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## Internet of Things Application based Home Automation Systems with Remote Access

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**ABSTRACT:** - The motive behind this research is to figure out various possibilities of home automation using IoT. Internet of Things is one of the most innovative concepts in the field of computer science engineering and no doubt wonders have been already witnessed in this subject before. Home Automation is one of the most demanded technologies in the electronics and computer market and with changing time, the increase in demand for smart systems have been observed. This paper show so many different ways of optimizing smart systems and develop an advanced home automation system. We have already experienced the revolution Amazon Alexa and Google Home has brought in the smart systems market and this research paper will emphasis on how similar systems can be developed with more efficiency and cost-effectively.

**KEYWORDS:-** Home Automation, Internet of Things, Remote Access

### I. INTRODUCTION

The market of smart systems is on its peak and we have seen how they revolutionize the whole setup of our home. The massive demand in the smart systems has raised curiosity among young developers and that is why this paper focuses on various possibilities of development of smart home automation systems efficiently in terms of cost as well as time. In the search of optimal solutions, the following are the concepts required to be focused on.

**Internet of Things (IoT):** The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. A thing in the internet of things can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low or any other natural or man-made object that can be assigned an Internet Protocol (IP) address and is able to transfer data over a network.

**Bluetooth:** This wireless technology enables communication between Bluetooth-compatible devices. It is used for short-range connections between desktop and laptop computers, PDAs (like the Palm Pilot or Handspring Visor), digital cameras, scanners, cellular phones, and printers. Infrared once served the same purpose as Bluetooth, but it had a number of drawbacks. For example, if there was an object placed between the two communicating devices, the transmission would be interrupted. (You may have noticed this limitation when using a television remote control). Also, the Infrared-based communication was slow and devices were often incompatible with each other.

**Wi-Fi:** Wi-Fi is the standard way computers connect to wireless networks. Nearly all modern computers have a built-in Wi-Fi chip that allows users to find and connect to wireless routers. Most mobile devices, video game systems, and other standalone devices also support Wi-Fi, enabling them to connect to wireless networks as well. When a device establishes a Wi-Fi connection with a router, it can communicate with the router and other devices on the network.

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However, the router must be connected to the Internet (via a DSL or cable modem) in order to provide Internet access to connected devices. Therefore, it is possible to have a Wi-Fi connection, but no Internet access.

### II. LITERATURE SURVEY

**The Phone approach:** Some systems are described as an enabling system that can be used to provide a common framework for home Automation. It provides a system for a smart home that includes facilities such as a system controller, housewide wiring and a common interface. This will enable using the existing system for home automation. A hardware based remote controller for power point control has been described. The function of this remote controller is to control the power supplied to devices at a remote location. The system uses the telephone line for transmitting the commands. The controller is a logic system built entirely of hardware. It eliminates the cost incurred with microcontrollers. It uses a DTMF transceiver which is interfaced with a solid state relay to control the power supply.

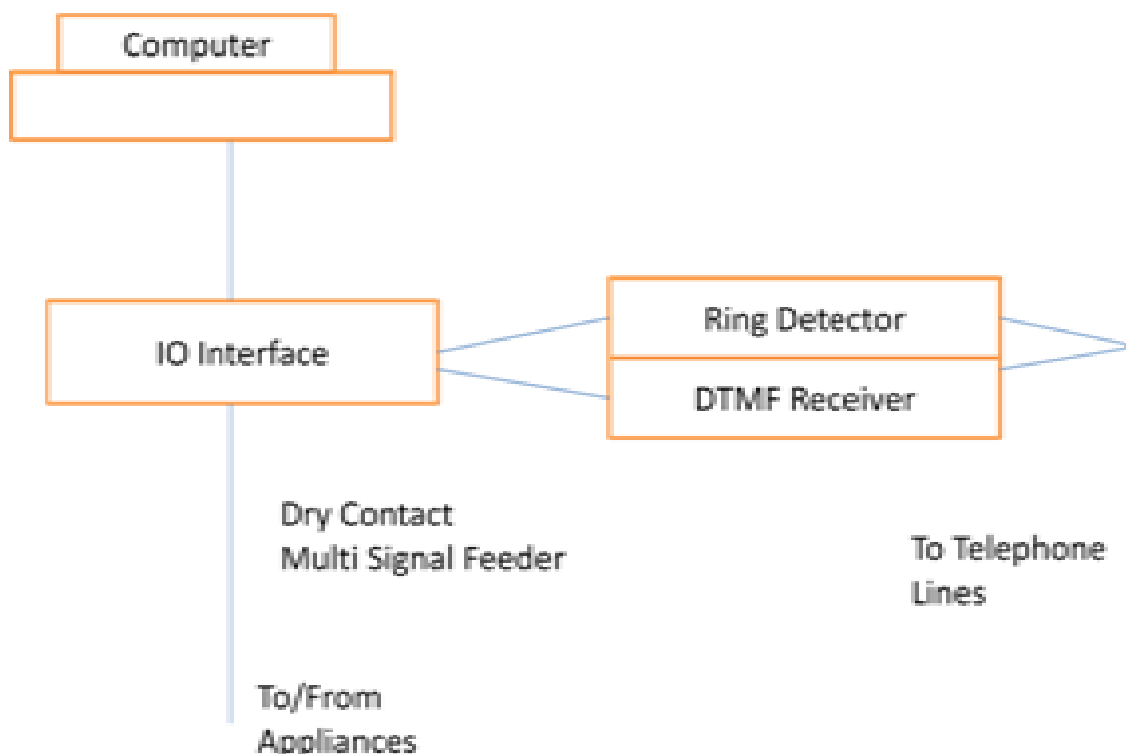


Fig.1: Smart control system to control appliances remotely by phone

It could also be implemented experimentally with infra red signals and AC power line carrier technology. A home automation system makes use of the dual tone multi frequency (DTMF) used in telephone lines. The system as shown in fig.1 uses the standard public-switched telephone lines. There are three components in the system. The first is the DTMF receiver and ring detector. The second part is the IO interface unit. The third part is the PC which does the online operations. The PC detects the ringing of the line and then authenticates the user. After this the user will be allowed to use the keypad tones to control the devices as required. An example of stepper motor control is taken up. This system has the advantage of being secure and allowing international standardization. This is because the DTMF

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tones are the same all over the world. But it suffers from the drawback that the number of appliances is limited by the number of keys in the keypad. An ordinary phone usually has 12 keys only [1,2,5,7,13].

**Usage of Bluetooth:** The system shown in figure 2 makes use of a cell phone and Bluetooth technology. Bluetooth technology is secured and low cost. It makes use of an Arduino Bluetooth board. An interactive python program is used in the cell phone to provide the user interface. The I/O ports of the Bluetooth board and relays are used for interfacing with the devices which are to be controlled. The Bluetooth is password protected to ensure that the system is secure and not misused by any intruders. The Bluetooth has a range of 10 to 100 meters, 2.4 GHz bandwidth and 3Mbps speed. The python app on the phone is portable. It is also a fast and cost-effective system. There is a diagnostic system that can detect problems in the circuitry.



Fig. 2:Block diagram of Home Automation

A feedback system will report status of devices after every signal toggle. The main drawback with respect to Bluetooth is that it takes a long time to discover and access devices in its vicinity. It does not provide energy conservation tips. Real time access cannot be achieved. Anywhere access to the devices cannot be achieved. Access is limited to within the Bluetooth range. The client is a PC that is connected via USB to the Bluetooth module, sensor circuit and a pulse width modulation circuit. Sensors and actuators are used to control the circuit. The Bluetooth module that is connected to it will allow it to receive various commands via Bluetooth. Bluetooth devices can scan and detect other devices easily. It might also be possible to check whether devices are working properly or not. The system also has an illumination sensor that can turn on lights when external light is dull and a temperature sensor. This system also suffers

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from the drawback of the range of Bluetooth being around 10 meters only. This system has the advantage of being able to fit onto an existing system. There is also low cost involved in this system[9,10].

**Utilization of wireless control systems:** Systems using wireless communication can be made by linking up stand alone appliances that are present at home or in office and integrating to form a cooperating network. A combination of various technologies like Wi-Fi and Bluetooth are used to integrate the system. Such a system is laid out. The universal Plug and play capability is used to provide a transparent network of devices to the user. The system makes use of the Open Service Gateway Interface (OSGi). The appliances are connected via different networking technologies. The user application layer makes use of web browsers, pocket PC application and a central console. Speech based commands can also be used for controlling the appliances. Advanced features are provided such as device discovery and device connection. The entire system is implemented in a Linux platform. The system also has the ability to add intelligent control modules. These control modules are capable of knowledge capturing and pattern recognition. The universal plug and play system uses many standard protocols for interoperability. The main advantage of the system is its interoperability. Another advantage is the dynamic discovery of the service. It also has the ability for sharing of service. The system proposed uses an Arduino board along with Wi-Fi communication technology. It also has the option of another automated mode where there are temperature and light sensors which can be set to control the appliances depending on the conditions. The system uses an Android smart phone to communicate with a home PC those servers as a server. The PC is connected to and controls the Arduino board. The GUI is designed using MATLAB. The mobile phone can communicate with the PC through Internet. Internet access is through Wi-Fi. However, this extension is not implemented in the system. The system has the advantage of remote access through the phone. The drawback is that the PC needs to be left on all the time. Also it depends on Wi-Fi for internet access which is not reliable and not widely available[14,15].

### III. CONCLUSION

The survey Based on all the systems and their advantages and drawbacks, this paper presents the features to be possessed by an ideal system for home automation with remote access. An ideal system should be available from all over the world to a user and in real time. A GSM network is identified as a candidate for this. However, the data channel of GSM must be used to provide internet access. Only the Internet can ensure that access can be made available at all times. This will give rise to a standard access method for the home appliances using the Internet protocol. The user interface should be a web application that has an associated mobile application. So that people of all kinds can access the system. Such a system should also have the feature of being easy to install. Only then automated homes can become commercially viable. There should be a lot of thought put into the design of the user interface for these apps. Plug and play capabilities will be an added bonus for the system. Ease of adding a new device to an automated house will play an important role in taking forward the systems commercially. Future scope for the home automation systems involves making homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions. More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be integrated closely with home security solutions to allow greater control and safety for home owners. The next step would be to extend this system to automate a large scale environment, such as offices and factories.

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