CLOUD BASED INTERNET OF THINGS FOR SMART CONNECTED OBJECTS

Dr. M. Duraipandian,
Head of Department, Department of Computer Science and Engineering,
Vivekanandha College of Technology for Women,
Namakal, India.
Email: svsduraipandian@gmail.com
Mr. R. Vinothkanna,
Department of ECE, Vivekanandha College of Technology for Women,
Namakal, India.
Email: rvinothkannaphd@gmail.com

Abstract: The paper proposing the cloud based internet of things for the smart connected objects, concentrates on developing a smart home utilizing the internet of things, by providing the embedded labeling for all the tangible things at home and enabling them to be connected through the internet. The smart home proposed in the paper concentrates on the steps in reducing the electricity consumption of the appliances at the home by converting them into the smart connected objects using the cloud based internet of things and also concentrates on protecting the house from the theft and the robbery. The proposed smart home by turning the ordinary tangible objects into the smart connected objects shows considerable improvement in the energy consumption and the security provision.

Keywords: Internet of things, Cloud computing, Smart home, Energy consumption, and Security provisioning.

1. Introduction

Internet of things emerged as the promising paradigm is the incorporation of numerous technologies and the communication solutions [3] allows a seamless communication with the physical things in the environment all over. A novel class of application services with the spatially distributed devices with the capacity to sense and actuate and identified using the embedded labelling communicate with the similar device of labelled identification using the internet and the web is denoted as the internet of things. [4] this unique identification for each objects and their ability to communicate make, the physical things smart and connected [5], The smart communicating things enhancing the communication with the humans and the similar smart things, ensures the data transferring between the manufacture, the operant, other commodities and the organization. This improves the customer service and the quality of living, the internet of things has almost influenced many areas ranging from the household things to

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government organizations. The support lent by the cloud /fog and the edge services further enhance the benefits of the internet of things and its functioning.

The integration of the information technologies along with the progress in the communication has enabled the introduction of innovation applications that proliferates a new way of living. The paper highlights the use of the internet of things in the smart home, to improvise the way of living by initializing the communication between the things in the home [9] the paper mainly concentrates on the smart home development that is mindful of its electricity usage at the household activities and the security provision for the house hold things. Electricity being a non-renewable and a sparse resource requires to be reserved for our future generations. So the paper highlights the electric power conservation through the cloud based internet of things and also the security for the household things that is very essential in the forth coming days.

Unlike, the usually employed sensors and the processors, the proposed method employs the WASPMOTE sensors that incorporates variety of the sensors to sense the temperature, electric appliances turned on, and the unwanted intrusions in the house, the breakage of the doors and windows, and the visitors for the house, and the beagle bone green processors to accumulate the data sensed.

The remaining paper proceeds with the 2. Related works holding the review of the overview of the internet of things and its uses in different applications. 3. Proposed work of enabling a smart home with the electricity conservation and the security. 4. The results for the proposed smart home with the electricity conservation and the security provision.

2. Related works

The internet of things enables in having a seamless connection of the tangible objects in the ecosystem around us. Gubbi et al [1], presents the survey envisioning the motivations of the internet of things along with its applications and the clouds assistance for the internet of things. Zanella [2] details the survey on the technologies, protocols, and architectures for internet of things in the urban areas along with the discussion on the technical solutions and the best practices adopted in the city projects that were developed by the padova Atzori et al [3] portraits the different technologies and the research issues in the internet of things, this survey proceeds with the scope of enhancing the future researches on the same. Miorandi et al [4] the survey on the enabling technologies, issues and challenges for the internet of things envisioning the future information and the communication technologies by linking the digital and the physical devices are addressed in the paper. Tan, et al [5] the paper elaborates the over view of the internet of things presenting the review of its architecture and the interoperability

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along with the specific models based on the application and the open issues to be addressed. Al-Fuqaha et al [6] the paper provides the breakthrough in the internet mobile network and the M-to-M communications as a survey along with the structure of the technical details that lead to the IOT befitting technologies, protocols and the applications. Stojkoska et al [7] the paper present the review on the internet of things for the smart home based on the cloud, Stankovic et al [8], survey the research topic and research problem in the internet of things paving way to envision the distant future changes that are possible by IOT. Alaa et al [9], the internet of things for smart home and their open challenges along with the endorsement for the improving the internet of things in the smart home, identified in the literature. Wortmann et al [10], the paper portrays the proliferation of the internet of thing and the various application that could be integrated with it paving way for the smart things. Li et al [11] Shancang et al [12] the definitions, architecture and the basic technologies and the applications of the internet of things are explored addressing the majority of the challenges from the literature surveyed.

3. Smart Home Enabled by the Smart Connected Objects

The proposed work scopes in paving way for the energy conservation at home, by applying the continuous tracking of the every electronic appliances at home. The measures of reducing the electronic consumption to the reduce the electricity bill, conserving the electricity for our future generations being the main aim of the project also concentrates on the security of the house which is compulsory entailment nowadays and also observes the dirt level of the house and sends intimation to the respective persons. The intimation is forwarded to the mobile as SMS or a flash message for the necessary actions to be taken. The block diagram in the fig.1 explains the proposed.
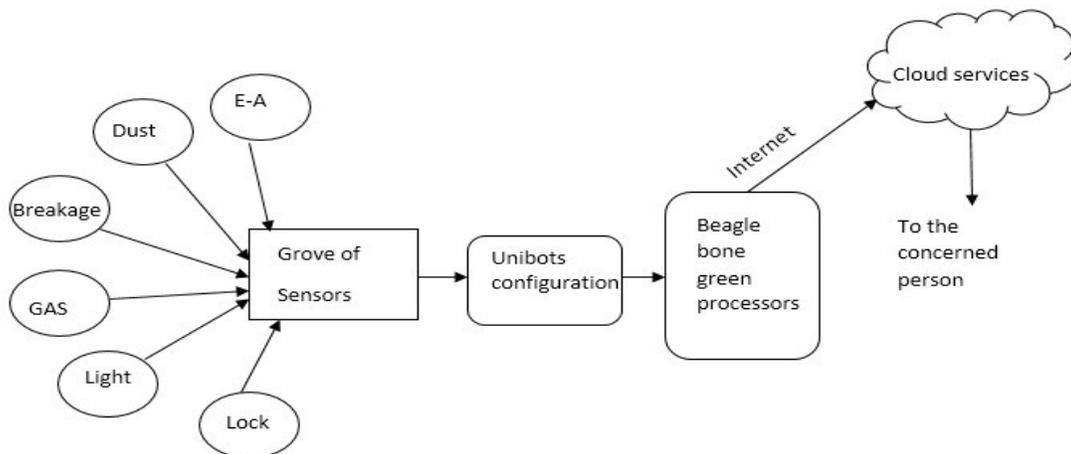

Fig.1 Proposed Block Diagram

The proposed method utilizes the waspmote sensors in tracking the details of the electronics appliances in the house. The grove of sensors are employed in monitoring the temperature, the unnecessary usage of the electricity, the dust particles in the house and the sudden intrusions in the house that is caused by breaking the locks and the windows along with the gas leakages in the house, with the primary aim of safeguarding the house and reducing the electricity consumption of the house.

The beagle bone green processors that supports the grove of sensors are employed in the proposed work in the quick transferring of the information to the concerned person's mobile as a SMS or a Flash message using the cloud services supported by the azure IOT toolkit and the visual studio code. The information are collected and identified with the situations of emergency, by configuring the unibots with the unibotsnode.JS library and programming in the node.js with the XDK IOT edition. The unibots are configured with the IF Then conditions, to identify the emergency situations.

On identification of the emergency situation, the SMS alter is transferred to the IOT-Hub and the azure IOT toolkit and the visual studio code, takes care of the conveying of the message to the cloud and from cloud to the concerned person mobile phone.

3.1. Cloud based Internet of Things Paving Way for a Smart Home

The smart home with the monitoring to control the unwanted electricity usage along with the security provisioning for the house against the theft /robbery and the leakage of the gas is assisted by the cloud based IOT. The method monitors the change in the environment of the home by sensor fixed. The house equipped by the waspmote sensor, enables to configure its hardware including any number of sensors, at present the mote sensor is equipped with sensor to identifying the wastage of electricity by the electrical/electronic appliances that are turned ON, unwantedly. The CT sensor SCT013 are employed in detecting the usage of the electric power in the houses. It provides measurement based on the intensity of the current that crosses the circuit. The waspmote sensors also include the sensor for the sensing the light, breakage, lock, dust and the gas leakage. The sound sensor is employed in identifying the breakages caused in the house for the theft or the robbery, the gas sensor MQ2 is employed in detecting the gas leakage, the FPD42NS is used in detecting the dust level of the house and the lock sensor MK720 the fig .2 shows the list of sensors employed in the developing the smart home.

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a) Gas Sensor

b) Dust sensor

c) Lock sensor

d) CT Sensor

Fig.2 Sensors

3.1.1. Working Process of the Connected Smart Objects

The sensor engaged in the process of converting the home into a smart home, enables a real time monitoring on the electronic appliances of the house and also secures the house from the unwanted attacks, the CT sensor engaged with identifies the flow of the electric current in the wires and represent it as high or low. Once the sensor reacts for the current flow that is high the unibots are configured using the node.js script for reacting for the exigent situations and conveys to the situations to the IOT hub and the situation of emergency is transferred as a short message service using the AZURE aided with the IOT tool kit to the transferring of the information to the concerned person. So the emergent situations could be handled.

The sensors engaged in the form of the lock sensor and the sound sensor helps in identifying the unwanted intrusions in the house, through breaking of the glass or the windows, the sound sensor enabling in processing the weird sounds in the house to the emergency message to the concerned person. More over the gas and the dust sensor employed in the house also helps in securing the house from the emission of the dangerous gas that is harmful at home and the dust sensor protects the children, elderly and the adults from being affected by the harmful dust

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particles from the environment. The few sensor engaged with enable the house and the appliances in it to be smart and also protected. The flowchart below in fig.3 shows the working of the proposed system in converting the home smart with the smart connected objects.
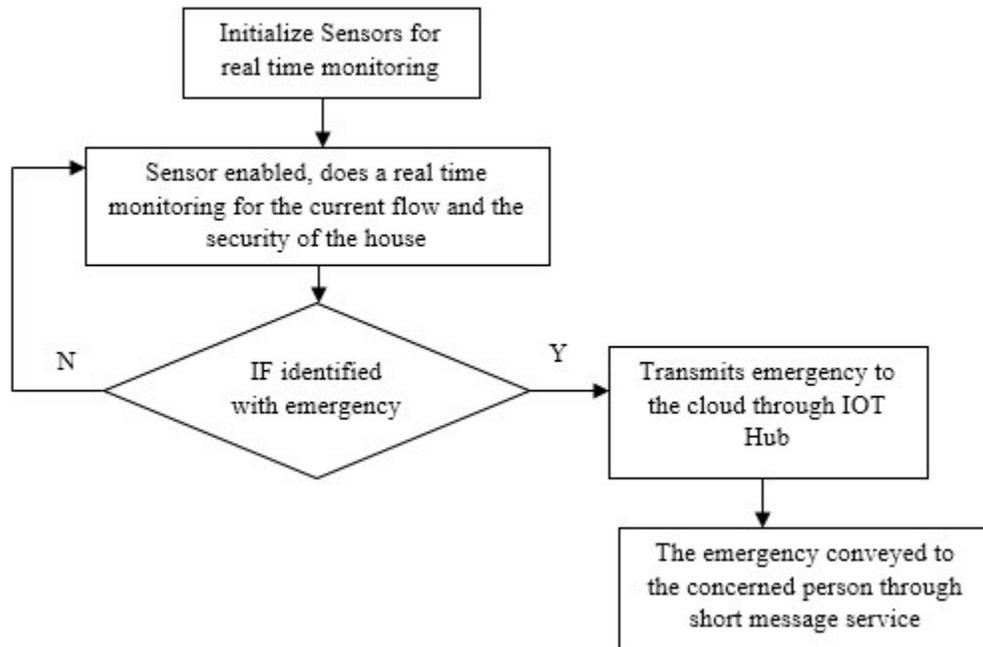

Fig. 3 Proposed Flow diagram

Thus the real time monitoring and the cloud based IOT enables in having the smart home with the identification of emergent situations by the configurations in the unibots using the node js.script. The complete setup for the smart home in conserving the electricity and securing the house is written using the Java. The BBG employed along with the sensor enables a connection of groove of sensors to have a real time monitoring. The fig.4below shows the beagle bone green processor used in the proposed method.

The BBG (the beagle bone green) built with the ARM335x processor, 512MB RAM dual rate, micron EMMC which is an onboard MMC chip that can hold up to a 4GB of information. SMSC Ethernet that supports the physical interface to the network and the TPS65217C power monitor providing power to the various process taking place. It is inbuilt with two groove connectors that makes easy the connections of large family of sensors to it at a lower cost providing an open-source and community aided development platform. The complete setup with the sensors, processors, unibots are configured using the java to support with the real time monitoring, the message transmission

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on the situations of the emergency as the short message service is done with the support aided by the azure IOT toolkit for the java script developed.

Fig.4 BBG processor [13]

4. Results

The results obtained based on the real time monitoring provided by the cloud based IOT with the sensor acting as the lower level devices in the monitoring the sudden changes in the environment helps in improving the electricity conservation of the house and the security services of the house without any human intervention. Cloud based IOT powered by the java and enabled by the BBG processor that enables in connecting a large grove of sensors at a low cost along with the message services, through the Azure IOT toolkit allows a considerable improvement in the conservation of the electricity and also in securing the house from unwanted theft and the robbery.

The fig.5 shows the considerable improvement in the electricity conservation on the home in when engaged with the smart connected objects supported by the cloud based IOT, the chart details the percentage of the improvement achieved in electricity conservation in the home that is smart and that is not smart on the different days in a month for different number of electric appliances used

The security alarms raised on the intrusion of the unwanted persons in the house, using the sound sensor and the lock sensor, improves the security of the house. By providing a real time monitoring of the environment in the house. Further the gas sensor and the dust sensor engaged elude the unnecessary fatalities in the house.
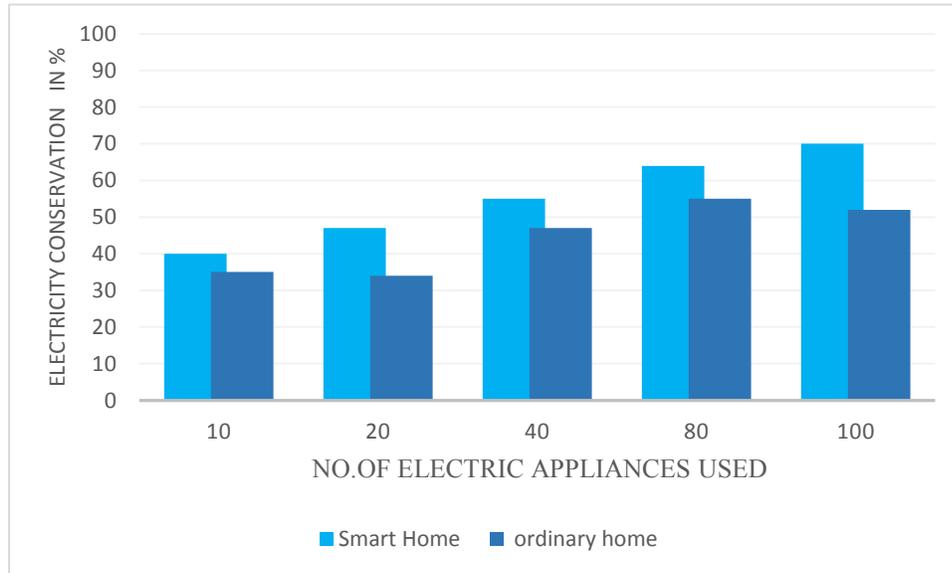
Fig.5 Improvement in electricity Conservation

5. Conclusion

The urbanization urges the human to improve the quality of the life by all means, and the emergence of the IOT has paved way for it by labelling all the objects around enabling them to communicate over internet. The proposed project is based on the concept, takes the steps in the conserving the electricity usage at the house along with the steps to secure the house from the robbery or theft or other mis-happenings at the house by engaging sensors in the house for real time monitoring. Further the monitored information are identified with the emergent situations by the configuring of the unibots using the node. Js.script, and the processor BBG using the internet connects the information of emergency to the cloud, where the SMS service to the concerned person is done through the AZURE IOT tool kit for the java code. The Complete set up of sensing the daily routines to track the emergency situations and report to the concerned person with the help of cloud based IOT shows considerable improvement on the electricity conservation and the security for the house.

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