International Journal of Advance Research in Science and Engineering
Volume No.06, Special Issue No.(04), December 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354

IOT and its Applications

Harshada Sawant, Neeta Kadukar

ABSTRACT

The IoT is intelligently connected devices and systems which comprised of smart machines interacting and communicating with other machines, environments, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will rise to meet the new challenge. Internet of Things (IOT) has provided an opportunity to build powerful industrial systems and applications by leveraging the growing ubiquity of RFID, wireless, mobile and sensor devices. Many industrial IOT applications have been increasingly developed and deployed in recent years. Now-a-days, controlling and monitoring plays a main role in our day to day life. Everything we can monitor and control using advanced technologies. Remote access is a wonderful feature that came because of high speed internet. The main objective of this paper is to provide a technology oriented and low cost system to monitor the electrical appliances and control devices in smart room or in an advanced industry.

Keywords: Internet of Things (IOT), Server, Raspberry Pi, Webpage, Ethernet, Smart phone etc.

I. INTRODUCTION

Earlier there was a simple manual way of handling machines. However, with the advancement of technology, new ways are introduced for controlling the machines like automation. At the touch of a button, we can access large amount of information due to capability of computers and the Internet[4]. Everybody wants an affordable and secure way to control their machines from any smart mobile device or Internet connection. The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors and connectivity to enable it to achieve greater value and service by exchanging data with the manufacturer, operator or other connected devices. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Internet of Things is the next big revolution of the world on digitalization of commercializing various modules/products. Everything is associated with the internet, some involves controlling and some involves monitoring the parameters from anywhere.

A printed circuit board (PCB) is the basic part in industry for manufacturing of any electronic product. Etching is main process for developing a PCB. In etching machine, the etchant solution is distributed over the boards by nozzle and recirculated by pumps. Adjustment of the nozzle, temperature and etchant composition gives predictable control of etching rates and high production rate. Etching at ambient temperature might take over an hour, so it is better to heat up the etching solvent to about 35-45 degree Celsius. At higher temperatures the etching performance decreases, so it is necessary to control the temperature of solvent. So the system continuously monitors the machine and at a specific condition it will take necessary action.

If one thing can prevent the Internet of things from transforming the way we live and work, it will be a breakdown in security. While security considerations are not new in the context of information technology, the attributes of many IoT implementations present new and unique security challenges. Addressing these challenges and ensuring security in IoT products and services must be a fundamental priority. Users need to

trust that IoT devices and related data services are secure from vulnerabilities, especially as this technology become more pervasive and integrated into our daily lives. Important challenge is the integration of security mechanisms and the user acceptance. User must feel that they control any information that is related to them rather than they feel they are being controlled by the system. This integration generates new requirements, not been previously considered.

The interconnected nature of IoT devices means that every poorly secured device that is connected online potentially affects the security and resilience of the Internet globally. This challenge is amplified by other considerations like the mass-scale deployment of homogenous IoT devices, the ability of some devices to automatically connect to other devices, and the likelihood of fielding these devices in unsecure environments. As a matter of principle, developers and users of IoT devices and systems have a collective obligation to ensure they do not expose users and the IoT infrastructure itself to potential harm. Accordingly, a collaborative approach to security will be needed to develop effective and appropriate solutions to IoT security challenges that are well suited to the scale and complexity of the issues. Full potential of the IoT depends on strategies that respect individual privacy choices across a broad spectrum of expectations. The data streams and user specificity afforded by IoT devices can unlock incredible and unique value to IoT users, but concerns about privacy and potential harms might hold back full adoption of the Internet of Things. This means that privacy rights and respect for user privacy expectations are integral to ensuring user trust and confidence in the Internet, connected devices, and related services.

Indeed, the Internet of Things is redefining the debate about privacy issues, as many implementations can dramatically change the ways personal data is collected, analyzed, used, and protected. For example, IoT amplifies concerns about the potential for increased surveillance and tracking, difficulty in being able to opt out of certain data collection, and the strength of aggregating IoT data streams to paint detailed digital portraits of users. While these are important challenges, they are not insurmountable. In order to realize the opportunities, strategies will need to be developed to respect individual privacy choices across a broad spectrum of expectations, while still fostering innovation in new technology and services[5].

II. COMPONENTS OF IOT APPLICATIONS

Components required for controlling and monitoringThe devices in the rooms and industry are given as follows:

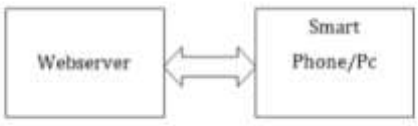

Fig 1: Server block diagram

The Figure 1 shows that the entire system is composed of two parts: Server and Client. The phone or PC can act as a client in case of IoT.

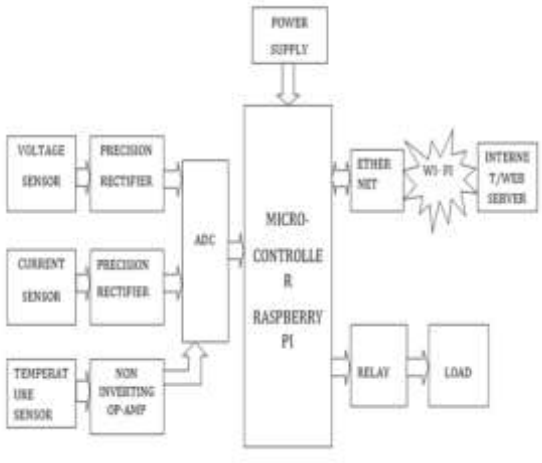

Fig2: Client block diagram

As shown in the figure 2 ,When power supply is given, sensors starts sensing the corresponding parameters. The data collected by sensors is conditioned and amplified to interface it with RaspberryPi system. Simultaneously the sensed values are uploaded onto the webpage[6]. The authorized person can access the data from any place at any time, monitor the parameters and control the load through IOT successfully.

The authorized person can login by using username and password. If username and password is correct then and then only user can monitor and control the machine. Maintenance is one of the major issue in industry. The voltage and current of induction motor can be calculated by using voltage sensor and current sensor. By using these parameters power consumption can be calculated and according to that indication or alert is sent out. Green signal for no maintenance, orange signal for maintenance is require every 10-15 days, red signal for emergency maintenance required. When power exceeds particular level then the motor gets automatically turned off. Temperature sensor is used to monitor the temperature of solvent and control the heater in the machine. When temperature goes beyond particular temperature the heater gets automatically turn off. The Webpage is used to monitor and control of machine using the data collected by Raspberry Pi platform.

Raspberry-Pi: These boards contain the ARM11 IC. ARM11 processor (Raspberry Pi) plays a key role in monitoring the system. Low-power consumption ARM11 processor (Raspberry Pi) operating at 3.3-5V, 50uA – 1A is designed and mounted on a PCB along with reset circuit and clock circuit. ARM11 is 32-bit processor with RISC architecture and having 40 GPIO with 8GB SD Card and 512 Bytes of RAM associated with this raspberry pi.

Temperature Sensor: Temperature sensor is used to monitor the temperature of chemical, which is used for etching purpose. When temperature exceeds particular temperature then the heater gets automatically off.

Current sensor: Current transformer is sensor used to linearly step down the sensor to a lower level compatible with measurement instrumentation. The core of a current transformer is toroidal, or ringed, in shape with opening in the center. The number of wire winding around the core dictates the step down ratio, between the current in measured line, and the current output connected to the instrumentation.

Voltage sensor: Voltage transformer is sensor used to linearly step down the sensor to a lower level compatible with measurement instrumentation. The number of wire winding around the core dictates the step down ratio, between the voltage in measured line, and the voltage output connected to the instrumentation.

Webpage: HTML is a specific type of universal language used for formatting a web page. The format of the webpage is dictated by HTML.The input to this webpage come from the IoT.The microcontroller of raspberry Pi gets its input from sensors and the output is given to network. This in turn is loaded onto the webpage to make it accessible to authorized users.

Relay: Relay is a device which allows low power circuit to switch a relatively high current/voltage and controlling the actions performed. Designing this on PCB we are connecting the appliances like bulb, DC motor etc.

III. APPLICATIONS

The IoT system can be designed for designed for a shopping mall or used in various organizations like educational Notice board system or at Railway station, Bus stand, industrial applications and Air-port to display the information and notification. In mall it is also used to control the humidity and temperature of mall via central AC by using temperature sensor[7]. In Industrial organization it can be also used in high risk areas like boilers,turbines where it is difficult for humans to venture . E-display system may be used to display Emergency messages in Hospitals. Figure 3 below shows IoT and its applications in various context.

Figure 3: Applications of IoT

Amongst various applications of IoT India today has marked out a number of cities to be developed as smart cities. Under this project various applications of IoT are put to use. Some of them are as follows:

1. Smart cities:-

1.1 To make the city as a smart city to engage with the data exhaust produced from your city and neighborhood.

1.2 Monitoring of parking areas availability in the city.

1.3 Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

1.4 Detect Android devices, iPhone and in general any device which works with Bluetooth interfaces or WiFi.

Figure 4: Smart city

1.5 Measurement of the energy radiated by cell stations and Wi-Fi routers.

1.6 Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.

1.7 Detection of rubbish levels in containers to optimize the trash collection routes.

1.8 As shown in the figure 4, Iot can be used for security, alert systems, mobile centric, public transit, smart automation and connected cars.

2. Intelligent Highways

Intelligent highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

3. Security & Emergencies:-

3.1 Perimeter Access Control: Detection and control of people in non-authorized and restricted.

3.2 Liquid Presence: Liquid detection in data centers, sensitive building grounds and warehouses to prevent breakdowns and corrosion.

3.3 Radiation Levels: In nuclear power stations surroundings distributed measurement of radiation levels to generate leakage alerts.

3.4 Explosive and Hazardous Gases: Detection of gas leakages and levels in industrial environments, surroundings of chemical factories and inside mines.

4. Smart agriculture:-

Our country thrives on agriculture and economy is dictated by the outcome of agriculture production. This makes IoT a versatile tool for enhancing agriculture yield. There are a number of ways to do this. Details of IoT application in agriculture and food processing are as follows:

4.1 Wine Quality Enhancing: Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

4.2 Green Houses: Control micro-climate conditions to maximize the production of fruits and vegetables and its quality, control of watering techniques to farmlands by detecting current moisture levels in soil result in adequate use of limited water resources.

4.3 Golf Courses: Selective irrigation in dry zones to reduce the water resources required in the green.

4.4 Study of weather conditions in fields to forecast ice formation, rain, drought, snow or wind changes.

4.5 Compost: Control of humidity and temperature levels in alfalfa, hay, straw, etc. to prevent fungus and other microbial contaminants.

5. Domestic & Home Automation:-

6.1 In home by using the iot system remotely monitor and manage our home appliances and cut down on your monthly bills and resource usage.

6.2 Energy and Water Use: Energy and water supply consumption monitoring to obtain advice on how to save cost and resources.

6.3 Remote Control Appliances: Switching on and off remotely appliances to avoid accidents and save energy.

6.4 Intrusion Detection Systems: Detection of windows and doors openings and violations to prevent intruders

6.5 Art and Goods Preservation: Monitoring of conditions inside museums and art warehouses.

6. Medical field:-

6.1 All Detection: Assistance for elderly or disabled people living independent.

6.2 Medical Fridges: Monitoring and Control of conditions inside freezers storing medicines, vaccines, and organic elements.

6.3 Sportsmen Care: Vital signs monitoring in high performance centers and fields.

6.4 Patients Surveillance: Monitoring of conditions of patients inside hospitals and in old people's home.

6.5 Ultraviolet Radiation: Measurement of UV sun rays to warn people not to be exposed in certain hours.

7. Industrial Control:-

7.1 Machine to Machine Applications: Machine auto-diagnosis the problem and control.

7.2 Indoor Air Quality: Monitoring of oxygen levels and toxic gas inside chemical plants to ensure workers and goods safety.

7.3 Temperature Monitoring: Monitor the temperature inside the industry.

IV. CONCLUSION

The IoT promises to bring about a revolutionary change in quality of life and productivity in industries. Through a widely distributed, locally intelligent network of smart devices, the IoT has the potential to enable extensions and enhancements to fundamental services like transportation, logistics, security, utilities, education, healthcare and other areas, while providing a new ecosystem for application development.

A concerted effort is required to move the industry beyond the early stages of market development towards maturity, driven by common understanding of the distinct nature of the opportunity. This market has distinct characteristics in the areas of service distribution, business, capabilities required to deliver IoT services, and the differing demands these services will be placed on mobile networks. Connecting those smart devices (nodes) to the web has also started happening, although at a slower rate. The pieces of the technology puzzle are coming together to accommodate the Internet of Things sooner than most people expect. Just as the Internet phenomenon happened not so long ago and caught like a wildfire, the Internet of Things will touch every aspect of our lives in less than a decade.

REFERENCES

[1.] www.gsma.com/connected living/wp-content/.../cl_iot_wp_07_14.pdf

[2.] http://www.libelium.com/top_50_iot_sensor_applications_ranking

[3.] "An Intelligent System for Energy Saving in Smart Home", 3rd IEEE international workshop on global trends 2014.

[4.] D. Singh, G. Tripathi, and A. J. Jara, "A survey of Internet-of-Things: Future vision, architecture, challenges and services," in Proc. IEEE World Forum Internet Things, 2014, pp. 287–292.

[5.] L. Atzori, A. Iera, and G. Morabito, "The Internet of Things: A survey," Computer. Networking, vol. 54, no. 15, pp. 2787–2805, 2010

[6.] "A review paper on "IOT" & It's Smart Applications",Vandana Sharma, Ravi Tiwari,International Journal of Science, Engineering and Technology Research (IJSETR

[7.] "Review on IoT based technology",Ms.Pradnya Hukeri, Mr.P.B.Ghewari, International Research Journal of Engineering and Technology