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THYRISTOR'S SINGLE PHASE INDUCTION MOTOR SPEED CONTROL BY USING BLUETOOTH

[1]Dr.V.Raveendra Reddy , [2]K.Saranya Reddy

[1]Associate Professor , [2]Assistant Professor

[1]Electrical & Electronics Engineering,

[1]RSR Engineering College, Kadanutala, Kavali, SPSR Nellore (dst) ,India

Abstract : A massive variety of motors are used in our daily lives, ranging from household gadgets to industrial gear. There has been a dramatic development in industry automation and residential automation during the previous decade. Electric motors are usually an important aspect of household appliances as well as industrial applications in automation, and it is always necessary to manage the speed of the motor to ensure that the appliances function smoothly. The microcontroller is another crucial component of the appliances. Because of their low cost and ease of customization to any unique purpose, microcontrollers are always a vital component in any embedded system applications. Electronic components such as thyristors and diodes have been widely employed in industrial applications to control motor speed. The main objective of this article is to use Bluetooth technology to regulate the induction motor speed through thyristor. In many industrial applications, adjusting the speed of the AC motor is necessary to run the process in phases; this article illustrates the technique of varying the speed of the AC Motor. The circuit includes a microprocessor and an induction motor. Thyristors are used to drive induction motors by regulating the pulses of the incoming AC signal. The microcontroller input is linked to four input modules: low, medium, high, and stop. The speed of the motor is displayed on an LCD panel.

IndexTerms **– Induction motor, Thyristor, Bluetooth, Microcontroller**

I. INTRODUCTION

Electric induction motors operate at a fixed speed, making them ideal for applications requiring a constant motor output speed. However, there are applications where the output speed of the motor varies. Equipment such as conveyors are well suited for fixed speeds, but there are some applications that are well suited for variable speed operation, such as: B. Fans, pumps, winders and precision tools. As a recent customer trend, this project required automation to develop a motor that automatically changes speed using Android Bluetooth. AC induction motors are the most widely used motors in consumer and industrial applications. There are several ways to control the speed of an AC motor. There are several ways to control the speed of an AC motor. One way is to change the frequency and voltage of the motor. Speed regulation of single-phase motors is typically achieved by electrical means such as reducing the supply voltage through an autotransformer, or by switching windings as needed to change the number of poles in the motor for different operating conditions.

Voltage control is the best method, but it only allows a limited speed range. Frequency serves as an interesting alternative to voltage control. In the frequency control method, controlling the frequency of the motor will saturate the air gap flux and maintain the air gap flux. Therefore, the stator voltage must also drop proportionally with frequency to

keep the air gap flux constant. The magnitude of the stator flux is proportional to the ratio of stator voltage and frequency. Therefore, if the voltage-frequency ratio is kept constant, the magnetic flux will remain constant. In our project the induction motor speed is controlled using GSM. Android applications offer a wide range of speeds with optimal output. In today's rapidly evolving world, there is an urgent need for high-quality products and services enabled by industrial automation.

II. Proposed System

Our article focuses on sending commands through a mobile app to remotely control the speed of an induction motor using a Bluetooth modem. A Bluetooth modem is connected to the microcontroller. A Bluetooth slave modem receives commands from a mobile phone. A Bluetooth modem sends a signal to an Arduino microcontroller. The Arduino microcontroller decodes the signal and sends it to the optocoupler. A corresponding optocoupler then activates the circuit to show the change in induction motor speed associated with the change in thyristor firing angle. The main purpose of this work is to control the speed of an induction motor using a triac. In many industrial applications it is usually important to vary the speed to run the process in different phases. This article describes the mechanism of varying the speed of an AC motor. The circuit is equipped with a microcontroller and an induction motor. Induction motors are controlled by controlling the pulses of the input AC signal using a triac. The microcontroller inputs are connected to four input modules: Low, Medium, High and Stop. An LCD screen was used to display engine rpm.

Block Diagram

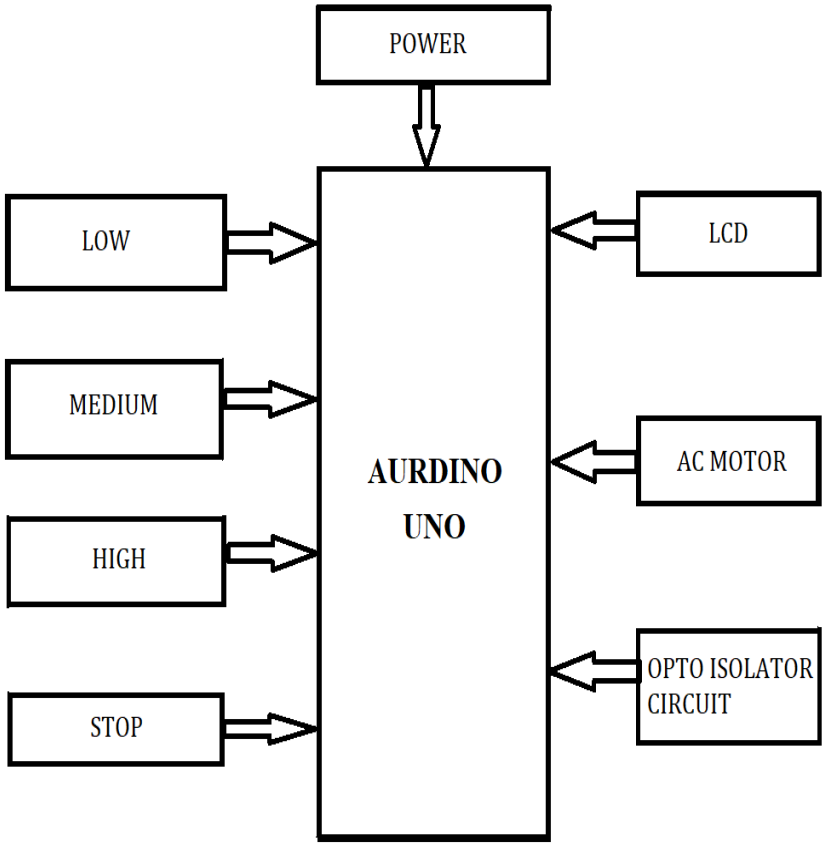

Fig.1 Block diagram of proposed system

III. HARDWARE REQUIREMENTS

1. ARDUINO UNO
2. BLUETOOTH
3. LCD
4. INDUCTION MOTOR
5. POWER SUPPLY
6. OPTO ISOLATOR

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital I/O pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16MHz ceramic resonator, a USB connector, a power jack, an ICSP header, and a reset button. It contains everything you need to support your microcontroller. Simply connect it to your computer with a USB cable, or power it with an AC-DC adapter or battery and you're good to go.

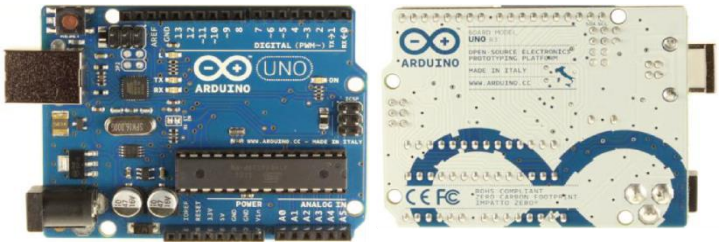

Fig.2 Arduino UNO

BLUETOOTH MODULE-HC-O5

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration

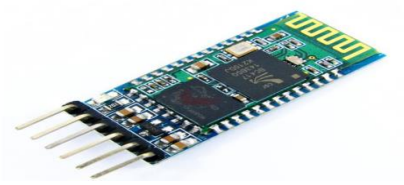

Fig.3 Bluetooth Module

OPTO ISOLATOR

An optical isolator (also called an optocoupler, optocoupler, or optical isolator) is a semiconductor device that uses a short optical transmission line to transmit electrical signals between circuits or elements of a circuit, keeping them electrically isolated from each other.

16x2 LCD

16x2 LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability, programmer friendly and available educational resources

Fig.3 Bluetooth Module

IV. RESULTS

The speed of induction motor can be controlled in four modules. The modules are low, medium, high, stop.In these modules we can use we can control the speed of induction motor by using Bluetooth.

Mode1:

The below figure shows that the speed of induction motor is at off state. If we send the command as OFF then the speed of the motor will get in to off state.

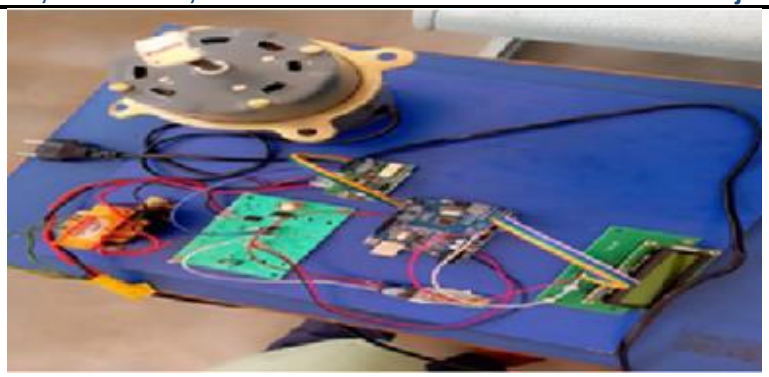

Fig.4 Motor in OFF condition

Mode2:

Here we send the command as speed is LOW ,as soon as the signal recieves the induction motor will start running slowly as shown in the figure below.

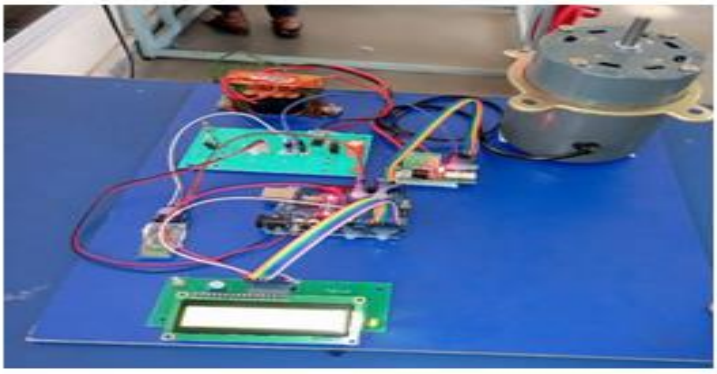

Fig.5 Motor running in LOW condition

Mode3: If we send the command as the speed is medium the induction will start running by medium state.

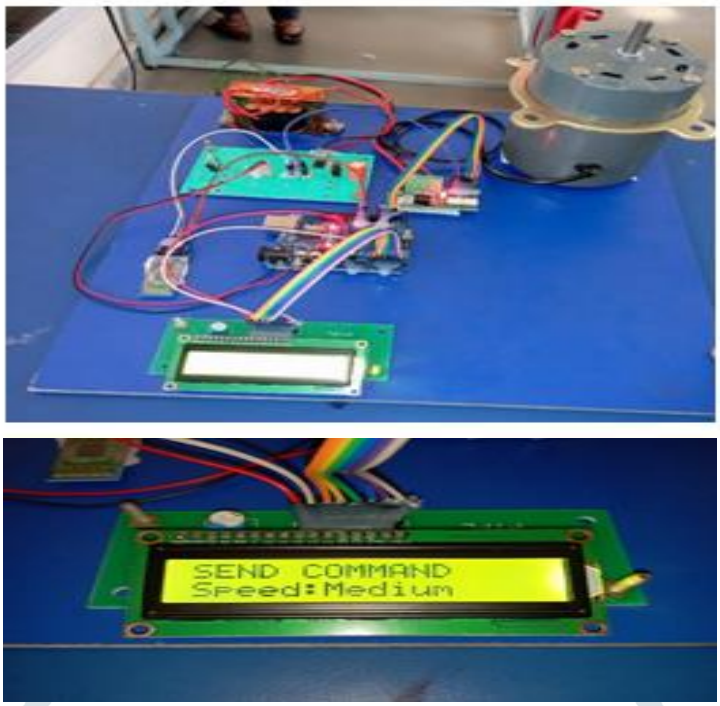

Fig.6 Motor running in MEDIUM condition

Mode4: Here we send the command as speed is HIGH ,as soon as the signal receives the induction motor will start running with high speed as shown in the figure below.

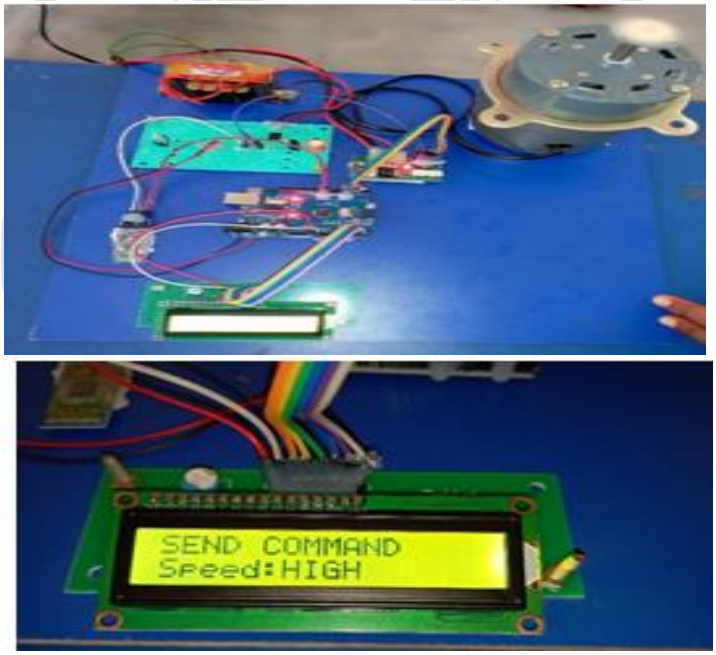

Fig.7 Motor running in HIGH condition

CONCLUSION

Adjustable Speed Drives are used in any application in which there is mechanical equipment powered by motors. The drives provide extremely precise electrical motor control, so that motor speeds can be ramped up and down, and maintained, at speeds required and at the same time speed can also be measured by the tachometer. Thus, in this project we show that how we provide a complete automation with the help of switches on the induction motor.

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