# Analysis & Control of Electrical Machines Using Internet of Things

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**ABSTRACT**

Nowadays, the Internet of Things (IoT) is being used in all the home appliances, industries and in every device. The Iot act as the hub for devices to connect people and to create relation between people to people, people to things, things to things. The control is made remotely by Iot. The Dc motor is operated by using Iot. The Dc motor is turned ON or turned OFF from the user Interface which is created in the web domain .The sensors connected near the motor, senses the parameters needed in the running motor. Here temperatures, speed, vibrations, are sensed and the obtained data are sent to the arudino microcontroller. The arduino microcontroller fetches the information to open source platform such as thing speak and the information is represented in the graphical system.

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## 1. INTRODUCTION

In the next century, planet earth will on an electronic skin. It will use the Internet as a scaffold to support and transmit its sensations. The Internet of Things is the most trending technology today that stands alongside wearable's and robotics. It is a very simple concept where devices in our home or wherever they are connected by Internet, have the capability to communicate with each other via the internet. The IoT is the intelligent interactivity between human and things to exchange information and knowledge. It is basically connection of formerly unconnected 'things' to the internet. The analysis says that by 2020 there will be more than 50 billion users connected. The IoT is a giant network of connected "things". The communication will be between people-people, people-things, and things-things. Iot is going to rule the world. The concept is basically connecting any device with an ON and OFF switch to the Internet. Usually sensors are used with this technology to pass data to the internet. Which uploads data like temperature, humidity, soil purity, etc to the Internet, and this data will be visible to you from anywhere around the world. It is possible to connect each and every device with this Internet of Things. In home automation systems it is connected to the net, which can be used to control appliances in your home like lights, door locks, air conditioning, etc through a web interface or smart phone application. A lot of technologies are being developed around this concept such as independent light-weight IoT networks, protocols for passing data, etc. It can get started on making a smart home automation system that is web based using normal HTTP protocols. You will be able to control any appliance in your home from anywhere from the world. The whole system is composed of two parts: Server and Client. Here, the server is the web interface consisting of buttons and UI (User Interface) that will allow you to turn ON/OFF a device. It consists of PHP files, Html files and a .txt file (to store data). Wireless systems can be of great help for automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere. For all these reasons, wireless technology is not only an attractive choice in renovation and refurbishment, but also for new installations.

## 2. RELATED WORK

**A. Home Automation:** In today's world Automatic systems are being preferred over manual system.The rapid increase in the number of users of internet over the past decade has made Internet a part and parcel of life, and IoT is the latest and emerging internet technology. Internet of things is a growing network of everyday. Wireless Home Automation system using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection. Home Automation system that employs the integration of multi-touch mobile devices, cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home.

This system uses a consolidation of a mobile phone application, handheld wireless remote, and PC based program to provide a means of user interface to the consumer. The required lights are turned on/off automatically by detecting the light outside the house. The user can also monitor the electric appliances through the internet via web server. Home automation system controls the following components in users home and monitors the following:

a)  Temperature and humidity
b)  Motion detection
c)  Fire and smoke detection
d)  Light level
e)  The proposed home automation system can control the following appliance:
f)  Lights on/off/dim
g)  Fan on/off
h)  On/off different appliance

The sensor data are sent to the web server and stored in the cloud. The data can be analyzed anywhere any time.

**B. Smart City***:* The smart city is analyzing and providing the consumer needs automatically using internet. For instance, home appliances, surveillance cameras, monitoring sensors, actuators, displays, vehicles, and so on, The IoT will foster the development of a number of applications that make use of the potentially enormous amount and variety of data generated by such objects to provide new services to citizens, companies, and public administrations. The final aim is to make a better use of the public resources, increasing the quality of the services offered to the citizens, services, such as transport and parking, lighting, surveillance and maintenance of public areas, preservation of cultural heritage, garbage collection, salubrity of hospitals, and school such as Smart Governance, Smart Mobility, Smart Utilities, Smart Buildings, and Smart Environment are used. The distributed database of building structural integrity measurements, collected by suitable sensors located in the buildings, such as vibration and deformation sensors to monitor the building stress, atmospheric agent sensors in the surrounding areas to monitor pollution levels, and temperature and humidity sensors to have a complete characterization of the environmental conditions it will be possible to combine vibration and seismic readings in order to better study and understand the impact of light earthquakes on city buildings. This database can be made publicly accessible in order to make the citizens aware of the care taken in preserving the city historical heritage.

The core infrastructure elements in a smart city would include:

i.     Adequate water supply,
ii.    Assured electricity supply,
iii.   Sanitation, including solid waste management,
iv.    Efficient urban mobility and public transport,
v.     Affordable housing, especially for the poor, Robust IT connectivity and digitalization,
vii.   Good governance, especially e-Governance and citizen participation,
viii.  Sustainable environment,
ix.    Safety and security of citizens, particularly women, children and the elderly, and
x.     Health and education.

**Waste Management**: Waste management is a primary issue in many modern cities, due to both the cost of the service and the problem of the storage of garbage in landfills.

**Air Quality**: The European Union officially adopted a 20-20-20 Renewable Energy Directive setting climate change reduction goals for the next decade. The targets call for a 20% reduction in greenhouse gas emissions.

**Noise Monitoring**: Noise can be seen as a form of acoustic pollution as much as carbon oxide (CO) is for air. In that sense, the city authorities have already issued specific laws to reduce the amount of noise in the city center at specific hours. An urban IoT can offer a noise monitoring service to measure the amount of noise produced at any given hour in the places that adopt the service.

**City Energy Consumption**: Together with the air quality monitoring service, an urban IoT may provide a service to monitor the energy consumption of the whole city, thus enabling authorities and citizens to get a clear and detailed view of the amount of energy required by the different services (public lighting, transportation, traffic lights, control cameras, heating/ cooling of public buildings, and so on).And it is monitored and automatically the system is operated.

### 3. PROPOSED ELECTRICAL MACHINE ANALYSIS AND CONTROL

The proposed method of the electrical machine is to give control signal from the user interface (i.e.www.konsolexpert.com/main.html). By using the ON and OFF buttons in the user interface. The command is

passed to the arduino microcontroller which is connected to the user interface in wireless. The interfacing is made by using personal home page programming between the arduino and user interface. To analysis the temperature, humidity, speed, vibration and Hall Effect from the DC motor. And to run the motor in efficient manner by using the closed loop control in current control and voltage control to maintain efficiency in the DC motor.

### A.     Block Diagram
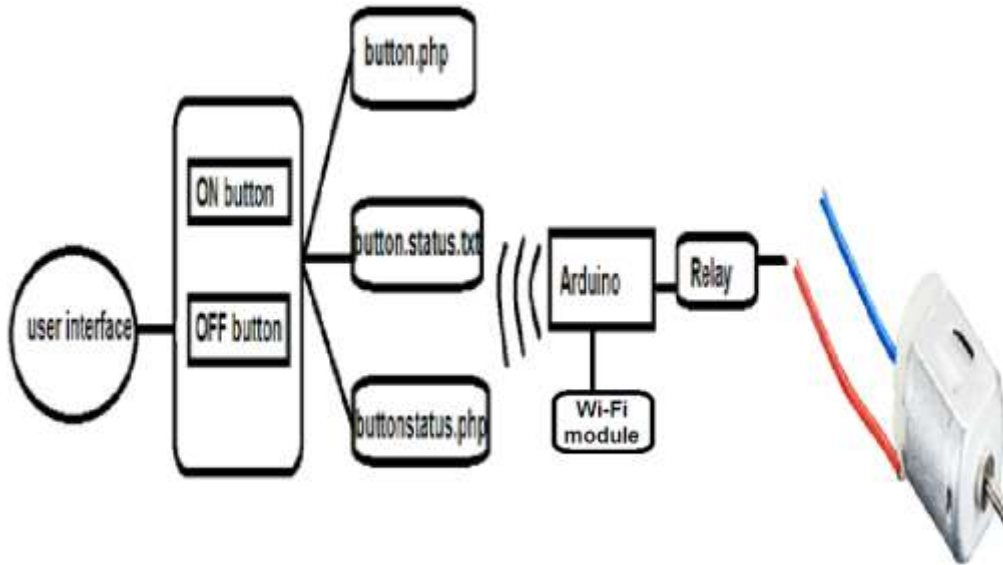


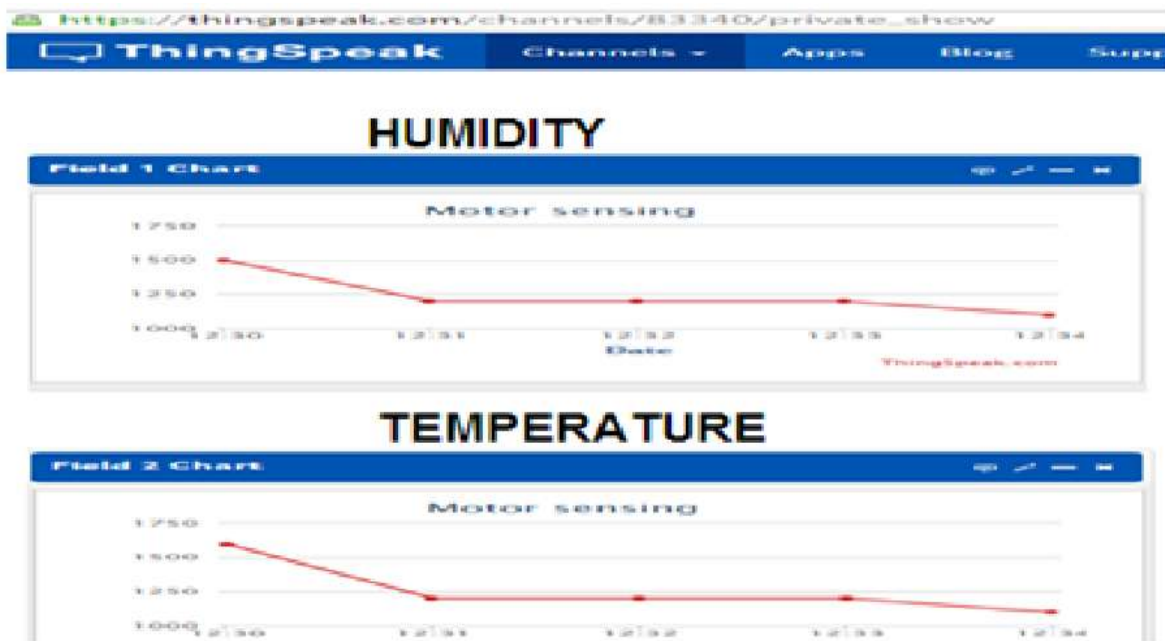In arduino is a microcontroller and proto typing platform. It is not a real time working hardware; it is just used for creating prototype model. The control program to the arduino is made in C programming for ON and OFF of the DC motor when the command is given to the arduino from the user interface. And the temperature sensor is activated and the sensor signal is obtained to the arduino analog input.

### B.     User Interface

The LCD of (16*2) is connected to the arduino to display the sensed temperature, humidity, speed, vibration and Hall Effect. Each parameter requires a unique LCD screen to display its readings obtained. The LCD screen has 16 pins .The A(15), K(16) is connected to  5V and grounded to activate the LED light in the LCD screen. The Vss(1) and Vdd(2) is connected to 5V and gnd to display the LCD pattern. Potentiometer is connected to the Vo(3) to adjust the brightness of the LCD screen ,and the data pins D4-9,D5-10,D6-11,D7-12 to transmit the data which is to be displayed.

### C. Wi-Fi module

i.      The Wi-Fi module is connected to the arduino to transmit the obtained data to the thing speak platform and output is viewed in it.

ii.     The Wi-Fi module is a self-contained system on chip with an integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi networking functions from another application processor. The module comes pre-programmed with an AT command set firmware. The arduino device can hook up, it gets much Wi-Fi ability as a Wi-Fi shield.

iii.    This Wi-Fi module requires a 3.3V DC regulated supply. The power consumption during transmission is around 250mA.

### D. Hardware Setup



A.     From temperature sensor the signal is passed to the A0 and the obtained temperature from the DC motor is displayed from the pin 7 in the arduino to the LCD screen.

B.     From humidity sensor the signal is passed to the A1 and the obtained humidity from the DC motor is displayed from the pin 6 in the arduino to the LCD screen.

C.     From speed sensor the signal is passed to the A2 and the obtained speed from the DC motor is displayed from the pin 5 in the arduino to the LCD screen.

D.     From vibration sensor the signal is passed to the A3 and the obtained vibration from the DC motor is displayed from the pin 4 in the arduino to the LCD screen.

E.     From Hall Effect sensor the signal is passed to the A4 and the obtained Hall Effect from the DC motor is displayed from the pin 3 in the arduino to the LCD screen.

The analysis is done in the hardware side and displayed in the LCD screen; the displayed data in the LCD screen should be passed to the user interface and open source platform things peak website.

**E.Graphical Representation**



Here the obtained data is represented graphically according to the data obtained from the operation. According to the data obtained from the DC motor, the DC motor is operated in efficient manner by using control loops in current control and voltage control to maintain efficiency in the DC motor as a closed loop control. And the each and every parameter are obtained and viewed in the graphical manner. The every parameter can be viewed uniquely or by a group of the parameters. The obtained result can be saved for a particular time period. This process improves the facility to read the data whenever the data is to be viewed when it is needed. The graphical representation is viewed according to the data obtained from the Wi-Fi. The graph is viewed in a point to point manner, for each and every millisecond. It helps to read the data perfectly in minimum time.

## CONCLUSION

The Analysis and Control of Electric Machine using Internet of Things has been experimentally proven to work satisfactorily and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, speed, humidity, vibrations and Hall Effect but also actuates a process according to the requirement. It also stores the sensor parameters in the things peak website in a timely manner. This will help the user to analyze the condition of various parameters in the home anytime anywhere. The result can be viewed very accurately and saved. The saved data can be viewed any time and it can be used to take as a hard copy.

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