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A REVIEW PAPER ON SMART HOME AUTOMATION

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ABSTRACT
Home automation trade has drawn goodish attention of researchers for quite a decade. The main attraction of any automated system is reducing human labor, effort, time and errors due to human negligence. With the development of modern technology, smart phones have become a necessity for every person on this planet. With the increase in consumption of energy and population, there is a grave need to conserve energy in every way possible. The inability to access and control the appliances from remote locations is one of the major reasons for energy loss. This paper presents a survey of all such systems.

GENERAL TERMS
Voice recognition

KEYWORDS: *Home Automation, Smartphone, Voice Control, wireless technology.*

I. INTRODUCTION

Until fairly recently, automated central control of building-wide systems was found only in larger commercial buildings and expensive homes. Typically involving only lighting, heating and cooling systems, building automation rarely provided more than basic control, monitoring and scheduling functions and was accessible only from specific control points within the building itself. With the advent of 'Internet of Things' in the last decade, we have been pushing for ubiquitous computing in all spheres of life.

It thus is of extreme importance to simplify human interfacing with technology. Automation is one such area that aims that achieves simplicity whilst increasing efficiency. Voice controlled House Automation System aims to further the cause of automation so as to achieve the goal of simplicity. Where home automation becomes truly "smart" is in the Internet-enabled devices that attach to this network and control it. The classic control unit is the home computer, for which many of the earlier home automation systems were designed. Today's home automation systems are more likely to distribute programming and monitoring control between a dedicated device in the home, like the control panel of a security system, and a user-friendly app interface that can be accessed via an Internet-enabled PC, smartphone or tablet.

This paper aims to perform a survey of all the existing such systems and compare the available features. The paper will also compare and contrast all the systems and look at their various features and disadvantages. A wide variety of options are available for the home automation systems.

After study of different review papers based on home automation starts with the brief description of home automation its need and importance then after that after review of different research paper is done on the basis of which literature survey of different technique used for automation with their advantages and limitations is discussed.

II. LITERATURE SURVEY

The concept of development of a smart home system is not an isolated case it has been existing since the term "smart house" was first coined by the American Association of House builders in 1984.
Implementation of these systems will not just increase the comfort level of modern generation but also help elderly and physically disabled people. All researchers are trying to put some handheld device (e.g. mobile or some battery operated device) in hand on people to increase level.
In the real world (outside of research labs and the homes of the rich and famous), home automation most commonly connects simple binary devices. This includes "on and off" devices such as lights, power outlets and electronic locks, but also devices such as security sensors which have only two states, open and closed.
The starting technologies that were used for automation mainly operate one or two devices also specific task can be performed with them which make them very inefficient . On the bases of study of review papers based on Home Automation following techniques are discussed they are as follows:-

- **System based on ZigBee**

System based on ZigBee sensor networks to make home networks more intelligent and automatic.
In ZigBee technology an end node, the node sends data to the coordinator, and the coordinator Hub sends the data back to the terminal end of the loop. Since all devices have their own IP Address based on IPv6, they can be directly connected to an external network. So, all smart devices It can not only through the handheld remote control device to the central and local home, but can also be controlled remote computer control through the introduction of home Internet Gateway machine.
The application of Zigbee is where, we require, low data rate, low power consumption, low cost, security and reliability. Zigbee is used in several field like medical, industry automation, home automation Vital Monitoring includes Heart-rate Monitoring Body heat Monitoring Personal equipment, control Consumer Electronic include Remote control PC- peripheral Control of windows roll/shades etc. Dimmer/ switches Alarm And security system include Smoke detector Water leakage alarm.

The advantage of Zigbee home automation is, it low power consumption device and very less time consuming system. Zigbee home automation make home safe and comfortable. Home automation takes less time to finish a task and also makes the work simpler. The wireless range of Zigbee is good enough for home automation. The range of Zigbee is100to300feetapprox.
The overall system cost is very low as compare to other. The cost is dependent on advancement of system. The limitation of the Zigbee home automation is If there any damage due to rupturing of cable the entire system get crashed and If he/she doesn't use the correct keys to perform the operations, human errors may occurs . In very rare case, the reliability of home automated device is decreases.

- **System Based on Radar**

From any place without any line of sight around the house, RF based wireless remote control system can change the state of the electrical appliances either in on state or off state.
Transmission through Radio Frequency has many advantages over infra red transmission. RF signal can travel a longer range hence its coverage area for operating is lager and moreover the transmitter and receiver need not be in line of sight. As RF frequency signal is strong, it is more reliable than IR transmission. The RF modules which is used in this work comprises of transmitter and receiver which operate at 434 MHz**.**

- **System Based on** Banana Pi

Main Features are it is a single-board computer, it can serve as a platform to make many applications for different purposes.
Strengths of system are it targets to be a cheap, small and flexible enough computer for daily life, it is built with ARM Cortex-A7 Dual-core CPU and Mali400MP2 GPU and open source software, Most

of common extension accessories Including LCD panel, touch screen, camera module, UART console and GPIO control pins are accessible from Banana Pi on-board connectors and headers.
Weaknesses of system are all these systems require the user to have some technical background and electronics basics. It also requires time to be learned and become expert in assembling and using it. However, many tutorials and detailed information about their assembly and use are free available on line. Another barrier is constituted by their commercial price that can also reach thousands of euros.

- **System Based on** Raspberry Pi

Main Features of It is a capable credit-card sized computer that allows developing electronics projects.
Strengths are ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. Could be used by people of all ages. Its challenge is to be used by people of all ages to explore computing and to learn how to program in languages like Scratch and Python and how to manipulate the electronic world around them.
Weaknesses are same as Banana Pi.

- **Smart Home Micro-Computers**

Smart Home Micro-Computers (SHMC) are small-sized computers that are connected to other devices in order to automatize and control the whole smart home system. They consist in a microcontroller with complementary components that facilitate programming and incorporation into other circuits. An important aspect is their standard connectors, which lets users be connected to a central processing unit (CPU) board to a variety of interchangeable add-on modules known as shields. They allow the users make interactive projects and applications with the environment by using multiple extensible connectors and by receiving inputs from many sensors and affect its surrounding by controlling lights or other actuators. In literature, there are some examples of applications where SHMCs have been combined with wireless sensors to create home automation systems to monitor and control home appliances. The strengths and weaknesses of each SHMC have been summarized.

COMPARING HOME AUTOMATION TECHNIQUES

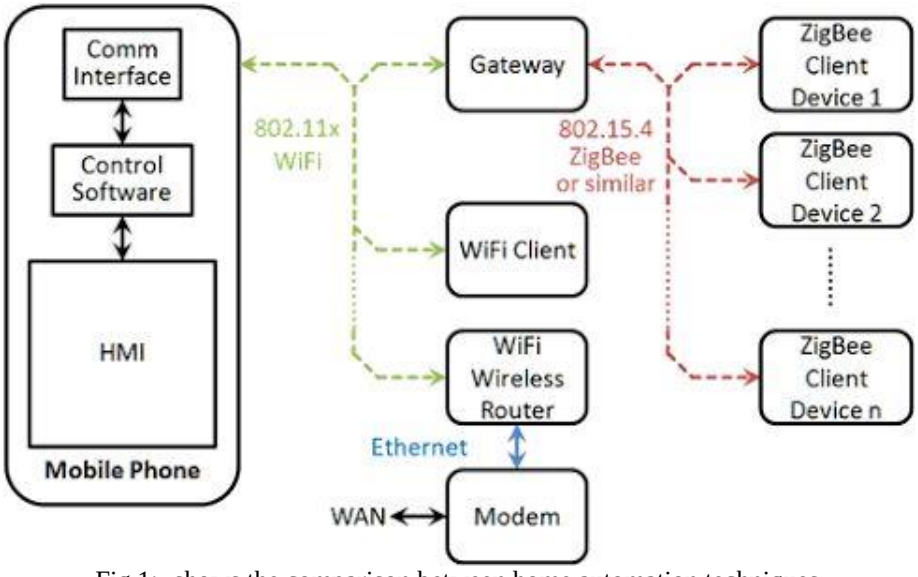

Fig 1:- shows the comparison between home automation techniques

III. DISCUSSION

It gives an overview of the status of smart home technologies by discussing the main relevant features and pointing out the strengths and weakness of each technology and product. It is a guide for users, who need to choose the technology that best suits their needs.

The diverse directionality and complexity of the existing communication devices represent a challenge. The growing trend is the development of bidirectional communication using a Home Automation Network (HAN) to monitor and control home appliances.de facto realizing a demand-response (DR) system. According to a report published by the American Council for an Energy, Efficient Economy, some of the systems from among the new feedback initiatives that make energy resources visible to residential users achieve the maximum feedback-related savings. If all systems are to do this, they will require a combination of useful technologies with well-designed programs that successfully inform, engage and motivate the users via the following determining factors, Data collection the technology allows the collection of all relevant data and provides access to them, Data processing: the technology allows the processing and analyzing of relevant data and can combine them, Data representation: the technology allows the relevant data to be made accessible to the users, Control and interaction capabilities: the technology enables users to access the status and monitor the functions of related technologies (bidirectional communication and interaction). These factors need to be considered when tailoring the data that should be provided to end-users.

It is also clear from the literature that the way to communicate the feedbacks to the end-users involves two main approaches. Systemic: the house exists in a systemic context, and the data, retrieved by means of a smart grid, are presented at an individual household level and compared with the average system performance, Gamification: the feedback is presented by using elements and concepts that are typical in computer games and is often integrated in a graphical user interface (GUI). In the following sections, the most relevant technological devices and integrated software or applications today available on the market for improving the interaction between users and home appliances are presented, compared and discussed.

IV. CONCLUSION

In this review paper the concept of the smart home and the advent of the smart grid have been presented. Smart technologies and products available on the market that allow an intelligent energy management of homes have been reviewed.

It was also discussed a general system's architecture and the barriers, challenges, benefits and future trends that future smart homes and grids will face. Efficient usage of electricity results in lowering peak load, reducing energy bills, and minimizing greenhouse gas emissions. In order to realize an effective integration of smart homes into a smart grid, the migration towards bi-directional communication networks has to be fostered, and well-tuned home automation system has to be designed. Currently one of the existing issues that are associated to smart home applications are the fact that in a home with all sorts of automated application, there will be too many remote controls or monitoring terminal, if the user installed a range of proprietary applications from different providers are also been studied.

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