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Smart Internet of Things Based Induction Motor Parameter Monitoring and Control System

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Abstract: ***Automation is the use of various control systems for operating equipment such as machinery, processes in industries such as boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications with minimal or reduced human intervention. This research paper presents advanced approaches using wireless monitoring system for induction motor based on Internet of Things (IoT) for safe and economic data communication. n the first approach, state of the art fault detection strategy is exhibited for induction motor. This research paper depends on the assessment of measured voltage, current, earth leakage, rotor status and speed. Progressed embedded strategy and utilized to isolate and survey the disappointment seriousness. In this procedure, distinctive sensors are associated with the motor, and the quantities are extracted by utilizing a microcontroller. The Graphical User Interface (GUI) with cloud server IoT is used to transmit the data from base station to remote station. This arrangement allows the client to interface with the framework. The proposed research paper based induction motor control system is validated through the simulation in Raspberry Pi 3 environment.***

Keywords: ***Induction Machine, Zigbee Protocol, Wireless control and Monitoring System***

I. INTRODUCTION

The present computing era is free from traditional computing confined to desktop or Laptop. Now, it"s emerging and involves intelligent objects such as machines, infrastructures, environment, devices and peripherals for consumer utility at daily use etc. which are interconnected through the internet, Gubbi et al. (2013). Earlier Internet was just confined to information interchange between user and set of users may be local or across global, but now Internet is going to revolutionise the humanity. The ultimate goal of the internet is to provide the speedy, relevant information about the real world applications and the objects Aggarwal et al. (2013). With continuous developmental and analytical research based approach internet application and utilities have waxed up, going beyond the speculation of the human mind; and thus resulting in the birth of IoT (Internet of Things).

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The global connection of intelligent objects is referred as IoT which mainly aims at connecting the most of the day-to-day common in hand tools and devices over the internet that would mainly serve the benefit of meeting comfort, luxury, and a kind of buttress to disabled, elderly people. The ultimate goal of the present study is to suggest a mechanism which can reduce the energy consumption and save the extra energy of motor for further use.

The thesis focuses on the reduction of energy consumption at an individual house and in a large public network such as rural areas. In addition, the thesis also deals with the study of the water irrigation problems that the wastage of water can be reduced. To fulfil the objective, following three modules have been proposed. The modules have been designed in keeping up view with major aspects and solving the concern at the three discreet levels i.e.

- The domestic and commercial level that includes residential places such as hotels, homes , work area (offices) etc
- Major are covering up a city, a town etc..
- The rural and bucolic area where irrigation practices are followed and traffic density are very less or occasional

Various components of the IoT can be listed as follows Alur (2015). Success of IoT depends on the problem solving capability and tendering up of comforts to the user. For implementation of IoT to develop 4 the module following key technologies have been taken into consideration (Bandyopadhyay & Sen 2011).

Table 1 Various components of IoT and their implementation

COMPONENT	APPLICATION/PURPOSE
Sensible Hardware	Interface b/w physical to software world
Centralised Data Storage System	Helps to store the heterogeneous data collected from various sensor
Android Interface (Application)	To carry out the interaction between human and module
System Memory	Collect raw data and processed information
Sensors	Data collection From Physical world and existing situation

The chapter is organised into six sections. Section 1 deals with various factors related to the IoT, its definition, concept and application in various fields of existing society. The concept of the smart city is elaborated in section 2. Section 3 consists of the proposed methodology of induction motor monitoring. Chapter 4 In order to obtain the result and discussions are given in section 5. Finally, conclusion of proposed system.

II. LITERATURE REVIEW

This chapter discusses various literatures related to the power consumption, traffic flow as well as irrigation system for a smart home and smart city. Almost each of these works include the Lab-View as a prominent tool to investigate the corresponding problem in proposed framework. The data confer to the current existing trends at various level concerning to affordability, comfortable and lively hood of the human being.

S. No	Problem Statement	Problem Statement
Problem Set 1	Problem Set 1 Energy wasted by various equipment‟s and appliances employed at domestic level.	A major problem of energy wasted in operation of existing trends include beyond the point operation of garden sprinkler & lights as well as door lamps all though we may have paced up in field of automation and carrying out these process autonomously. Thus in order to cope up with this rudimentary model and sort out the problem sensors and time based operation have been opted to obtain optimum accuracy and best standards
Problem Set 2	Unwanted and beyond the point operation of Central Air Conditioner and H.V.A.C. units.	Maintaining proper temp, and humidity is also kept well into mind as per requirements and there by existing weather to meet the best in salubrious comforts.
Problem Set 3	Unnecessary operation of Artificial lighting sources.	Although previous work has obtained automation of natural light trough remote control switching but lack the possibility over presence detection and light intensity adjustment. Chapter 3 in depth deals with the issue.
Problem Set 4	Increased rate of theft and several other unsecure activities. The existing solution are very expensive	Major portion that was left out in previous work is incorporation of security aspect at domestic level at best price. Here in a in depth analysis and solution is proposed that maintains the security standards complying to the requirement and necessity and adhering the economical price range.

To overcome the lack of standardization in monitoring and control of equipments related to the water management in the Motor Parameter, Robles et al. (2015) has suggested a smart water management scheme. In order to propose a model, they apply the existing “Object Linking and Embedding for Process Control Unified Architecture (OPC UA)” for logistic and manufacturing sector with IoT. This model has the capacity for subsystem interaction and other water management related issues.

III. SYSTEM DESIGN

The key role played in all set of module is buttressed by IoT and as far as concerned to the cumulative development and growth in field of IoT it has yet to come and would serve as the zeitgeist of the current and well as generation to come.

As per existing scenario prescience can be drawn that portraits that in era to come most of the thing would be taken up by Internet and would act as a driving force for the humanity delivering the required need at level best comfortably and affordability. The primary function performed is, the data (temperature, light intensity) collected by the Control unit to centrally located server with the help of the USB communication as a medium of communication. That data which is transmitted is displayed on PC and can be stored for future reference.

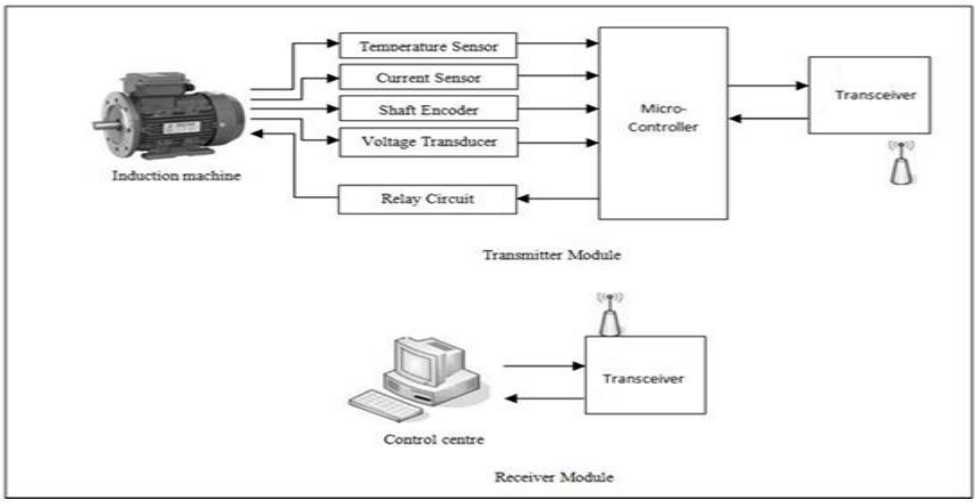

Figure1 Block diagram for iot based Induction Motor Parameter Monitoring

3.1 After every 80 seconds:

Samples of temperature and light intensity are taken every 10 seconds and stored in memory. After 80 sec, i.e. after 8 samples have been collected, the micro controller sends all the 8 samples at a time and clears the buffer.

The process is repeated every 80s.This is the fundamental condition for calling.

3.2 When the temperature and light intensity value exceeds maximum:

A maximum temperature and light intensity limits are provided. When the present sample exceeds the max temperature and light intensity, the micro controller immediately sends data collected up to that point.

This section gives the overview of the monitoring and controlling scheme of induction machine. A general block diagram of the proposed scheme is given in Figure. 1. In this section, we describe the three frameworks that are considered to implement the concept of smart cities. The power consumption module in motor side is primarily a real-time power monitoring sub-system, the sensor based surveillance system ensures security of people in public places and control system provides the simulation and picture to control at desired places. The framework shows the equipment along with the purpose, mandatory to ensure that smart motor monitoring automation, providing comfort to end users in their demanded ways. This data is transmitted efficiently and smoothly to receiver end through iot MQTT Communication Protocol. The micro-controller If the user anytime wants to Start or stop the induction machine, a signal will be given by the computer system present at the receiver end, which is communicated at the transmitter end through MQTT protocol. In turn the micro-controller unit present at plant location generates a signal which energizes and de-energizes the relay circuitry to stop and start the induction machine respectively. Thus this system not only monitors the operation of induction machine but also protects it from the severe faults that commonly occur. The automation of city in respect to resources is the prime purpose to considerate as induction motor monitoring. In the same line the computing security will play a key role in the success of induction motor monitoring. In view of security computation, which will apply firewall policy in client-server architecture, so that all the automation, as designed in framework can be saved and controlled successfully. Apart from this insertion of different new module will be incorporated such as advanced Local Transport management system (using GPS: Global Positioning System), Advanced Irrigation system, Integrated Emergency Services. Its fact, in order to implement smart city, there is need to work on various framework parallel, so this article focus majorly on electricity, camera base surveillance based security and traffic control system only.

IV. RESULT AND DISCUSSION

After the installation, the system module is capable to keep track record of the Power consumption of discrete consumer in a real time domain. If any, detection of Power issues (i.e. through variation in the readings of (Power Units) the defaulter can be easily tracked.

4.1 Temperature Monitoring

Temperature of stator winding can be measured through Dallas DS1820 Direct to digital temperature sensor. The Dallas Direct–to–Digital Temperature Sensors measure temperature through the use of an onboard proprietary temperature measurement technique.

4.2 Speed Monitoring

Speed of revolution of induction machine can be measured using shaft encoder wheel and sensor.An encoder is a rotational transducer that converts angular movement into digital impulses.

4.3 Process Monitoring

The temperature data logger is used extensively in industries such as food processing, manufacturing, printing, metallurgy, etc. where critical process variables (temperature, pressure, etc.) may adversely affect the results of the process. Continuous monitoring records the process, and user-defined alarm limits immediately alert the operator of extreme conditions that require attention. In the event of power interruptions the system automatically resumes monitoring the process at the present conditions. Our research objective is to design and deploy the framework which is worth useful to improve the existing scenario in field of controlling and making the systems automated, simplified on the other hand also helps in maintain security aspects also.

In this article the three frame work are discussed: which is based on electricity, public security and traffic control system. As smart city article concluded the combination of various different domain, so in our proposed work i.e. in another article is to take other area.

V. CONCLUSION

IoT is a paradigm which makes each object as an intelligent object. Intelligent objects have the identification, sensing, communication and processing features which makes them capable to communicate with other objects, software and services running on the internet. Intelligent objects forms the backbone of the IoT and helps to improve the living standard in a city. A smart city has many IoT based applications running in different areas across the city. In this thesis, we have applied IoT to study the issues related to the power consumption, irrigation system, and traffic flow and security system in a city to make it a smart city. We have proposed sub module at three distinct levels carrying out the purpose of automation using IoT. These modules monitor and control of the Induction Motor required solving the aforementioned problems. Proposed System is found capable to solve the various issues, importantly issues related to the power consumption, its automation and billing process successfully.

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