Home Automation Using IOT: Review

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Abstract – Internet of Things plays a vital role in home automation techniques and security system. In home automation the user can control the home appliances with the help of his/her smart phone. That help physically disabled person to be independent and to be secure. Internet of Things (IOT) is widely used all over the world nowadays; The IoT offers huge potential for enhancement of various applications such as: Smart homes, Healthcare Monitoring, Industrial Internet, Security, and Energy Engagement etc. The *construction of ordinary homes into "smart homes" has seen a* rise in last few years. Using IOT in homes helps to save energy consumption and Automate home appliances using mobile phones. In this paper a brief overview of different techniques and experiments done on IoT based Smart Homes and security system is presented.

Key Words: Smart Home Security System, GSM, SMS, multi sensor, theft alarm, Home automation, voice activated system.

1. INTRODUCTION

In recent years, Internet has grown rapidly and changed human's life by providing better connectivity and communication. The Internet technology can be extended to connect objects that are used in day to day life. This expansion of internet services is called Internet of Things (IoT)[1].

Unintentionally, a lot of power is wasted away on daily basis. Sometimes TV and/or lights are left on while sleeping. This increases the amount of energy we are consuming and generates a lot for the electricity bill. Besides, it gives no warning while we are using the electricity, so that we just overuse the electricity without noticing about it.

Home automation is the method of using devices and programming through a network to access home appliances for better life and for physical disabilities and the older persons. It helps in reducing human efforts and interaction as much as possible and use programs to perform those tasks. Most of the smart home systems use wireless technology like internet, radio frequency and Bluetooth to communication between the controllers and receivers. Users can send commands and control the smart home systems via computers, smartphones and pre-built programming codes.

Security in homes is also a major concern nowadays; securing homes using IoT is widely implemented. A secured smart home should keep the home safe from theft and external dangers that includes house fire and LPG gas leakage. Mostly, the home appliances and gadgets are connected to specific sensors, which reduce human labor and physical work, by sensing and proactively responding to their needs, automatically[2]. A Home Security System provides security and safety for a home, by alarming the home inmates from theft, burglary, natural adversity and miss-happenings such as fire accident, gas leakage etc. In this paper, we aim to discuss related technologies[3].

2. ARCHITECTURE OF INTERNET OF THINGS

Architecture of internet Of Things contains basically 4 layers:

- Application Layer
- Gateway and the network layer
- Management Service layer
- Sensor layer

2.1 APPLICATION LAYER:

- Lowest Abstraction Layer
- With sensors we are creating digital nervous system.
- Incorporated to measure physical quantities
- Interconnects the physical and digital world
- Collects and process the real time information

2.2 GATEWAY AND THE NETWORK LAYER:

- Robust and High performance network infrastructure.
- Supports the communication requirements for latency, bandwidth or security.
- Allows multiple organizations to share and use the same network independently.

2.3 MANAGEMENT LAYER:

- Capturing of periodic sensory data.
- Data Analytics (Extracts relevant information from massive amount of raw data).
- Streaming Analytics (Process real time data).
- Ensures security and privacy of data.

2.4 SENSOR LAYER:

- It provides a user interface for using IoT.
- Different applications for various sectors like Transportation, Healthcare, Agriculture, Supply chains, Government, Retail etc.

3. LITERATURE SURVEY

M L Sharma1 et al. (2017) [4] has developed a home automation system that interfaces with Android mobile devices. That mobile device and system can communicate with each other via Wi-Fi. The proposed Home Automation System enhances mobility and supports monitoring and control of devices from any remote location within Wi-Fi range. Being a simple and user friendly application it serves as an application of great help to the old aged or physically disabled people.

User can select the option, which switch he/she wants to switch ON/OFF or set timer from their Android smart phone Application. This command goes to the Wi-Fi module. Wi-Fi modules transmitter convert it into signals and send that command to the receiver of the Arduino Uno microcontroller, then controller activates that particular I/O pin on the board and send input to the Relay. After receiving current, it generates electromagnetic field in coil and passes the 12V current to switch ON the light.

Ravi Kishore Kodali et al. (2016) [5] has built a smart wireless home security system which sends alerts to the owner by using Internet in case of any trespass and raises an alarm optionally. The difficulty faced by current home security/surveillance systems in providing information pertaining to the situation to users while being away from home is tried to overcome in this project. PIR motion sensors are installed at the entrances of a building. These sensors as explained earlier detect the motion of human beings. This signal which detects their presence becomes the input trigger for the micro-controller. The owner, who may or may not be present in that building, will be receiving a voice call on his mobile phone.

Jared Maato et al. (2017) [6] has developed a prototype of a computer based fingerprint door access control. The main components include a low-cost SM630 fingerprint verification module, a personal computer and a relay-operated electromagnetic lock. The system performs training and verification using a LabVIEW program in conjunction with the SM630 fingerprint reader module. The verification result is passed onto the electromagnetic lock to grant physical access to a restricted area. The system has an additional feature of capturing an imposter image. This is an important tool in carrying out security analysis.

Supreeta et al. (2017) [7] has developed an IoT Based security system for homes, banks, offices etc. This sends text message to user as well as his neighbor if fire or theft detected. This system also uses a camera to capture the picture of intruder, which makes it more efficient than CCTV. Twilio platform is used to send text alert in case of fire and theft detected. This platform is better than GSM module because this platform costs less than SMS rates of various networks, which makes it economical.

J. Esquiagola et al. (2018) [8] has implemented an IoT platform for monitoring indoor air quality. He has developed a custom hardware, firmware and software regarding to present a complete solution from specification until visualization of results. This solution uses the CoAP protocol to perform the communication between devices and follow the Web of things paradigm. Three main hardware modules: Gateway, border router and sensor nodes. The Gateway performs the requests to collect data from sensors. It also stores all data in a local database and can execute some preprocessing tasks. The second component is the border router which establishes the communication between the gateway and the sensor nodes. Advanced sensor technologies were used to obtain accurate results of the parameters which affect the indoor air quality.

Prajwala Srivatsa et al. (2017) [9] gives a proposal for addressing the issue of indoor air quality using the internet of things communication model. The effect of low moderate levels of carbon dioxide on the occupants on the indoor space is presented. The system when deployed will monitor the carbon dioxide levels in the room in real time and continue collecting data periodically in programmed intervals. The system is designed to contain three major areas of functionality: first, the wireless sensor network that will provide the system with the part per million reading of the room's carbon dioxide. Second, this information is passed through a wireless access point and gets dumped on a server machine. Third, the server side stores and processes this data. The server side contains user interface and notification system functionalities. This system can visibly reduce impaired cognition among employees of an office building or increase the learning capacity of students in a school classroom. Thus when productivity of people is increased naturally the organization gets benefits.

F Nugroho et al. (2017) [10] has implemented a prototype of kitchen security system using Internet of Things. The system is designed using 4 types of sensors and Arduino UNO. DHT 11 sensor is used to monitor temperature and humidity, IR Flames sensor is used to detect fire, MQ-135 sensors are used to detect gas leakage, and PIR sensors are used to detect human activities in the kitchen. The sensors output is then connected to the Arduino which will control the relay. The relay acts as a fan switch in the event of a gas leak, uncontrolled fire and excessive temperature increase. Under these conditions, Arduino will also turn on the alarm and the led, and send information to the server.

J.DAMODHAR et al. (2016) [11] has presented a Raspberry pi based kitchen monitoring system through webpage with WI-FI based technology. He has designed and implemented a compact wireless sensor network with internet capability.

The system can monitor the status of kitchen and send email and/or an alert SMS via GSM network automatically to users. The system has the capability to control through internet, where the subject of received email is read by the developed algorithm fed into Raspberry pi and then the system responds to the corresponding instruction with high security. The user can directly log in and interact with the embedded device in real time without the need to maintain an additional server. In the proposed system, kitchen parameters such as gas leakage, fire, light intensity and LPG gas weight age can be monitored and also controlled by the modules. When gas will be detected exhaust fan ON automatically to send gas outside and also when fire will be detected AC motor will be ON to sprinkle the water to remove the fire. This all information will be sent to the concerned authority via GSM and also Email.

4. CONCLUSION

Different approaches of home automation are presented in this paper for smart kitchen and home security. Each method has its own advantages and disadvantages. We cannot say that which method is best for home automation and which gives best security. New technology can still improve the efficiency of smart homes.

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