

WIRELESS INDUSTRIAL MONITORING OF SINGLE PHASE INDUCTION MOTOR USING ZIGBEE COMMUNICATION

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ABSTRACT

In this paper, the speed of induction motor are monitoring by employing Zigbee based wireless networks for communication in industrial fields. Induction motors are very popular and used in many industrial application. This system has transmitter and receiver section which are controlled by DSPIC30f4011. The communication between those sections are made by Zigbee transmitter and receiver. The parameters such as voltage, current, speed and frequency were monitored. The main advantage of Zigbee are low maintainence , cost, low power consumption and reliability.

Keywords: Induction motor (IM) drive, Zigbee , Wireless , Speed control.

[1] INTRODUCTION

One of the most common electrical motor used in most applications which is known as induction motor. This motor is also called as asynchronous motor because it runs at a speed less than synchronous speed. In this, we need to define what synchronous speed is. Synchronous speed is the speed of rotation of the magnetic field in a rotary machine and it depends upon the frequency and number poles of the machine. An induction motor always runs at a speed less than synchronous speed because the rotating magnetic field which is produced in the stator will generate flux in the rotor which will make the rotor to rotate, but due to the lagging of flux current in the rotor with flux current in the stator, the rotor will never reach to its rotating magnetic field speed i.e. the synchronous speed.

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802 standard for personal area networks. ZigBee is targeted at radio frequency (RF) applications that require a low data rate, long battery life, and secure networking. ZigBee has a defined rate of 250 kbps best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Zigbee is a low-cost, low-power, wireless mesh network standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications. Low power-usage allows longer life with smaller batteries. Mesh networking provides high reliability and more extensive range. Zigbee chip vendors typically sell integrated radios and microcontrollers with between 60 KB and 256 KB flash memory. Zigbee operates in the industrial, scientific and medical (ISM) radio bands; 868 MHz in Europe, 915 MHz in the USA and Australia, and 2.4 GHz in most jurisdictions worldwide. Data transmission rates vary from 20 to 900 kilobits/second.

C. PROPOSED SYSTEM

In this proposed system we used Zigbee communication which is a wireless device used in industrial application for controlling speed of single phase induction motor for wide distance . Compare to other wireless device like Bluetooth, wifi etc Zigbee is advanced because it is extendibility, and it is simple. The range of Zigbee is about 70m to 300m and the data rate is 250kbps.Zigbee has 128 bit and many other application layer.

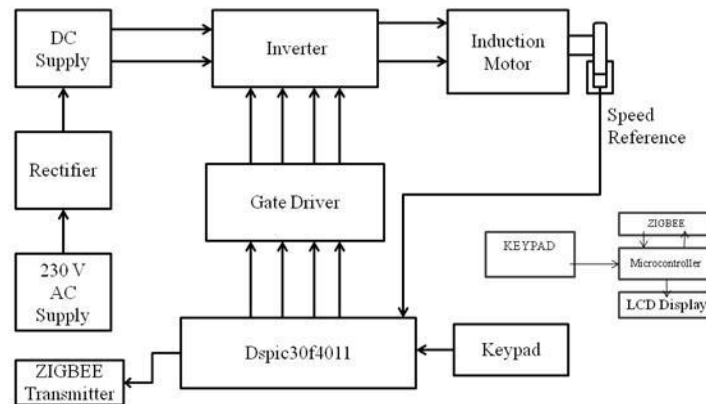
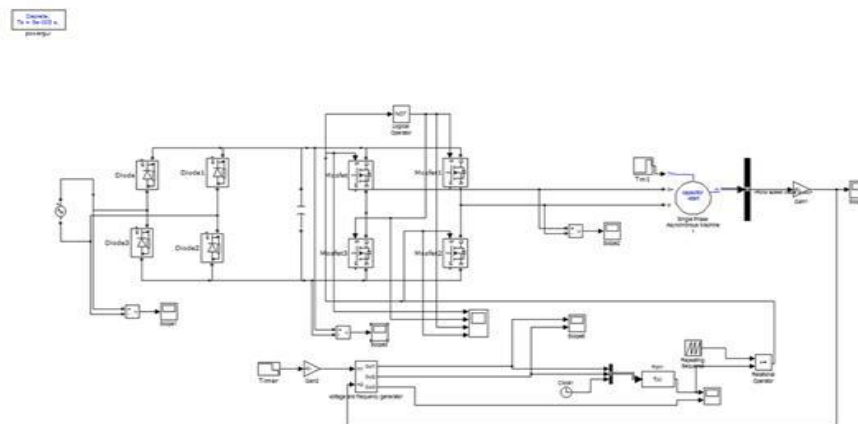


Fig.1.Block diagram of proposed system

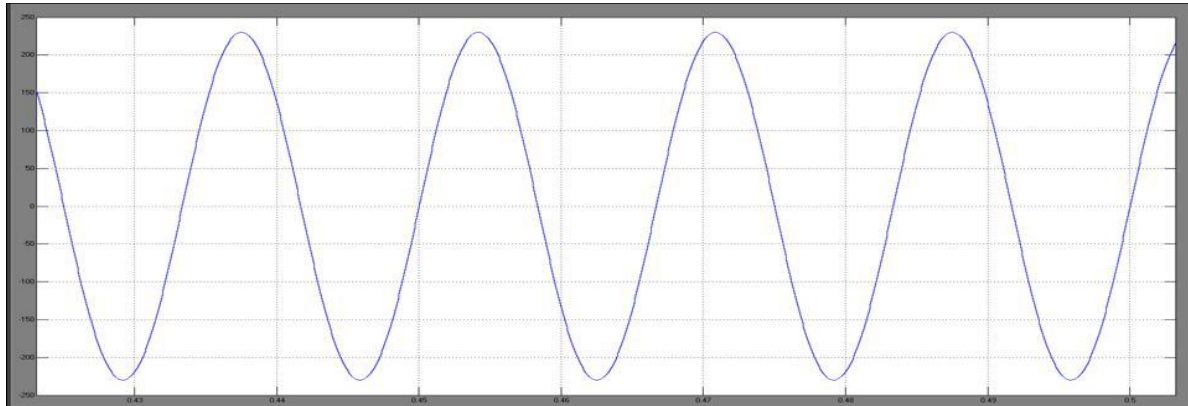
When 230V,50Hz single phase AC supply is fed to the rectifier, AC supply is converted into DC supply. Then dc supply is given as input to the inverter which converts dc supply into ac supply . The output of the inverter is given to the single phase induction motor in which the output speed of the motor is obtained and it is compared with reference speed and it is fed to the Dspic30f4011.Now the obtained 5V is converted into 12V and it is fed to the gate driver .Gate Drivers changes low current to high speed and then the output of the gate driver is given to the inverter and the cyclic operation will be continued. Thus the output is displayed in LCD display.

2.1 SIMULATION CIRCUIT

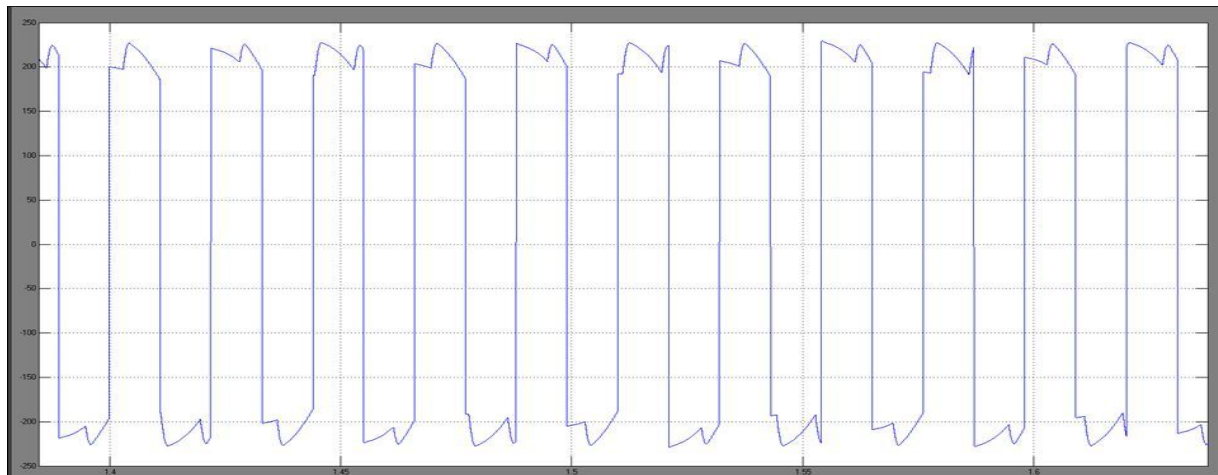


V. SIMULATION RESULTS

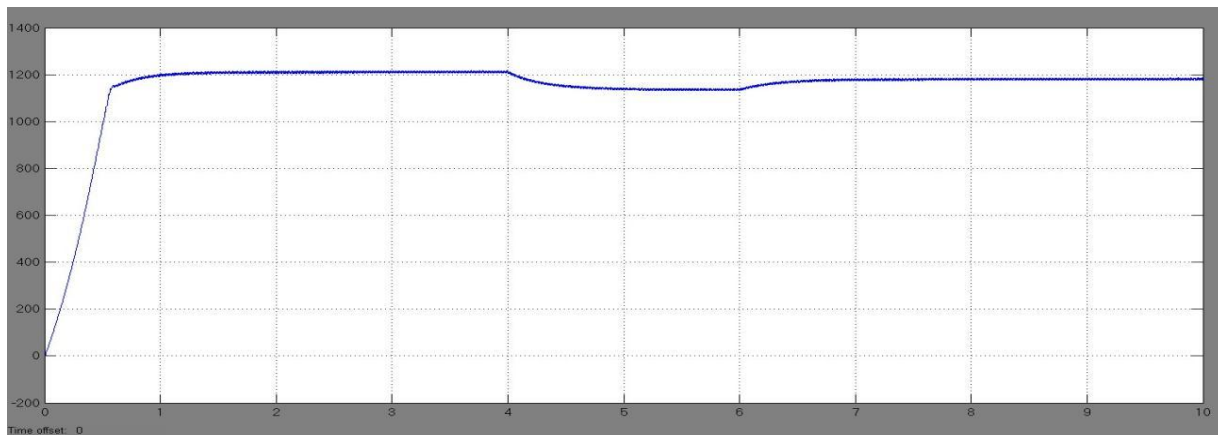
INPUT VOLTAGE



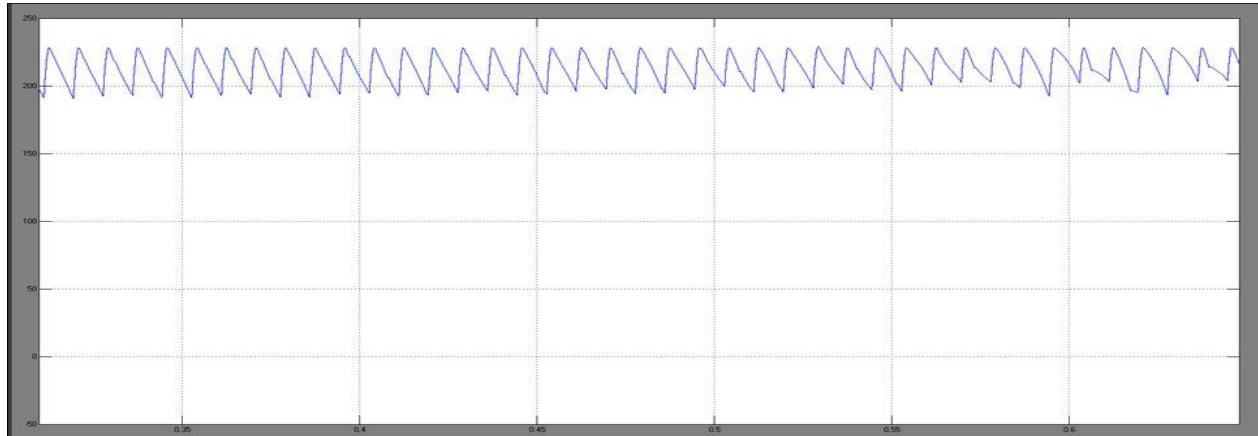
OUTPUT VOLTAGE



OUTPUT SPEED



DC LINK CAPACITOR



HARDWARE SETUP



CONCLUSION:

Hence the speed, frequency, voltage, current of single phase induction motor are monitored by using Zigbee communication successfully. This system has transmitter and receiver section which are controlled by DSPIC30f4011. The communication between those sections are made by Zigbee transmitter and receiver. The above work is evaluated by using MATLAB/SIMULINK and Visual studio.

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