



Remote Access and Monitoring of Induction Motor through Wi-Fi with Smartcard Security

Beethu Varghese¹, Krishna Mohanan², Ramesh Sankar³, Basil George⁴, Basilkumar N.K⁵

Assistant Professor, Dept. of EEE, Mar Baselios Institute of Technology and Science, Kothamangalam, India⁵

B.Tech Students, Dept. of EEE, Mar Baselios Institute of Technology and Science, Kothamangalam, India^{1,2,3,4}

ABSTRACT: The development of wireless structure control of electrical devices using smart card security system includes wireless protocol access, monitoring the load parameters, safety cut-off of load on over voltage and over current. The software is accessed using authorized individuals with the help of a smart card. Here the system is implemented on an induction motor having several parameters like temperature, voltage, current, and speed are continuously monitored at the base station. Any variations in voltage, current, speed, temperature are considered and the supply is cut-off if needed for protection. The device that is to be controlled is connected to the remote server consisting of a wireless transmitter-receiver adapter, with the help of a virtual channel called 'ad-hoc' network. This will be driven by a micro-controller. The voltage regulation is obtained by TRIAC and a zero crossing circuit, the speed is varied by varying the firing angle of TRIAC. The base station communicates with remote server through Wi-Fi protocol. The control is done by the software loaded in the base server using Visual basic. The base stations first authenticate the personals using smart card.

KEYWORDS: RFID Reader, RFID Tag, Security, Wi-Fi Module, Visual Basic.

I.INTRODUCTION

Identification of persons is always important in places like Airports, industries, railway stations, theatres, etc. Identification can be made automatic using Auto-identification. There are various methods for auto-identification. Some of them are bar-code systems, optical character recognition, biometrics, smart cards and RFIDs, of which RFID technology is a revolution. Various applications of RFID include: Transportation and logistics, manufacturing and processing, security, animal tagging, waste management, time and attendance, postal tracking, airline baggage reconciliation, road toll management etc. To keep unauthorized personnel out of their building, companies have implemented access control systems. Employees are given an access badge with radio frequency identification (RFID) chip in it. This technique uses electromagnetic fields to exchange data from a tag (like a smartcard) to an object (a reader) for the purpose of authentication, identification or tracking.

In this paper, it proposes the induction motor parameter control using RFID smartcard with Wi-Fi access. This method enables the monitoring and controlling of the motor. The parameters like voltage, current, speed, temperature are monitored and is compared with the cut off values. If the values satisfies, the motors starts running and parameters are displayed on the LCD display. Control access is provided by Wi-Fi module, RFID module and Visual Basic platform. Monitored parameters are accessed on the personal computer through a Wi-Fi module. Authorized person can access the VB platform using RFID tag. Changed parameters are given to motor drive on the machine side through Wi-Fi.

II.SYSTEM STRUCTURE

The aim is to monitor and display the parameters of a single phase induction motor and controlling the parameters like voltage, current, speed and temperature by identifying the authorized persons using RFID technology. The accessing can be provided using Wi-Fi and smart card security. It provides safety cut-off during over voltages and over currents.

A. Proposed Structure and Design of the System

Fig. 1 shows the basic block diagram of the proposed system. This method enables the monitoring and controlling of the motor. The parameters like voltage, current, speed, temperature are monitored and is compared with the cut off values. Here voltage is measured by a potential transformer, current is measured by a current transformer, speed is measured with the help of an IR LED sensor and temperature is sensed by a temperature sensor LM35. The output of potential transformer, current transformer and LM35 is analog in nature. These analog values are converted into digital values with an ADC module. If the values satisfies, the motors starts running and parameters are displayed on the LCD display. Control access is provided by Wi-Fi module, RFID module and Visual Basic platform. Monitored parameters are accessed on the personal computer through a Wi-Fi module. Authorized person can access the VB platform using RFID tag. Changed parameters are given to motor drive on the machine side through Wi-Fi.

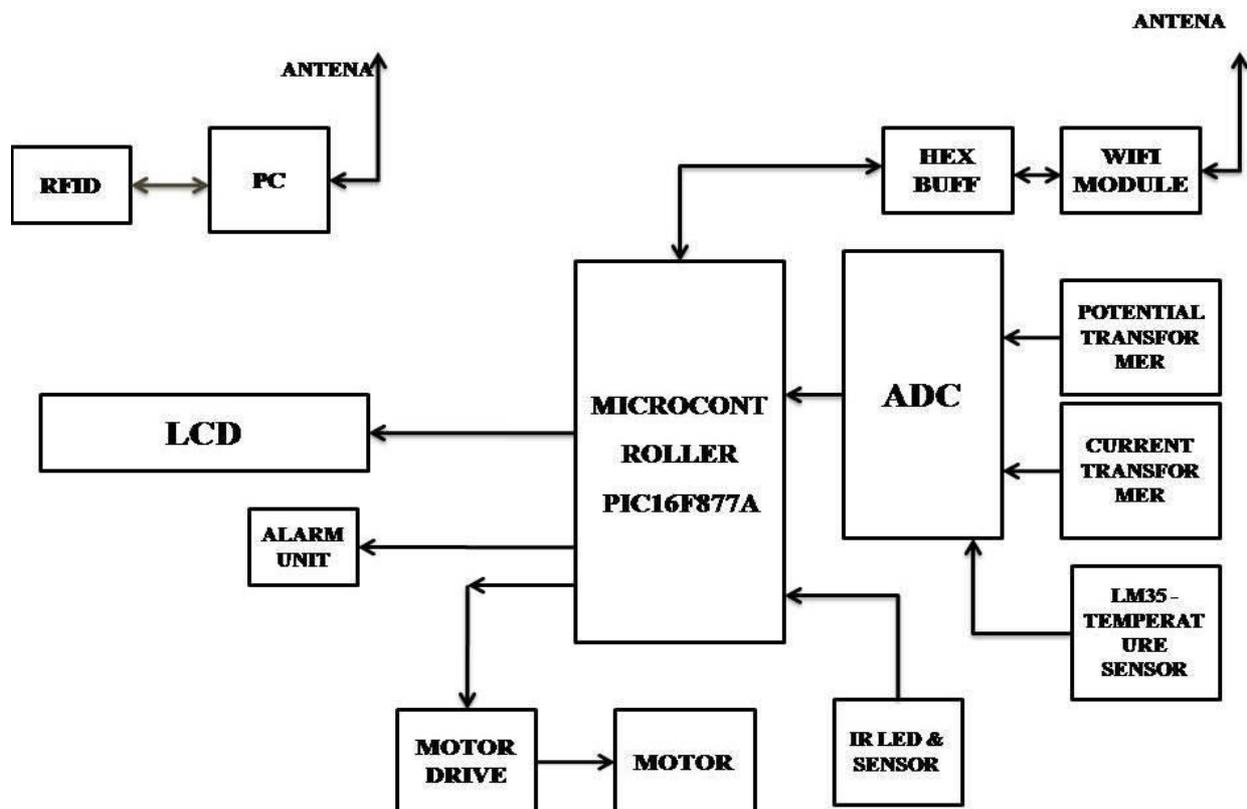


Fig. 1 Block diagram

III. WORKING OF THE SYSTEM

Working of the system is mainly divided into two. One is the measurement part and controlling part. The operation start when the motor get started. After starting of the motor the parameter are measured. Then the parameters are compared with programmed cut off values. If the value satisfies the motor continue running or else motor stop running. The parameter like voltage, current, speed and temperature of an induction motor are measured and displayed. Potential transformer measures the voltage of the motor. It is a step down transformer. By inductive coupling between the winding of the transformer voltage will be measured and this voltage is step down to 5V which is suitable for microcontroller. Current transformer is a type of instrument transformer that measures high value of alternating currents. It generates a current, with respect to primary current. A voltage is generated depends on the secondary current of the current transformer. This generated voltage is very small which is not sufficient for microcontroller to measure. Hence it is amplified by using an amplifier. LM35 measures the temperature it is a 3 pin IC. Pins are Vcc, ground and output. LM35 generate a 10mv output for every degree Celsius. Output of LM35, current transformer and

potential transformer are analog in a nature. It is converted into digital signals using ADC which is inbuilt is PIC16F877A. An IR LED sensor measures the speed of the machine IR LED consist of a receiver and transmitter. IR LED transmitter is also called TSOP1738IC. TSOP1738IC is used to count the rotation of motor by using a PWM drive. PSW will helps to generate a crystal frequency of 38MHz. Motor has a cut of on the shaft. The pulse will reflected from the cut of shaft and TSOP IC will act as a receiver and rotation of motor will count. IR LED is directly connected to the counter pin of micro-controller hence controller will count the rotation of motor in a minute. Output of all these devices is fed to the micro-controller PIC16F877A. When the motor starts parameter will be checked and safely cut off, if there is over current and over voltage. These parameters are displayed on the LCD display. The measurement part ends with displaying of monitored parameter are sending them to the authorized personal computer through Wi-Fi.

Authorised individuals can access these personal computer by using RFID module. Authorised person will have a RFID tag. If person is an authorised one, tag is accepted and that person can open the control box and the value to be changed is given to the box appeared on the screen and the value are send back to the motor drive through Wi-Fi module on the motor side. Motor drive consist of a TRIAC control and zero crossing detector. Motor drive change the parameter of the motor according to the value given by the personal computer and the motor drive is connected to the microcontroller to control the parameter of the motor. The output of Wi-Fi module is about 3.8V which is not sufficient for the efficient operation of microcontroller. This 3.8v is boosted to 5v using Hex buffer.

IV. DISCUSSION AND RESULT

RFID Based Security System which is able to identify authorized persons was successfully developed. Several parameters like temperature, voltage, current, and speed of an induction motor are continuously monitored from remote a system. Any variation in voltage, current, temperature and speed are considered and the supply is cut-off, if needed for protection. Only authorized individuals can access the system with help of smartcard. The motor parameters are varied and the output is monitored successfully.



Fig (2.a) Measurement part

Fig (2.b) Controlling part

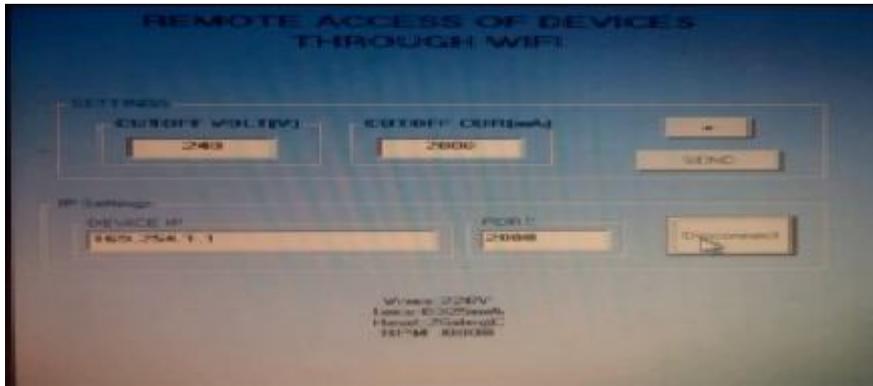


Fig (2.c) VB Platform

V. CONCLUSION AND FUTURE SCOPE

RFID is increasingly used with biometric technologies for security. It develops wireless structure control of electrical devices. This system continuously monitors the load parameters. Variations in voltage, current are considered and supply is cut-off if needed for protection. Monitored parameters are accessed on the personal computer through a Wi-Fi module. The software is accessed only by the authorized individuals by using RFID technology. It enables to detect the various fluctuations in voltage, current, temperature and speed which can affect working of the system and thereby avoid all such problems which can arise due to above mentioned reasons.

The software is accessed using authorized individuals with help of smart cards. In future the control access range can be expanded by replacing Wi-Fi with an Internet access. Also the number of the authorized individuals can be increased by making simple changes in the program. It can be implemented in various areas such as electrical hazard area, used to control high rated machines and automation of motors & generators in industries.

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