti condensing electrical circuit used for controlling the speed of single phase induction motor.

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