

Home Automation: Present and Future

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Abstract— Home Automation is an approach to have things around your home happen consequently. Home automation is getting to be plainly prominent because of its various benefits. Home automation refers to the control of home appliances by remote control. Heterogeneous home automation frameworks and advances considered in survey with central controller based (Arduino or Raspberry pi), web based, email based, Bluetooth-based, versatile based, SMS based, ZigBee based, Dual Tone Multi Frequency-based, Cloud-based and the Internet with execution. This paper introduces a review of past smart home research and the related innovation and also the current technologies of smart home research. This paper also talks about future home automation.

Keywords: Automation, Technology, Smart Home, Healthcare, IoT

I. INTRODUCTION

Home automation is building mechanization for a home, called a smart home. It includes the control and computerization of lighting, warming, (for example, brilliant indoor regulators), ventilation, aerating and cooling (HVAC), and security, and also home machines, for example, washer/dryers, stoves or fridges/coolers. Wi-Fi is regularly utilized for remote checking and control. Home devices, when remotely observed and controlled through the Internet, are an essential constituent of the Internet of Things.

Smart homes constitute a branch of ubiquitous computing that involves incorporating smartness into dwellings for comfort, healthcare, safety, security, and energy conservation. Early home automation began with labour-saving machines. Self-contained electric or gas-powered home appliances became viable in the 1900s with the introduction of electric power distribution [1] and led to the introduction of washing machines (1904), water heaters (1889), refrigerators, sewing machines, dishwashers, and clothes dryers.

In 1975, the main broadly useful home computerization arrangement innovation, X10, was created. X10 is a communication protocol for electronic devices. It basically utilizes electric power transmission wiring for flagging and control, where the signs include brief radio recurrence blasts of advanced information, and remains the most broadly available. [2] By 1978, X10 items incorporated a 16channel charge support, a light module, and an apparatus module. Not long after came the divider switch module and the primary X10 clock. By 2012, in the United States, as indicated by ABI Research, 1.5 million home mechanization frameworks were installed. [3] As per Li et al. (2016) there are three generations of home automation:

First generation: remote innovation with intermediary server, e.g. ZigBee robotization.

Second generation: artificial brainpower controls electrical devices, e.g. Amazon Echo;

Third generation: robot buddy who associates with human, e.g. Robot Rovio, Roomba.

Smart homes enhance traditional security and safety mechanisms by using intelligent monitoring and access control. According to the World Health Organization (WHO), 650 million people live with disabilities around the world [5]. It is not possible or logical to support all of these patients in medical centre or nursing homes for an uncertain period of time. The solution is to accommodate healthcare services and assistive technologies in patients' home environment.

This paper is a survey on smart home projects, which are arranged according to their intended services. It also discusses the significance and limitations of smart home components and the various technologies used in home automation. It explains the current trends of smart home research and future challenges that must be overcome to design a feasible smart home.

II. HOME AUTOMATION

A smart home is an application of ubiquitous or pervasive computing or environment. Several synonyms are used for smart home, e.g., smart house, home automation, domestique, intelligent home, adaptive home, and aware house. An early definition of smart homes was provided by Rudolf [5]. According to Rudolf, "the smart home concept is the integration of different services within a home by using a common communication system. It assures an economic, secure and comfortable operation of the home and includes a high degree of intelligent functionality and flexibility."

Sampath provides a more appropriate concept of smart homes. According to Sampath, "A home which is smart enough to assist the inhabitants to live independently and comfortably with the help of technology is termed as smart home. In a smart home, all the mechanical and digital devices are interconnected to form a network, which can communicate with each other and with the user to create an interactive space" [6]. Considering the current trends in smart home research, we can define the smart home as an application of ubiquitous computing that is able to provide user context-aware automated or assistive services in the form of ambient intelligence, remote home control or home automation.

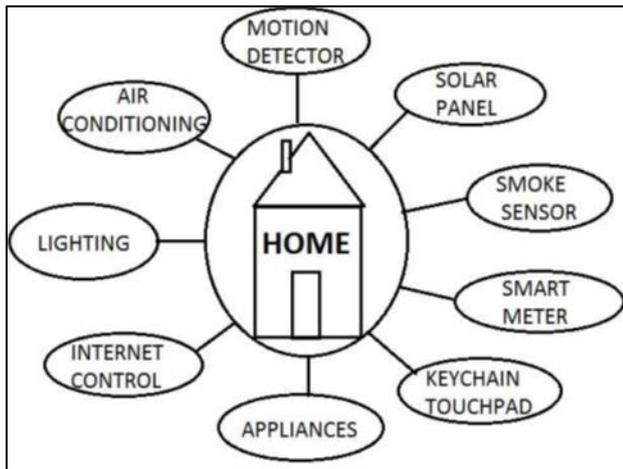


Fig. 1: General Home Automation System

III. HOME AUTOMATION IN PAST AND PRESENT

The present smart homes are more about security and living greener. Current patterns in home mechanization incorporate remote versatile control, computerized lights, robotized indoor regulator modification; booking machines, portable/email/content warnings, and remote video observation Sensors are the eyes and ears of the home system. There are sensors for an extensive variety of uses, for example, measuring temperature, dampness, light, fluid, and gas and recognizing development or invention. The various technologies used in home automation

A. Bluetooth:

Bluetooth is a remote standard that has a place with the PAN convention family. It works in the 2.4 GHz band partitioned into 79 sub channels with 1MHz separating, utilizing FHSS. GFSK and additionally PSK regulations are utilized, contingent upon the Bluetooth variant utilized. Full duplex exchanges are acknowledged by means of TDD.

B. Wi-Fi:

Wi-Fi is probably the most exploited wireless technology nowadays. It belongs to the family of (W) LAN networks, but with latest amendments it could also be belonging to the (W) MAN family). In distinction to Bluetooth, the Wi-Fi range is partitioned into just 13 halfway overlaying sub channels (fourteenth accessible in Japan just), each involving the band of 22MHz.

C. ZigBee:

ZigBee is a radio recurrence (RF) correspondences standard. The ZigBee organizer is in charge of making and keeping up the system. Each electronic gadget (i.e. Clothes washer, Television, Lamp and so on) in the framework is a ZigBee gadget oversight by the facilitator. All correspondence between gadgets proliferates through the facilitator to the goal gadget. The remote idea of ZigBee defeats the meddling establishment issue with the current home mechanization frameworks recognized before. ZigBee networks can be established by a coordinator only. Upon correct PAN parameters settings, other devices may join the network, forming one of the following topologies.

D. X10:

X10 has for some time been the standard by which other home computerization innovations are measured. X10 works by means of home's electrical cable wiring and may encounter issues identified with wiring separations, stage contrasts, and line commotion. Numerous lovers trust X10 innovation has turned out to be old, supplanted by the more up to date and more adaptable remote advancements. In case you're new to home computerization it's most likely a smart thought to begin with some other innovation, on the grounds that X10 gadgets can be More hard to design and execution is here and there whimsical.

E. Z-Wave:

The first remote home mechanization innovation, Z-Wave set models for remote home computerization. Z-Wave broadened the usable scope of home mechanization by influencing all gadgets to twofold as repeaters. Its expanded system unwavering quality additionally empowered business applications. Z-Wave gadgets are intended for simplicity of setup and utilize, and happen as near turnkey as the home mechanization industry permits, particularly accommodating for starting devotees.

F. Internet of Things (IOT):

It is Internet of Things (IOT) which allows objects to be sensed & controlled remotely across existing network infrastructure, creating opportunities for more direct integration of physical world into computer-based systems, & resulting in improved efficiency, accuracy & economic benefit. End-to-end health monitoring IoT platforms are coming up for antenatal & chronic patients, helping one manage health vitals & recurring medication requirements. In this paper we use IOT for energy efficient Environmental Conditions sensing in home Automation. We have discussed the roles of IOT in automation in these papers we have also discussed that integration of solar based energy system with IOT for home automation. Integration of sensing & actuation system by connecting to internet is discussed here. Efficient power balance and generation & energy usage is the objective of research.\

1) System Design:

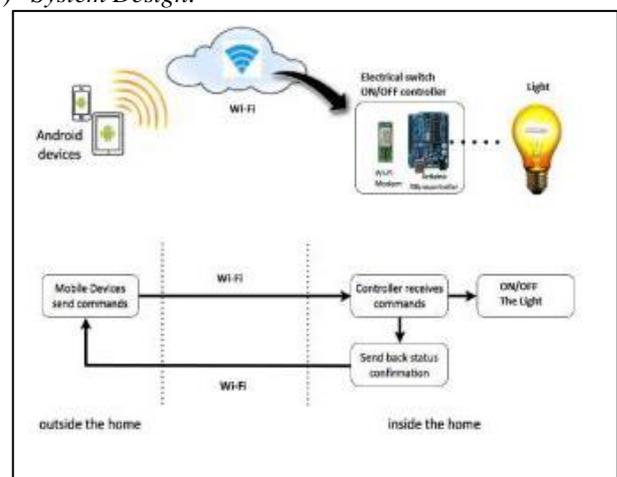


Fig. 2: System Architecture In this proposed system Fig. 2: illustrates the overall control function of the system. The projected system works using the smart phone Android

application, which is the main source for giving the instruction to the Wi-Fi module.

From user side, 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. After that controller activates that particular I/O pin on the board and send input to the Relay. In that Relay, which has already 230V power supply, after receiving current it generates electromagnetic field in coil and passes the 12V current to switch ON the light. User can select the option from anywhere in remote access area network, which is near about 100 m from Wi-Fi module.

IV. FUTURE SCOPE

Future homes will be able to offer almost all required services, e.g., communication, medical, energy, utility, entertainment, and security. As we move into the next generation, more and more devices will begin to connect to one another. Gesture control is also a future. The dream in a future in which data is communicated between devices and humans without relying on manual input of individual bytes. Computers that can automatically mine data and then use that data to change aspects of the home environment is the future. For example, a smart thermostat that is able to automatically gauge the temperature of a room and then adjust the central heating and cooling units as necessary or a washing machine that automatically detects its contents and programs itself to be finished washing at a specified time. These are all goals that engineers are working toward and depend not only on advances in data-mining technologies but also in big data computing. Pert is the next generation home automation innovation that lets you control, monitor and secure your home with your smartphone. The future healthcare service provider will consider the smart home an effective way of providing remote healthcare services, especially to the elderly and disabled who do not require intensive healthcare support. As technologies continue to advance, you can expect the house of tomorrow to be even more automated than that of today.

A. Future Scope in (IOT)

This application can be further developed into system with the following enhancements:

- Bill functionality can be added to the home automation system which can predict bill of any selected period.
- Gas leakage and light dimming functionality can also be added in near future.

V. CONCLUSION

This paper shows a general overview of smart home project that are masterminded by their expected services. It also covers the survey of various technologies which emphatically support the home automation systems in reliable way. This paper recognizes a few future bearings of smart home research. 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. Thus, the Internet of Things based Home Automation System is better than all traditional existing Home Automation Systems.

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