

Speed Control of Single Phase Induction Motor by Android Application using Wi-Fi

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Abstract:- The single phase Induction motor or Asynchronous motors are as ubiquitous as they are useful in serving as prime power sources for a seemingly limitless array of small-horsepower applications in industry and home. Thus controlling the speed of the Induction motor plays a significant role. Here the proposed system is designed to control the speed of Induction motor by android application using Wi-Fi, where remotely controlling the speed of an Induction motor is accomplished. The advantage of android is that it is an open source operating system is used in terms of Android application that is smart phone which will act as a remote controller. Android application which uses Internet to connect to the WIFI module of control circuit that is connected to the motor. We use internet to establish communication between the user and Monitoring unit, we are monitoring and controlling the speed of AC motor.

Keywords:- Node MCU, AC Induction motor, Speed sensor, LCD display, Mobile Phone, Router.

I. INTRODUCTION

The availability of fast-processing, stable and sensitive products provided particular benefits in industrial Automation. As a result of the developments in Communication technologies, systems are no longer monitored and controlled by personnel using classic methods, but automatically by computer- controlled or remote controlled devices. Industrial environmental conditions have been upgrading day by day with this newly introduced automatic techniques as a result of getting rid of the conventional procedures of manufacturing increasing huge workloads. The next generation industries will be Technological developments have enabled to be taken classic systems place by Automatic and advanced systems definitely more advanced and automatic as compared with existing ones. This brings on a new terminology of “Smart Industries” in this new era of Monitoring as well as controlling of various Industrial applications.

The implementation of this method to control the speed of the Induction motor helps to reduce the work of the man power; since Wi-Fi is used the person can operate the motor from anywhere because the Wi-Fi gives a long range of communication. Hence this leads to exchange of relevant data and other parameters information among various devices to improve their performance, which will help industries to have better productivity, management and increased throughput.

II. WORKING

In this technology we have used components they are as follows: Power supply, Induction motor, speed controller, speed sensor, LCD display, I2C, Wi-Fi module, NodeMCU, Router and Mobile phone. By adding these components we can create a system to control speed of AC induction motor via Wi-Fi. The 230v power supply is given from an Ac power supply which is regulated by the voltage rectifier and converted to 3.3v. As the NodeMCU requires a constant voltage of 3.3v, NodeMCU is switched on, the ESP8266 WI-FI module is activated and searches for the nearby router that is available with internet connection. The Wi-Fi module connects to the router with the static IP address provided by the router. This IP address is checked by connecting NodeMCU to PC via USB. The obtained IP address is provided to the application on the Mobile phone, thus the operating phone is also connected to the same router. Now the Wi-Fi module and mobile phone using the same IP address can communicate with each other. The speed adjustment bar on the mobile phone is used to adjust the speed of the Ac single Phase induction motor. The url to be used is <http://gpio:IPadress:data>. Data is given from 0 to 255 to control the speed of the induction motor via application which has a slider to alter the speed. The NodeMCU communicates with the speed controller with the given data and thus controls speed respectively. The Speed sensor is used to monitor the speed, which is connected to NodeMCU. The Node MCU via I2C connection to the 16x2 LCD display shows the readings of the speed. The LCD display is used to check change in speed of the motor in case of power cut or power fluctuation.

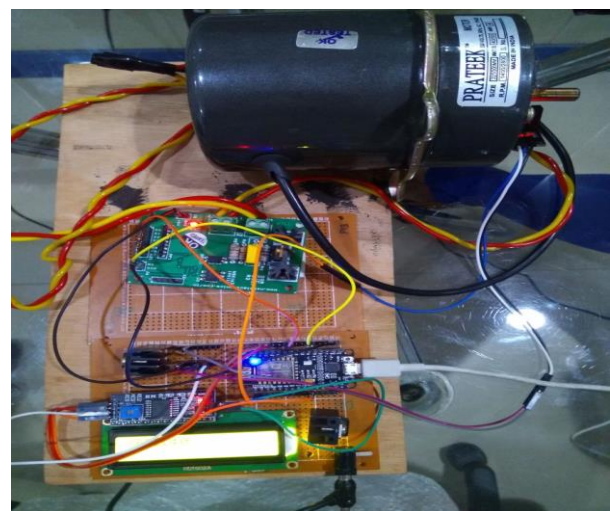


Fig 1:- Working Model

III. COMPONENTS AND SOFTWARE

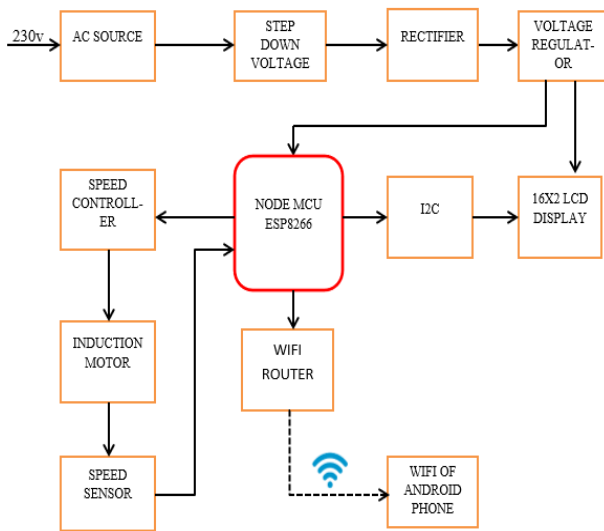


Fig 2:- Block Diagram of Speed Controller of Single Phase Induction Motor

➤ *Components*

- Node MCU
- Speed controller
- Induction Motor
- I2C
- Speed sensor
- Wi-Fi Router
- Android phone

The above components are used in this technology to control the speed of an Induction motor.

• *Node MCU*

The Node MCU is known as the Node Micro Controller Unit. It is open source software, which includes both the firmware and hardware. The ESP8266 Wi-Fi SoC from Espressif system is the firmware it uses the Lua scripting language and the Hardware which is based on ESP-12 module. A simple code is used to establish a Wi-Fi connection, and define the input and output pins accordingly. It is the Wi-Fi equivalent of Ethernet module. With its USB-TTL, the NodeMCU Dev board supports directly flashing from USB port. It combines features of Wi-Fi access point, station and microcontroller. These features make the NodeMCU a unique tool for Wi-Fi networking. It can be used as access point, station, host a webserver or connect to internet to fetch or upload the data.

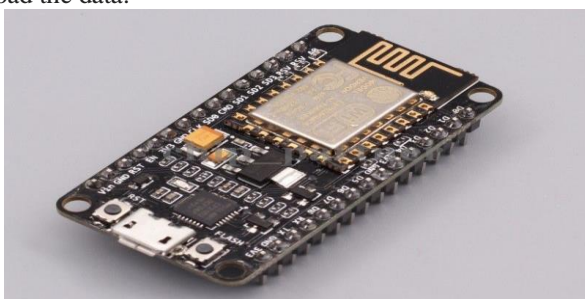


Fig 3:- Node MCU

• *Speed Controller*

Induction motors, speed reduction is accompanied by a corresponding loss of efficient and poor power factor. As they are widely being used, their speed control may be required in many applications. SSR (Solid State Relay) PIC 8 BIT speed controller is used. It provides high degree of reliability, long life and reduced electromagnetic interference (EMI), with a much faster response time. This board controls AC load very easily through UART and 8 BIT data control.



Fig 4:- SSR 8Bit speed controller

• *Induction Motor*

Single phase Induction motor is widely being used in the home appliances, offices, workshop etc. As the power delivered to these is single phase. Hence they are cheaper, reliable, simple in construction and easy to handle. It is also called as Asynchronous Motor, because an Induction motor always runs at a speed lower than Synchronous speed.

• *I2C*

It is a serial protocol for two-wire interface to connect low-speed in devices like EEPROMs, D/A convertors, I/O interface, Microcontrollers and other similar peripherals. It uses only two wires SCL (Serial clock) and SDA (Serial data). I2C Transfers 8 bits or bytes serially.

• *Speed sensor*

FC-33 Motor Sensor Module is used. The module can be used with the microcontroller for motor speed detection. Usually this is done by counting the events for a given period of time

• *Android Phone*

The Application is been created using app inventor website.

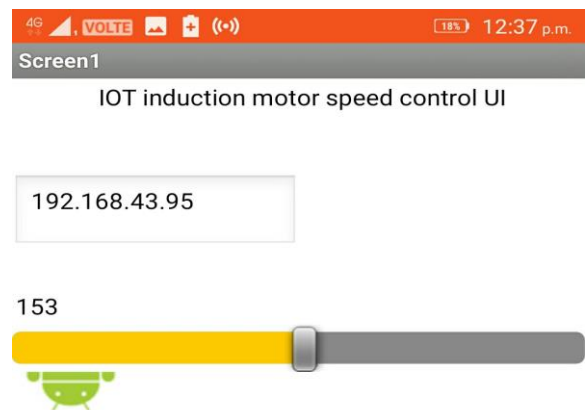


Fig 5. Screenshot of Application

IV. APPLICATION

This can be implemented in Real Time bases such as,

- Industries.
- House hold like home automation.
- Wood working machinery.
- Water pump.
- Large blowers.
- Vacuum pump.

V. CONCLUSION

The key idea of the proposed work is to provide flexible and long distance connectivity between monitoring unit and user. The advantages of the developed system are to have a continuous monitoring over the unit and also control them if going beyond their threshold conditions. The system controls the speed of an AC single phase induction motor by wireless communication using internet through Wi-Fi module. Wireless Control from Remote places. Easy to operate, by using mobile possible to on/off motor. Speed of motor varies by simple touch on mobile screen. Display the status of current speed, Reduce maintenance.

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