

A Theoretical Overview of IOT Based Smart Home Automation System – to connect various facilities through the network

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Abstract— Smart Home Automation system is a feature of modern technology based on IOT. Where we will provide all the long-term smart facilities, which actually people need. Our system will describe that how can we made a dynamic connection by using computer technology, image display technology, communication technology to monitoring our smart home from any corner of the world through the network. A moving sensor with a smart camera will detect the antecedents of the user easily and also there will be updated remote control system to control other congenial equipment's. The main purpose of making this system to make our home more comfortable and secure.

Index Terms— Long-term smart facilities, people need, dynamic connection, monitoring, moving sensor, smart camera, remote control system, secure.



1 INTRODUCTION

A Smart home is a residence that uses internet-connected devices to monitor our home and it control the management of appliance and systems, such as lighting, heating etc. [1]

In our day to daily life, life security is very essential. It is considered to be basic need of our life. But now days. Smart Home Automation System is a feature of modern technology based on IOT. Where we will provide all the long-term smart facilities, which actually people need. Our system will describe that how can we made a dynamic connection by using computer technology, image display technology, communication technology to monitoring our smart home from any corner of the world through the network. A moving sensor with a smart camera will detect the antecedents of the user easily and also there will be updated remote control system to control other congenial equipment's.

The main purpose of making this system to make our home more comfortable and secure. Smart Home is one part of technological advances in the field of automation, especially in terms of controlling household electronic devices that are integrated with smartphones. So that the use of electrical power for electronic devices and lights can be controlled and monitored by homeowners, in their efforts to save the maximum use of electric power load. Smart Home Automation system is a feature of modern technology

based on IOT. Where we will provide all the long-term smart facilities, which actually people need. By using the application of IOT, and user can get the access to using all the non-smart devices which turn into smart devices.

Home automation takes this idea forward and helps equip homes to use less mechanical and electrical energy, reducing human effort by operating systems at our finger tips and increasing savings in terms of cost efficient bills [2].

2 APPLICATION

Detailed Now IOT applications are not limited into a specific area. It has shown the significant contribution from the small area to largest area.

Sometimes we leave our elderly relatives at home for work. Many of them are sufferings from different diseases. Especially in our country, it's a major problem for all of us to keep our elderly relatives at our home. IOT based system will also provide some facilities for those person who having some sort of disability [1]. This system allows the user to control the home automation devices such as light, fan, water tap, gas, air conditioner, bed etc. without even making a physical connection. These all we can handle through the IOT base smart home automation system.

In so many developed countries, they have some modern technology to take care of their elderly relatives during the

working hour. They also have so many modern feature for solving this problem. If in our country, we can made something like that, then we can also fell relax during our working hour.

By the using of IOT (Internet of Things), we can made a dynamic connection between our smart home and our daily living life though the internet. By using those modern technology such as image display technology, computer technology, control technology, sensor technology; we can monitor our home from anywhere we are working. IOT can provides all the smart facilities to our elderly relatives so that they can get an easy and comfortable life during our absence.

The main goal of our research paper is to find out a comfortable smart home through our Internet technology. By this research we can find out an easy way to monitor all the movement which is happened inside of our house. Through the smart camera technology we will be able to know that, what happened inside my house, also is there our elderly relatives are ok or not. Our first goal is to provide an algorithm by which we can detect the movement of people using smart cameras. Our main goal is to observe the activities of each and every moment of a house.

Also, the Globalized demand for energy consumption has reached newer heights. With the advancement of state of the art technologies, demand for power as a form of energy has increased. Energy in its basic forms is being utilized in pencil cells to hydro-electric projects [4].

3 SMART HOME IMPLEMENTATION:

We strive to make our systems up-to-date. Where we can involve all the smart and updated technology which belongs from IOT. We try to make our system user friendly. There will be various kind of devise and input devices as like-

- Electric eyes on door so that we can determine the person.
- Some camera will be installed so that we can observed some room [5].

- Temperature sensor on Air conditioner so that the power of AC will be increase/decrease automatically.
- Sensor on each water tap to reduce wasting of water.
- Sensor on each electrical plug so that we can solve the problem of electricity consumption.
- Smart doorbell sensor in the garage so that we can observe it.
- Pressure sensor on bed.

We will use antennas so that we can make a wireless communication. Also we will use a RFID (radio frequency identification) to detect the presence of an RFID tag. It belongs to a group of technologies referred to as Automatic Identification and Data Capture (AIDC). It automatically identify the objects and collect data about those objects.

4 SYSTEM ARCHITECTURE AND ALGORITHM:

If our application system will be divided into two major parts.

- Energy control unit.
- Building Automation System
- Cloud analysis engine.

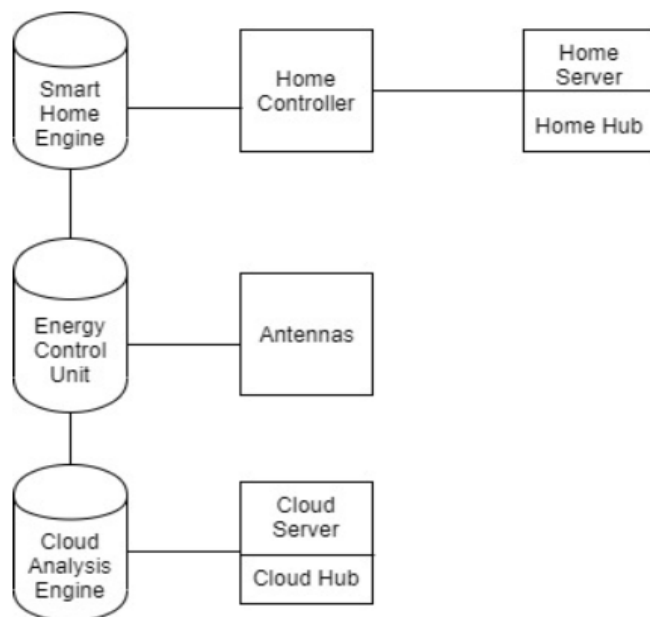


Figure 1: Smart Home Architecture

There will be a smart energy unit. Through the antennas we will make a wireless connection between our home and us. The energy control unit antenna is designed to cover all the frequency band, also it can be used to simulate the performance of the smart home sensors. We know, with the upward demand of energy, the motion of energy consumption is high. Corporations and industries spend thousands of dollars on energy and millions more in efforts to find ways for energy conservation [6].

Smart home engine will be based on building control system which is developed by iTechTool. Timewheel is the central data structure of building control system. Building automation is the automatic centralized control of a building's HVAC (heating, ventilation, and air conditioning. It provides security system, access control, and other interrelated system through a Building Management System [4].

The cloud analysis engine is a next generation analytics tool which is using network data analysis to improve application performance and availability. It performs data allocation, correlation and visualization. It gathers and correlates data from multiple sources, including physical and virtual endpoints [6].

Smart Home engine will manages devices locally in hard real time. On the other hand, Cloud analysis engine will provide soft real time analysis.

By smart home engine we will tracking our every activity through a camera which will be connected with a network. We will use DHT11 temperature sensor which is a digital temperature sensor that measures temperature and relative humidity; Amicikart Touch free automatic sensor for each water tap by using which the water tap will be open or close without any touch; The DOME Z-Wave Multi Sensor which offers motion detection and light sensor all in one tiny package. It will ensure that we are not wasting resources. It's like a camera, laser, and assistant in one, but cheaper and less intrusive; Wearable humidity sensor-This sensor use to detect hear rate, activity,

skin temperature. DHS active infrared sensor for garage; pressure sensor for bed.

We will use tracking algorithm which takes a set of observation from sensor as an input. Tracking algorithm provide the ability to predict future position of multiple moving objects based on the history of the individual positions being reported by sensor systems. We also use Hungarian algorithm for the tracking problem [4]. In our research we try to develop a user friendly system by which we can easily control and combine all the appearance-bearing and non-appearance-bearing sensors. Our algorithm will show you how it's works with the sensors through a network; how we can control all the cameras so that anyone can find out the unknown persons presence in our smart home, also all the movement which happened inside our house.

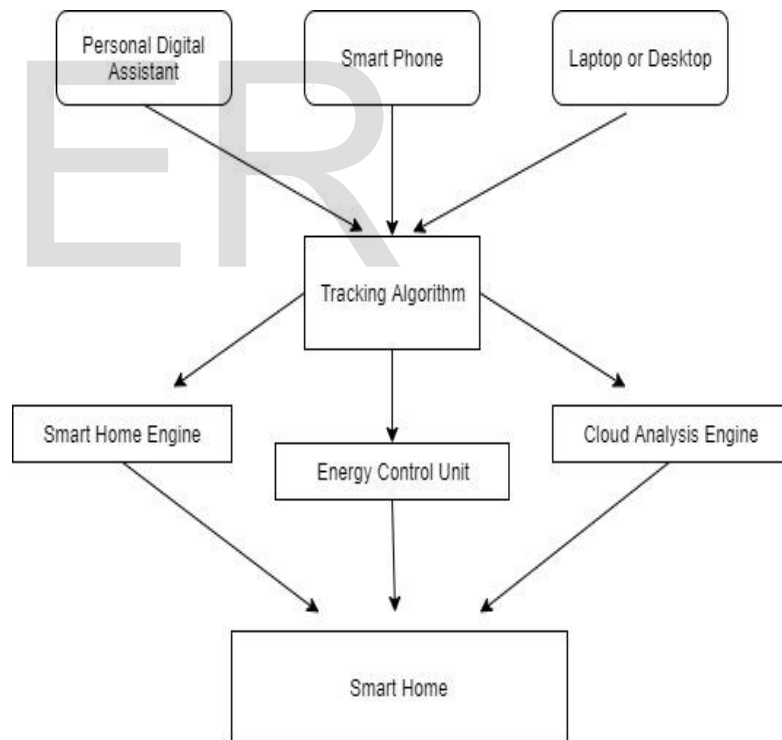


Figure 2: Block diagram of Smart Home Automation System

We can see that any unauthorized person cannot enter the home , if anyone want to enter the home he/she have to authorized at first by his/her identity.

5 DISCUSSION ON THE SYSTEM PERFORMANCE

The system consists of different sensors such as DHT11 temperature sensor which is a digital temperature sensor that measures temperature and relative humidity; Amicikart Touch free automatic sensor for each water tap by using which the water tap will be open or close without any touch; The DOME Z-Wave Multi Sensor which offers motion detection and light sensor all in one tiny package. It will ensure that we are not wasting resources. It's like a camera, laser, and assistant in one, but cheaper and less intrusive; Wearable humidity sensor-This sensor use to detect hear rate, activity, skin temperature. DHS active infrared sensor for garage; pressure sensor for bed. Here the home sensors are connected with the home network [8].

This tracking algorithm takes as input a set of observations from sensors and partitions them into tracks, one for each subject. The algorithm has no prior knowledge of the number of subjects. It does have a graph model of the set of possible paths between sensors; our work developed improved graph models. We will also use Hungarian algorithms for the tracking problem. We refer to cameras as appearance-bearing sensors since we can use appearance information in the imagery to distinguish subjects. Electric eyes, water tap sensor, and many other sensors are non-appearance-bearing since we know that someone is present but we do not know the identity of the subject. Our experiments show that our algorithms work in a sensor network that combines appearance-bearing and non-appearance-bearing sensors. In such networks, precision and recall go down somewhat as compared to a network in which non-appearance-bearing sensors are replaced with cameras. However, the mixed network provides higher precision and recall than does a network in which only the smaller number of cameras is used (non-appearance-bearing sensors are removed and not replaced with cameras).

The proposed system is very helpful in monitoring and controlling smart home environment. Using this system can be continuously monitored in home. Proposed

system also improves security. User can monitor every activity in home and can control windows and doors. This system also ensures better utilization of energy and resources through smart lighting, smart appliances and smart air-conditioning system. The appearance of the Smart home Prototype along with the Smartphone Application that has been made.

For Smartphone Applications, we use the Blynk Software and MIT App Inventor software in its manufacture. For MIT App Inventor, we uses Thing Speak as a webserver. For Blynk there is automatically a web server. The HC-SR04 ultrasonic sensor test is performed to determine its level of accuracy when compared to distance measuring devices that are in accordance with industry standards. In this system the home appliances are connected to smart devices [7].

6 LIMITATION

There are some limitation in our research. We can see the person who tried to enter our smart home or we can observe all the activities, which happened inside our smart home. But we cannot find out the identity of that unknown person.

7 FUTURE WORK

The preferred In future, we will try to doing our research about how we can find out the unknown person's identity in our smart home though the smart technology. Also, in this research we can detect the sickness of a person. But we cannot find out a proper solution for that sickness. In future we try to make a way by which we can contact with the doctor for consultation through our smart home technology.

8 RECOMMENDATION

This research provides better home safety. It will give us more secure home. So, user will be able to control their home from any corner of the world through the internet. It will save electricity consumption. Our system will help to reduce unwanted incident because we can detect all the movement

which happened inside the house. It will help to monitoring the home. We have focused on cost too.

We tried to implement this system in low cost. So that it can be used in our smart home automation system and it can be user friendly. In our research, most challenging part is accuracy level. If we can't able to find out more accuracy, we can't find out the real result. We have to face so many kinds of difficulty. We are doing this research on basis of Bangladesh situation and our home safety.

9 CONCLUSION

In this paper, we have presented the step-by-step procedure of how can we make our home smart enough through the internet. With the help of the energy control unit, home appliance can be converted into a smart and intelligent device using IOT. We tried to control the network through the antennas. Within the Smart Home, each and every movement of the house we can determined, also we can control it from anywhere through the help of IOT.

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