IoT Based Security System for Smart Homes

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Abstract—The Internet of Things (IoT) enables the electronic devices to be interconnected by a network. A smart home can be considered to be a residence enabled with communication networks, home appliances and sensors that can be controlled as well as remotely accessed by the home owner. The concept of smart home has developed into a form of an artificial intelligence service that can be operated by self-understanding the behaviors of the residents. This paper has tried to propose a smart home system which will help to monitor the internal environment of the home such as temperature , gas leakage and also will help the owner to take care of the plants by watering them with the help of a remote device.

Keywords—*Aurdino, Internet of Things, Smart Homes*

I. INTRODUCTION

Technological advancements and the usage of internet have made our life easier. Internet of Things has expanded the benefits of Internet based networks by allowing machine to machine to communication which has certainly increased the scope of earlier forms of communication like human to human or human to device. It permits people and devices to be connected anytime, anywhere with anything and anyone.[6]

The Internet of things is inter connecting of physical devices, buildings, vehicles and many other objects embedded with electronics, actuators, sensors, software, and network connectivity which enable objects to collect and exchange data. The Global Standards Initiative on Internet of Things in 2013, defined the IoT as a Global infrastructure for the information society, which allowed services by interconnecting things based on interoperable information and communication technologies.[1]

Nowadays Internet of Things (IoT) gained a great attention from researchers, since it becomes an important technology that promises a smart human being life, by allowing a communications between objects, machines and every thing together with peoples. IoT represents a system which consists things in the real world, and sensors attached to or combined to these things, connected to the Internet via wired and wireless network structure. The IoT sensors can use various types of connections such as RFID, Wi-Fi, Bluetooth, and ZigBee, in addition to allowing wide area connectivity using many technologies such as GSM, GPRS, 3G, and LTE. IoT-enabled things will share information about the condition of things and the surrounding environment with people, software systems and other machines. by the technology of the IoT, the world will

becomes smart in every aspects, since the IoT will provides a means of smart cities, smart healthcare, smart homes and building, in addition to many important applications such as smart energy, grid, transportation, waste management and monitoring .[2]

Internet of Things is a new technology of the Internet accessing. By the Internet of Things, objects recognize themselves and obtain intelligence behavior by making or enabling related decisions thinks to the fact that they can communicate information about themselves [3]. These objects can access information that has been aggregated by other things, or they can added to other services [3] . Figure 1 reviews that with the internet of things, anything's will able to communicate to the internet at any time from any place to provide any services by any network to anyone. this concept will create a new types of applications can involve such as smart vehicle and the smart home, to provide many services such as notifications, security, energy saving, automation, communication, computers and entertainment [4,5] .
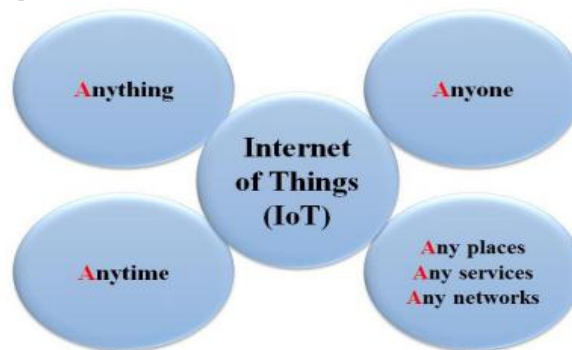

Fig. 1. Internet of things Concept

The role of Wi-Fi in home automation system has primarily increased due to the networked nature of deployed

electronics where electronic devices such as TV , mobile phones etc are becoming a part of the home IP network and the increase in the usage of smart phones and tablets. Open platforms that employ a network of intelligent sensors can help a person to control all the electronic devices and applications with a single device. The network of sensors can be used to monitor systems such as ventilation, heating, room temperature, air conditioning, lighting etc. Adding of intelligence to home environment can improve the quality of life. With the introduction of the Internet of Things (IoT), the research and implementation of home automation has become more popular.

II. PROBLEM STATEMENT

From this project, we are trying to simplify the day to day chores of the house and provide it just on one click on the internet. Monitoring the various crucial factors of the home, providing the flexibility of controlling the home appliances and controlling other factors any part of the world will be easy as if the user is present at home. The key features which we are going to include in the current project are as follows:

A. Gas sensor for detection of leakage of Domestic LPG gas
This sensor will be used for avoiding any kind of fire accident in the home. In India blast in homes due to LPG gas leakage is common reason for the fire in homes. This can be prevented just by adapting this low cost sensor. After connecting to the server the user can remotely monitor the Gas leakage, or we can get an alarming message or call indicating the leakage of the Gas thus preventing any major accident.

B. Sensor for detecting internal temperature of home
They can be used for detecting fires and generating alarming signal to the home owner. The temperature sensors can be also be used to detect and react in emergency situation, for ex: if the sensor detects rise in temperature above a threshold value, it will automatically trigger the water pump and disengage the fire and also send alarming signal to fire brigade as well as to the home owner.

C. Automatic A/C (Air conditioner) switching as per temperature as well as user access control through cloud
This sensor will be most helpful for the working class people who work in their office whole day and just want to jump to the bed after reaching to their home. Through this sensor they can monitor the temperature of the home and then turn on/off the air conditioner and make the suitable temperature at their home while they are still on the way to their home.

D. Automatic irrigation for domestic garden using soil moisture sensor
This sensor will decrease the headache of home owners of watering the plants when they are off to the vacation or away due to official work. This sensor will monitor the moisture level in the soil of the plants and update on the cloud. Now the user can monitor the moisture. When the moisture level decreases, then the user will have the flexibility of turning on the water pump from anywhere in the world using android app or through any computer.

III. CONDUCT OF EXPERIMENTATION

The initial experiment is done with implementing all the modules for the node and the gateway on the breadboard. The testing of hardware as well as software part is done on the same platform until the desired result comes out. The sensor nodes are tested in real time at the different locations like plantation, Indoor, Outdoor etc. Here some of the sensor nodes have explained:

A. Soil Moisture Sensor
Here the resistive soil moisture sensor is connected to the microcontroller and tested with the help of soil moisture parameter of plants at outside garden. The sensor measures the soil moisture level and convert it into the analog voltage. Here the arduinonano controller having facility of ADC with 10 bit resolution and also having 8 channels so that the analog voltage can be efficiently converted to the digital as well as total 8 sensors can be connected parallally to this same node.

The ADC data is then get processed and with the help of addressing of the RF24 module the processed data gets send to the master node which is responsible for the cloud updatation.

Fig. 2 Sensor node for Soil Moisture of garden

B. Humidity and Temperature (Outdoor)
Here the outdoor Humidity and temperature can be measured by the help of DHT11 sensor which is connected to the microcontroller. The controller processes the data and sends to the master after every 2 minutes of intervals

Fig. 3 Sensor Node for Humidity and Temperature (Outdoor)

C. *Actuators (Relay as Switch)*

Here the relays nodes plays an important role in switching electrical devices like water pump, Fan, Air Conditioner etc. The relay node comprises of arduino based microcontroller connected directly to the cloud using wifi module (the same module available on the master i.e. gateway node). This node continue checks the incoming data from the cloud in polling method and when the command changes like "Device ON" or "Device OFF" the relay gets turned ON/OFF.
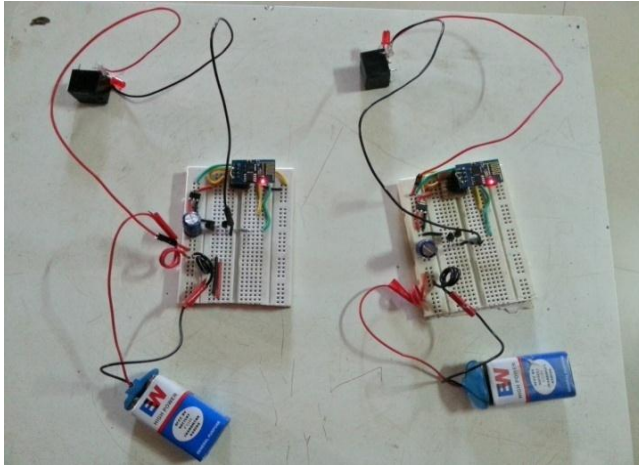

Fig. 4 Node: Relay as switch

IV.   ANALYSIS OF RESULT

After experimentation of all the modules on the breadboard the final node module is designed and implemented on the PCB. And with the help of these PCB modules the tiny sensor nodes have developed. These node sends the data to the master node in time/event fashion and the master is updating these all the sensor data on the Thingspeak cloud frequently. So the Data is now available for the user to access from the remote location.

A.   *Outdoor Garden Sensors*

The parameter of the Outdoor garden sensors i.e. Temperature, Soil Dryness is measured by the sensors and they uploads frequent data to the thingspeak cloud. The android app is polling for the available data on the cloud on every 1 seconds of interval and the last data can be display on the screen. There is also facility to update thingspeak commands from an android app. Using radio buttons. So the user can turn ON/OFF water pump as per dryness of the soil. The system works in the both manual as well as automatic mode. User have free dom to select whether to Turn ON/OFF the pump as per condition or freely through android app.
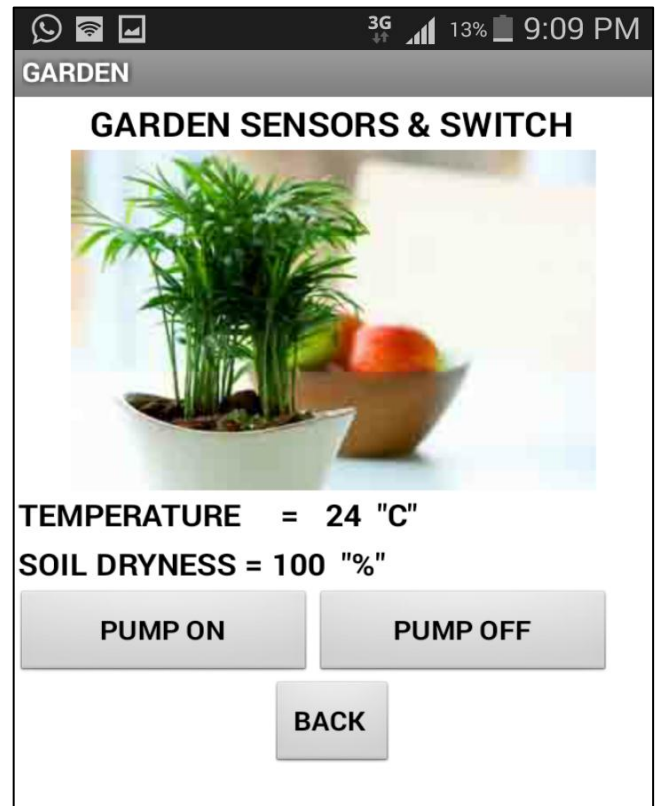

Fig. 5 Android App Screen: Garden Sensors and actuator control

B.   *Kitchen Sensors*

The parameter of the Kitchen sensors i.e. Temperature, LPG gas is measured by the sensors and they uploads frequent data to the thingspeak cloud. The android app is polling for the available data on the cloud on every 1 seconds of interval and the last data can be display on the screen.

The user have facility to make triggers for alerts like if the LPG gas get leakage then the user will get SMS / Call as well as the status get updated on the facebook or twitter tweets. This can be happened using the triggers available for the thingspeak cloud using its internal applications.

Fig. 6 Android App Screen: Kitchen Sensors

C. Living Room Sensors

The parameter of the Living room sensors i.e. Temperature, Humidity is measured by the sensors and they uploads frequent data to the thingspeak cloud. The android app is polling for the available data on the cloud on every 1 seconds of interval and the last data can be display on the screen. There is also facility to update thingspeak commands from an android app. Using radio buttons. So the user can turn ON/OFF A/C or Fan available in the room as per temperature of the room. The system works in the both manual as well as automatic mode. User have freedom to select whether to Turn ON/OFF the A/C or Fan as per condition or freely through android app.

Fig. 7 Android App Screen: Living Room Sensors

V. CONCLUSION

By using this Project for the Smart Home concept the user can easily access the home conditions seating from anywhere in the world as well as can access to the switches manually from the mobile app or computer else can automate them as per the conditions of the sensors. The Platform of the Iot is the very vast area so as per the present development of this project there is very large scope of modifications in this project.

REFERENCES

[1] Maheshwari D G, I M Umesh, A Study on Internet of Things based Smart Home, International Journal of Science, Engineering and Technology Research (IJSETR) Volume 6, Issue 8, August 2017, ISSN: 2278 -7798

[2]Zeinab Kamal Aldein Mohammed , Elmustafa Sayed Ali Ahmed, Internet of Things Applications, Challenges and Related Future Technologies, World Scientific News 67(2) (2017) 126-148

[3]http://www.nxp.com/assets/documents/data/en/white-papers/INTOTHNGSWP.pdf

[4] Saranya C. M., Nitha K. P., Analysis of Security methods in Internet of Things. International Journal on Recent and Innovation Trends in Computing and Communication, Volume 3, Issue 4; April 2015.

[5] Sapandeep Kaur, Ikvinderpal Singh. A Survey Report on Internet of Things Applications. International Journal of Computer Science Trends and Technology Volume 4, Issue 2, Mar - Apr 2016.

[6]Anjum Sheikh,Tushar Uplanchiwar, Implementation Of A Low Cost Wireless Sensor Network For Internet Of Things, International Journal of Advanced Computational Engineering and Networking, ISSN: 2320-2106, Volume-5, Issue-5, May-2017

[7]L. Atzori et al., "The Internet of Things: A survey, Comput. Netw. (2010)," doi:10.1016/j.comnet.2010.05.010

[8]V.Jyothi1 , M. Gopi Krishna2 , B. Raveendranadh3 , Debashree Rupalin, IOT Based Smart Home System Technologies, International Journal of Engineering Research and Development e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com Volume 13, Issue 2 (February 2017), PP.31-37