IOT Based Green House Environment Using Mobile Assistance

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Abstract- *Smart home systems achieved great popularity in the last decades as they increase the comfort and quality of life. Most smart home systems are controlled by smartphones and microcontrollers. A smartphone application is used to control and monitor home functions using wireless communication techniques. We explore the concept of smart home with the integration of IoT services and cloud computing to it, by embedding intelligence into sensors and actuators, networking of smart things using the corresponding technology, facilitating interactions with smart things using cloud computing for easy access in different locations, increasing computation power, storage space and improving data exchange efficiency. The development proposed in thesis incorporates smart sensors, communication channel and protocols for data exchange, peripherals such as atmega328, MQTT Tx. Rx. Kit, (for data interchange) Data Receptor and Decoder Shield, addressing & de-addressing data module, comm. IOT, in other words, integrates the ubiquitous communication, pervasive computing, and ambient intelligence. IoT helps to link the base station (equipped with the NODEMCU Interface) which interacts with the entire module located at home. IoT here also helps to mitigate the installation and running cost and covering it all within acceptable boundaries and scope of the economy.*

Keywords- Internet of Things, MQTT protocol, Google Assistance, gas monitoring, temperature device monitoring.

I. INTRODUCTION

Classic smart green home, internet of things, cloud computing and rule-based event processing, are the building blocks of our proposed advanced smart home integrated compound. Each component contributes its core attributes and technologies to the proposed composition. IoT contributes the internet connection and remote management of mobile appliances, incorporated with a variety of sensors. Sensors may be attached to home related appliances, such as air-conditioning, lights and other environmental devices. And so, it embeds computer intelligence into home devices to provide ways to measure home conditions and monitor home appliances' functionality. Cloud computing provides scalable computing power, storage space and applications, for developing, maintaining, running home services, and accessing home devices anywhere at anytime. The rule-based event processing system provides the control and orchestration of the entire advanced smart home composition. Classic smart home, internet of things, cloud computing and rule-based event processing, are the building blocks of our proposed advanced smart home integrated compound. Each component contributes its core attributes and technologies to the proposed composition. 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). 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. This chapter confers to the idea of prodigious application of IoT acting as the boon in the development of modern infrastructure at discrete levels that includes:

Domestic Commercial level covering up particular consumers per necessity (Smart Home). It also underscores the desideratum of energy conservation and optimum utilization of the available energy, so that it can be preserved for future generation.

IoT is made up of two words, „Internet‟ and „Things‟. The term „Internet‟ refers an infrastructure to facilitate the scalable, configurable and reliable connections among various intelligent objects, whereas, the intelligent objects are captured by the term „Things‟. Thus, IoT is the

global network of number of individual networks to access the immediate and reliable information about the real world applications and objects. This global connection can be represented as given in Figure 1.

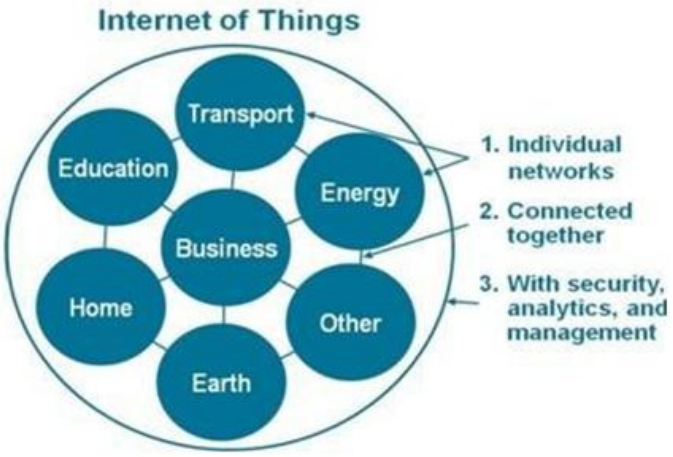

Figure 1 Global network of individual networks

The main contributions of the work in this thesis can be summarized as follows First chapter described introduction iot smart home and need of analysis of iot smart home process, problem statement of iot smart home. Chapter 2 describes the existing methods used for the home automation work. various sources, inferences from literature and the methods used for smart home automation are presented. Chapter 3 analyses the performance of the proposed system design techniques. A brief study of the various sensors, software presented in proposed system used to presented. Later the results are compared and discussed. Chapter 4 presents a novel approach using result and discussion images. In Chapter 5, a summary of the outcome of the proposed work is discussed. The future enhancements that can be done are also discussed.

II. LITERATURE REVIEW

This chapter provides information about earlier work carried out by different researchers in this field. Home appliances of a smart home have a global connection with outside world to facilitate the communications. Louis et al. (2015) has investigated the home energy management system with Lab-View and domestics controller. They have incorporated wind power, solar power and battery storage power with the regular power supply via domestic's controller in their proposed frame.

Nasrin Khan Sari et al. (2014) has investigated the effect of energy consumption in a smart city on the behaviour of the households and suggested the conceptual CLIOS model (A Complex, Large scale, Interconnected, Open and Socio-technical model). They have applied the social science theories, cognitive science and existing learning methodologies in their proposed model. Further, they have suggested that a combined application of renewable technologies, awareness programs and comparative system analysis can motivate the people to reduce the energy consumption and to adopt the renewable energy systems in a smart city.

Castello et al. (2009) has applied geo statistical tool to monitor and control the smart home temperature. Variography and kirging are two important geo statistical tools. Spatial dependency ofthe observations can be computed by variography, whereas, kirging can be used to interpolate the predicated values.

Muawiya et al. (2016) has investigated the load sheddingand power consumption in a smart home. They have applied the „Frequency Response Grid Friendly Appliance System (FRGFAS)" to monitor, control and automate the power consumption activities ofhome appliances and outdoor lightings. FPGA parallelism and flexibility of the LabVIEW enhances the qualities of the FRGFAS. Their proposed load shedding framework is highly applicable in ZigBee applications and other similar kind of applications.

To investigate the effect of heat capacity of the building manufacturing material along with the thermal inertia of the building Vollaro et al. (2014) has used two different software"s namely, AermecMC11300 and TRNSYS. Here, AermecMC11300 software calculates the aggregate thermal load, whereas, the TRNSYS software computes the thermal load on hourly basis in a day.

Kumar et al. (2014) has proposed a „Home Energy Management System (HEMS)" for home energy management and load control in a network. This model incorporates the non-conventional energy resources, visual interface to monitor and control the system with following three modules.

- HEMS software.
- A centralized module to manage home energy consumption.
- A load scheduler for the network of appliances.

Gayathri & Harish (2014) have studied the home power management problem by including wireless sensor networks, LabVIEW and ZigBee protocol. They noticed that the minimization in power consumption occurs due to the proper management, control and periodic alerts to home appliances. The major advantage of their proposed framework is that it is free from physical cabling. Jangia et al. (2013) has

suggested a strategy for simulating and testing the home appliances. Home appliances can be realized in the following two ways in their proposed strategy.

- Thermal home appliances can be simulated by applying constant numeric values of heating and cooling.
- Rest of the home appliances can be simulated in its time duration profile.

III. SYSTEM DESIGN

As entering into the era of modernization and automation, there is an all-around development and technological growth in the electrical and electronics sector. Modern electrical appliances, fittings are becoming more luxurious and simple to operate, like operating through android or personal computer. We thereby felt the requirement that needs to be brought up by slightly modifying the existing technology. Adopting this new technology would possess the benefits to not only operate the appliances with Android, personal computer or autonomously but will also possess the ability to calculate the consumed energy by the particular load.

The system is consisting of nodemcu board which use controller. To access the internet we required the internet connectivity which provided by WiFi module to transmit the message. The find sensor values temperature, gas, and PIR sensor values occur use the vibration sensor. To monitor the live data we used application called open nodemcu ide. The common access point like router is used to provide the internet connectivity for system as well for used is used like router.

In the below figure 2 shows the overall block diagram of the proposed system. Initially the values of cloud server are being cleared so that a previous value does not required to be stored after each restart. Then the VNC Viewer app is started and simultaneously the Wifi module is powered and connection is established between Wifi module and acess point through which can upload and access the sensor value over internet. The control taken through the used are send by VNC Viewer application and uploaded over the cloud server the controller retrieves the data through Wifi module and performs the required action, depending on the control signal provide by the user.

Figure 2 shows the block diagram of impact sensing by the sensors whenever the temperature values takes place. It starts with the initialization of the ADC as the output of the DHT22 sensor is an analog signal. The ADC digitizes the impact of the temperature values sensed by the sensor and sends it to the microcontroller. If the value of this impact is less than the threshold value then, the microcontroller will ignore it and if the value of impact exceeds the threshold value then, the microcontroller will consider it as an over temperature and turn on fan from sends the signal to the module and the base station.

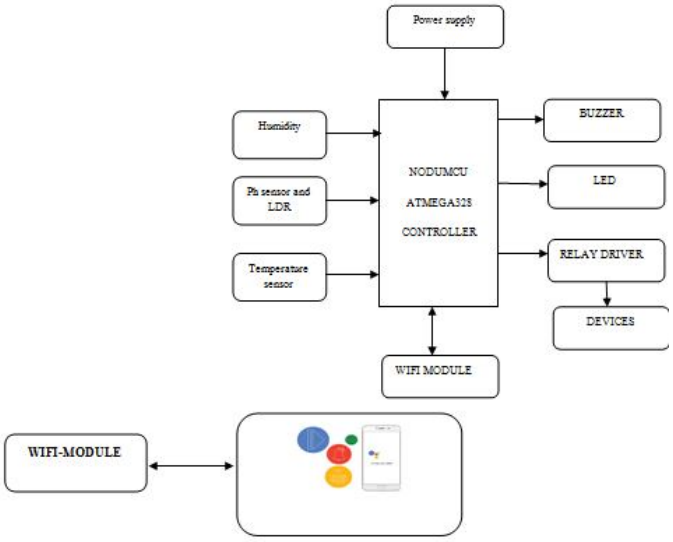

Figure 2 proposed system block diagram

The temperature sensor is analog sensor which used to monitor the temperature transmit the analog signal to the nodemcu controller, controller transmit the signal continuously through MQTT protocol (mosquito protocol). MQTT protocol type of communication between server and controller with help of wifi module advanced protocol module instant updating of data's. google assistance used to on/off on/off devices MQTT protocol.

PH sensor used to detect ph values of soil this sensor will used detect soil values. Which is used to monitor continuously to the soil ph values store to the database.

Humidity sensor used to detect the humidity values of both soil and air, which help to monitor the environment moisture content and needy of water content in the irrigation parts working principle humidity is converted into electrical signal ,electrical signal convert the both analog and digital signal. Normally analog signal threshold based set point set and make it to digital signal. This digital signal handle the microcontroller continuously monitor the signal if the signal getting means of low values immediately respond and alert the user and turn on he motor.

```
1. Is the humidity sensor temperature and PH > threshold
2. If yes wait for (seconds) and check for sent the status MQTT
protocal
3. If reset button is pressed go to 1 else go to step 4
4. Collect the Sensors information.
5. Collect current device details on/off condition from home
6. If (exIt temperature information)
{
Fan or FAN device on ();
}
If (exit humidity information)
{
User intimation and turn on motor();
}
If (exit PH information)
{
User intimation();
}
7. Else
{
Sensor value continuously monitoring();
}
```

Figure 4 pseudocode for proposed system design

IV. RESULT AND DISCUSSION

Proposed system working module consist of three different types of architecture inbuilt in single modules they are, it consist of three module they are,

First module:

Temperature sensor detects the temperature values and fan will be on automatically otherwise fan is ideal state this will very useful to energy consumption without man power.

Second module:

The temperature, humidity and PH values monitoring system, LM35 , dht22 sensor used to detect the values continuously any temperature, humidity and PH is detect intimation given to the controller. Depends on this level of sensor on and off the motor pumps.,

Third module:

Third module is humidity monitoring system. DHT22 sensor used to monitor the humidity; DHT22 sensor monitors both temperature as well as humidity. The temperature values are continuously sent to via server based database. We check the details for user through server pages.ldr sensor used to monitor the day and night light intensity will automatically on/off the lights. Based on this sensor values irrigation motor will turned on/off automatically. User to energy consumption.

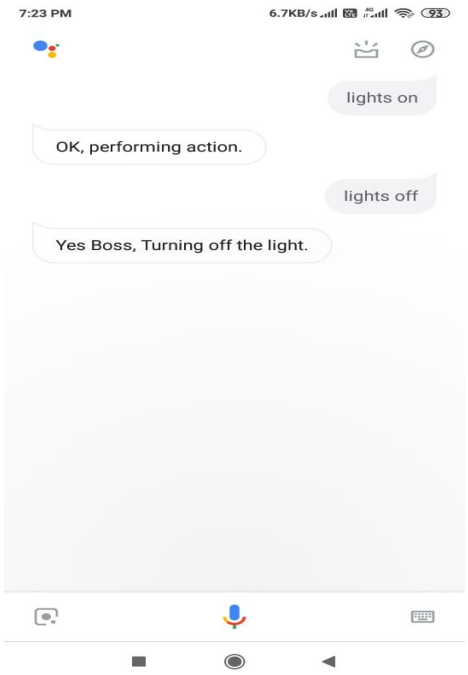

Figure 6 Google assistance based control module

If temperature values are exit the particular values user will turned on the fan using through voice signal based assistant's android application. Server and monitoring section applications are demands on the wifi based MQTT communication protocols.

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 home 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, and security system in a home to make it a smart home.

REFERENCES

[1] Aggarwal, C, Ashish, N & Sheth, A 2013, „The internet of things: A survey from the data-centric perspective", Managing and mining sensor data, Springer.

[2] Agriculture system in Bangladesh. Available at: http://www.bookrags.com/history/terrace-irrigation-ema-05/.

[3] Almohri, H M J, Yao, D & Kafura, D 2014, Process Authentication For High System Assurance, IEEE Transactions On Dependable And Secure Computing, vol. 11, no. 2.

[4] Alur, R, Berger, E, Drobis, A W, Fix, L, Fu, K, Hager, G D, Lopresti, D, Nahrstedt, K, Mynatt, E, Patel, S, Rexford, J, Stankovic, J A & Zorn, B 2015, Systems computing challenges in the internet of things, Computing community consortium, Catalyst, pp. 1-15.

[5] Attia, I J & Ashour, H 2010, „Energy saving through smart home", The online journal on power and energy engineering, vol. 2, no. 3, pp. 223-227.

[6] Atzori, L, Iera, A & Morabito, G 2010, „The internet of things: A survey", Computer Networks, vol. 54, no. 15, pp. 2787-2805.

[7] Automation of an irrigation system. Available at: http://www.thefreedictionary.com/irrigation+ditch.

[8] Available from: http://homepage.ntlworld.com/ d.richards60/ domotics2.html.

[9] Baig, F, Mahmood, A, Javid, N, Razzaq, S, Khan, N & Saleem, Z 2013, „Smart home energy management system for monitoring and scheduling of home appliances using ZigBee", Journal of basic and applied scientific research, vol.3, no. 5, pp. 880-891.

[10] Bandyopadhyay, D & Sen, J 2011, „Internet of things – Applications and challenges in technology and standardization", Wireless personal communications, pp. 1-24.

[11] Banzhaf, E & Hofer, R 2008, Monitoring urban structure types as spatial indicators with CIR aerial photographs for a more effective urban environmental management, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 1, no. 2, pp. 129-138.

[12] Barnaghi, P, Wang, W, Henson, C & Taylor, K2012, „Semantics for the Internet of Things: Early Progress and Back to the Future", International Journal on Semantic Web and Information Systems, vol. 8, no. 1.

[13] Bayouth, M & Thorpe, C 1996, An AHS concept based on an autonomous vehicle architecture, Proceedings of 3rd annual world congress on intelligent transportation systems.

[14] Bejczy, AK 2009, „Sensors, controls and man-machine interface for advanced teleoperation", Science procedia, vol. 208, pp. 1327-1335.

[15] Belim, N, Bhambure, H, Kumbhar, P & Tuteja, S 2013, „Automate and Secure Your Home Using Zigbee Technology", International Journal of Innovative Research in Computer and Communication Engineering, vol. 1, no. 1, pp.63-66.

[16] Bijalwan Vishwanath 2014, Labview NI vision Security and surveillance, Amar Xiv preprint arXiv:1406.1580.

[17] Binfa, Z, Tao, L and Tao, L 2005, Study on Anti-theft alarm system of Street lighting cable, Journal of lighting monitoring, vol. 4, pp. 230-24.

[18] Blackmon, T T & Stark, L W 2006, „Model-based supervisory control intel robotics", Presence, vol. 5, pp. 205-223.

[19] Bolivar, MPR 2008, „Smart cities: big cities, complex governance, Transforming city government for successful smart cities", Public administration and information technology, Springer, vol. 8, pp. 1-8.

[20] Bordencea, Valean, H, Folea, S & Dobircau, A 2011, „Agent based system for home automation, monitoring and security", Proceeding of the 34th international conference on telecommunications and signal processing TSP.

[21] Branzila, M & Sarmasanu, C 2013, „Lost cost smart sensors for an intelligent home, Advances in instrumentation and sensors interoperability", 19th Symposium IMEKO TC 4 Symposium, pp. 1-4.