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SMART HOME AUTOMATION SYSTEM DEPENDS ON SENSOR FOLLOWED BY IOT

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Abstract

Internet of Things (IoT) is fast emerging technology which involves interaction among things around in internet without human interference. The modern home automation system gives security and joyful life at house. That in why demand of using home automation technology is developing everyday. It formed human life easy and secure. Our research paper familiar the design and execution of home automation, recognizing, and home security over the internet of things (IoT) . Its system focuses on the house to produce a smart wireless home security system that sends an email with a image to the home owner if any devices enters into the home and further let on an alarm if all fire accident happened. Its system can manage and monitor the house temperature, humidity, flame condition and all house devices against in any place in the world. Their system could be controlled via many ways like the internet, smartphone, voice control and electrical switch. Its likely method has a low price design, user formable interface and easy installment in a home. The system is very flexible and easy to understand. Though IoT technology, the user can reduce the wastage of electrical power by appropriate monitoring and controlling.

I. INTRODUCTION-

The home automation is controlling of home devices from central control point, automation is todays leading project where most of the things are being completely automated. Home automation is technology that allow home appliances to perform different sets of tasks automatically. The smart home enables user to manage the energy consumed and increase savings by controlling lighting, window coverings, irrigation and monitoring usage. The portability and technologies of smartphone increased the users' interest in controlling their appliances from the smartphones[1]. The automated appliance control enable users to execute tasks before arriving home. Smart home control system provide solution for assistive technologies especially to the disabled and elderly person using the mobile remote control apps .A home automation system will monitor/control home attributes like lighting, climate and other appliances. It may also include

security such access control and alarm system. When connected with the internet, home devices are an important factor of the IOT. An home automated system generally connects all the controlled devices to a central hub or gate way.

Now – a – Days the home automation systems are getting popular with the everyday use of internet. It is considered as one of the power saving system, with the use of such automated system we can also save our time and that time can be utilized for doing some productive work. Let us consider an example, that in the morning you are in a hurry leaving for office and half a way you realize that you forgot to switch the fan, now rather than going back home and turning it off you can turn it off through the servers by connecting it to the servers this saves you time and electricity too. Another example is that we have to start our motor daily to fill the overhead water tank. The motor is kept ON till the tank gets overflowed. This is wastage of water and energy. If we can schedule the motor prior, will turn it ON and after some time we will turn it off, then it will save a lot of water and energy. So, we aim to design a system which can overcome these issues and provide protection from damage saving time and energy.

An automated system not only reduces the burden to attend each device installed and the stress induced with it but also saves on the resources as time, power wastage and money. A remote-control system liberates user from physical restriction of being at home while likewise mechanizing most assignments hence being increasingly practical and thus expedient. IoT can greatly benefit from cloud services. IoT devices generate a tremendous amount of data. Not only can cloud store that data efficiently but it can use cloud computing to decrease the hardware and software demand form the user[2]. This allows for a system with weak processor of Raspberry Pi to perform deep learning tasks as facial recognition.

Speech recognition is also one of the main components of this project. As speech is one of the most natural means of communication so it seems only natural to have it as point of interaction between user and system. The system uses Google's speech recognition. Every Android smartphone has Google Assistant built-in. So, the system can be used on any Android smartphone. The system could be controlled either using voice or text of via app.

1.1. Scope

Future scope for the home automation systems involves creating homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and contribute automated toggling of devices situated on conditions. Further energy can be conserved by ensuring activity of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be combined closely with home security solutions to let on greater control and safety for home owners. The next step would be to enhance this system to automate a large scale environment, such as offices and factories. Home Automation offers a global standard for interoperable device. Standardization set up smart homes that can control appliances, lighting, environment, energy management and security as well as the expandability to attach with other networks.

1.2. Importance of home automation

The household activities are automated by the development of special appliances such as water heaters to reduce the time taken to boil water for bathing and automatic washing machines to reduce manual labour of washing clothes[3]. In developed countries, homes are wired for electrical power, doorbell, TV outlets, and telephones. The other application includes when a person enters the room, the light turns on. In advanced technology, the room can sense the presence of the person and who the person is.

Taking into account the day of the week, time of the day and other such factors it can also set apt lighting, temperature levels, television channels or music levels. In the case of a smoke detector when fire or smoke is detected, the lights in the entire house begin to blink to alert the resident to the probable fire. In case of a home theatre, the home automation system can deflect distraction and lock the audio and video

components and can also make an announcement. The home automation system can also dial up the house owner on their mobile phone to alert them or call any alarm monitoring company.

Fig:1 : Importance of home automation

1.3. Problem Being face by Today

Home automation helps people to get things done conveniently. For example, it helps to turn on the microwave oven from the office laptop, remotely start vacuuming, etc. But from these tasks it is unclear that how materially it would improve one's life.

Now the home automation systems are being developed by different manufacturers. This creates confusion in minds to select a home automation system for you.

The home automation systems are very expensive. Hardware is required as many homes appliances lack intelligence. Since greatest of the systems are customized, technicians are required to install them.

II. LITRETURE REVIEW

This part discusses the details of the existing solutions as well as technologies used in this article.

2.1. Home Automation and Security System

Easy Home or Home automation plays a vital role in modern stage because of its extensibility in using it at other places with high exactness which will save money and time by decreasing human hard work. Prime focus of this technology is to control the household furnishings like light, fan, door, AC etc. automatically. This review paper has exact information on Home Automation and Security System using Arduino, GSM and how we can manage home appliances using Android application. When a person will appear into the house formerly the sum of the number of family entering in the house will be incremented, in Home Automation mode appliances will be converted on while in security light will be turned on along with the alarm. The count of the number of persons coming the house is again displayed on the LCD screen[4]. In Home Automation form when the room will become vacant i.e. the count of persons reduces to zero then the appliances will be turned off making the system power efficient. Further a person can manage his home devices by using an android application quick in his mobile phone which will limited the human backbreaking work. At the same time if anyone insert while security mode is on a SMS will be send to house owner's mobile phone which will indicate the presence of a person inside the house. The alarm can be adjusted of using SMS or Android application

2.2. Home Automation using Internet of Things

The main purpose of the project is to develop a system that will produce remote control of home appliances and also implement security against the tragedy when the home moderator is not at home. This paper is mainly concern with the automatic control of light or each other home device using internet. It is instant to save the electric power and human energy. This project is formed with the help of controller and raspberry pi. The various device connected to the micro controller and sensor is combined testing wireless network.

2.3. A Survey on Internet of Things Based on Home Automation

A low-priced and user friendly smart home system, which uses an Android application to communicate with the cloud and provides switching functionalities, is presented. The System disqualify the use of Personal Computer (PC) and other Computer Peripherals which leads to overall reduction in the cost of the system. Unlike the similar system which uses either of the Bluetooth module network, the proposed system uses Internet of Things (IoT) for monitoring and controlling the Electrical/Electronic Appliances, remotely. Switches of Electrical /Electronic appliances are integrated to the system in order to demonstrate the effectiveness and feasibility of the system.

2.4. Review Paper on Home Automation Using Internet of Things

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 environmental world toward 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 usage IOT for energy efficient Environmental situation sensing and in Home Automation. We have discussed the roles of IOT in automation in this papers and 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[5].

III. APPLICATION OF IOT IN SMART HOME AUTOMATION

1. **Lighting :** Today, home light can automatically arrange to personal requirements. For instance, if users start watching a movie, the lights can be programmed to automatically dim not to distract them from the plot. When you enter your home, the lighting can be turned on automatically without the necessity to press a button. When you leave your home, the system can turn the lights off automatically to save energy, and you don't have to worry about it. All the home lighting can be linked to your smartphone, laptop, and more connected devices. Consequently, you can configure your app so that your light turns on when your alarm rings in the morning.
2. **Bathrooms :** IoT technologies in the washroom can arrange your home routine also entertaining and convenient. Smart mirrors can connect to other devices like laptops and smartphones, recognize the faces of family members in front of them, and display the information those people find interesting, such as news articles, weather forecasts, or specific websites. Special sensors can monitor movement in the bathroom, and turn off the water automatically if no one is there.
3. **Gardens :** For those users who are interested in growing vegetables, fruit, and herbs at home, sensors can be exceptionally beneficial. The technology allows users to check on the app if the temperature is right, and if the plant is properly hydrated and receiving the necessary amount of sunlight.

   The app can monitor the current state of the soil, identify if there is enough moisture in it, and turn on a smart irrigation system if needed. When the amount of moisture reaches the optimal level, the sensor detects it and stops the watering system, thus elusive overuse of water.
4. **Kitchen :** With artificial intelligence technology, IoT devices keep make the cooking process secure and easier. Smart sensors can assure that various thing is OK in your kitchen: you can identify for smoke and carbon monoxide, or that the temperature and humidity levels are suitable. Special in-built programs monitor if the users get enough products in the fridge (and reorder them if needed), give instruction on recipes, and calculate the nutritional value of meals.
5. **Security System :** When you leave your home, do you repeatedly check that the doors and windows are closed, and that the TV, computer, and electrical appliances are off? Smart security systems will produce that for you with the guidance of special sensors. These controllers can automatically lock the door while you go out, close the shutters, offend electronic devices and make sure that your home is secured opposed to human and animal trespassers**.**
6. **Safety sensors :** Safety sensors are smart devices that can identify when there is something wrong at your home. They can notify users of potential threats immediately and even take necessary action

to prevent them. All they need is a smartphone connected to the Internet and sensors installed at their home.

7. **Doors :** The doors of our future will not need keys. To unlock your house, the smart door can use facial recognition. Any people that are not recognized as residents at the premises will need to be let in by a resident. The doors can further be programmed to open when you approach your home and close when you leave.
8. **Home Routine :** Al and Ml technologies can conduct the temperature in your home, the lighting arrangement, or the security system. The technology can offer you news updates, find the information you request on the Internet, send you notifications via the app on the Internet about the purchases you need to make, order you a meal, schedule an appointment, and book you a flight or a hotel.

IV. METHODOLOGY

The following contributions are made to achieve the objectives: -

- The proposed system uses a Raspberry Pi board which is a miniature computer with all the functionalities of a desktop computer. It has built in Wi-fi and Bluetooth. It can interact with vast array of sensors and can be programmed with multiple programming languages.
- The developed Home Automation System uses conventional development board with sensors but also deep learning techniques via cloud which provides idiosyncratic features.
- The major components used in the developed system consists of a Raspberry Pi, a camera, android mobile, Relays, multiple sensors[6].
- The feed from the camera take pictures and match them with households to make sure only authorized people get house access. The computation will be done on cloud using AWS.
- The developed system is controlled via Blynk app which can receive vocal commands from Google Assistant.
- The system uses an ultrasonic sensor to measure the distance of user from front door and when a threshold is reached, it turns on camera which saves on both power and storage.
- The system includes an LDR which automatically turns ON lights if it detects low-lit environment.
- The system also uses a Soil Moisture Sensor which turn on the sprinklers to water the plants if it detects dry conditions.

Light Sensor

Light Dependent Resistor (LDR) as shown in Figure, is a resistor whose resistance is proportional to that of incandescing light. Increase in light give rise to more and more electronics to jump to conduction band thereby conduction electricity.

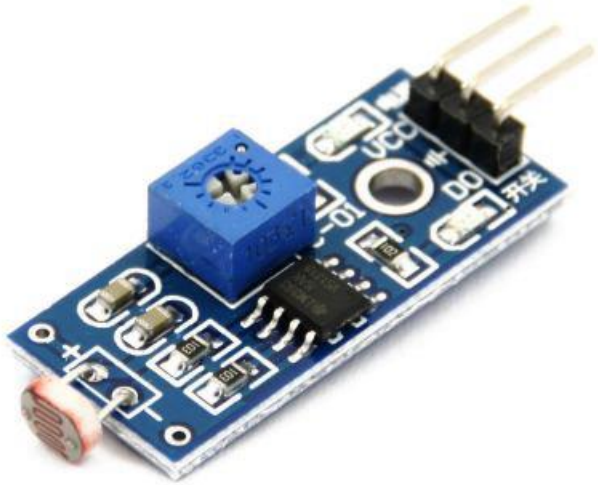

Fig: LDR [7]

Ultrasonic sensor

Ultrasonic sensors as shown in Figure, as its name suggest use ultrasonic waves to measure distance of object from itself. These inaudible waves can be used to pin-point distances to objects across short distances.

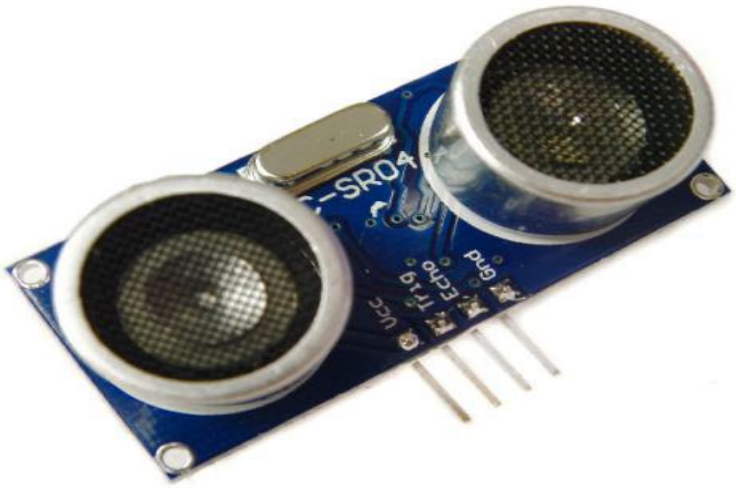

Fig: Ultrasonic sensor [8]

Soil Moisture Sensor

The two probes of moisture sensor act as variable resistors. More moisture will lead to more conductivity. It is pretty forthright in use and is shown in Figure.

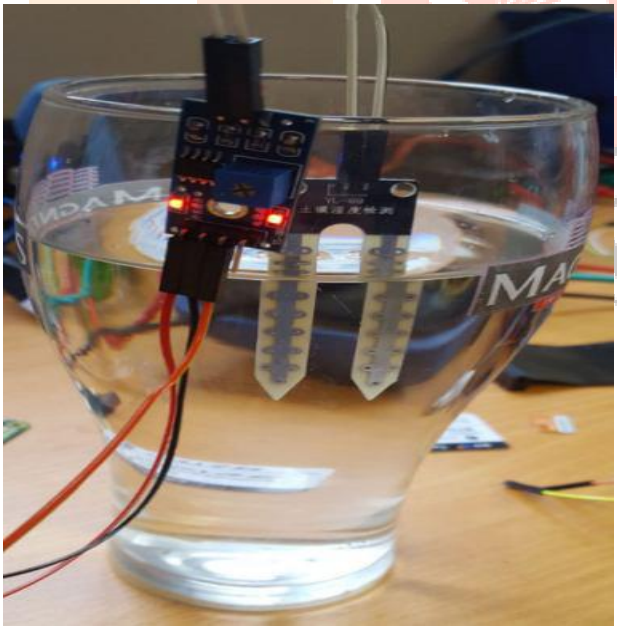

Fig: Soil Moisture Sensor

CHALLENGES IN HOME AUTOMATION

A smart home in IoT faces challenges concerning both sides: consumers and suppliers. Prior to diving into the IoT business, check out the potential drawbacks. Forewarned is recommend.

Lack of awareness of the benefits. It frequently happens that adopters of revolutionary information technologies are unaware of its evident usability pros or have blocks ahead of applying IoT models into their use cases. Before starting, conduct a market research and business analysis to find your specific niche in the industry.

Cyber-attacks. Yes, the paradox is that devices aimed to make our lives also secure are revealed to despiteful attacks because they are connected to the network. We all believe the era of 5G is expected to gather a kind of relief in this case; however, it doesn't preclude the efforts of IoT home solutions providers to care for security.

Privacy concerns. A new requirement of Amazon and Google to IoT device providers shown a reachable, probably not pleasant, scenario for customes to detail Alexa and Google Assistant a status of home network devices continuously, which means aware a private lifestyle of users. It is significant for a business not to overstep the boundaries.

Connectivity. 5G has not reached everywhere yet. Devices deployed in IoT infrastructure are highly dependent on network connectivity or the embedded systems, which can stall their performance. The winner takes it all when the winner can support mostly autonomous operation or off-line mode.

Infrastructure update concerns. The average operating time of "not smart" household appliances sometimes reaches 15 years. Consumers are unlikely to buy a stove every 2-3 years because the system is outdated. Thus, the hardware and software need to be continuously updated according to the last versions in use.

V. RESULT

The experimental model was made according to the circuit diagram and the results were as expected. The home appliances could be remotely switched over Wi-Fi network. Both the switch mode and the voice mode control methodologies were successfully achieved. The Blynk application was also successful in displaying the status of every application.

VI. CONCLUSION

It is distinct from this project work that an individual control home automation system can be cheaply built from low-cost locally applicable components and can be used to control various home appliances ranging from the security lamps, the television to the air conditioning system also even the integrated house lighting system. And better still, the components required are so small and few that they can be packaged into a small inconspicuous container. The designed home automation system remain tested a number of times and certified to control other home appliances used in the lighting system, air conditioning system, home entertainment system and many more . Hence, this system is scalable and flexible.

The home automation using Internet of Things has been Experimentally reliable to work satisfactorily by connecting simple appliances into it inclusive of the appliances were successfully controlled remotely over internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark[9]. It also stores the sensor parameters in the cloud (Gmail)in a timely manner. This will support the user to analyze the situation of various parameters in the home anytime anywhere.

This project aims to design and develop an economical and efficient home automation system which is capable of controlling home appliances based on user's commands via
smartphone. It also responses to vocal commands using Google Assistant.

The developed project has used AWS cloud service to store the database of allowed users and authenticates people by taking photos via camera and matching them with database using cloud computing. The system makes it easy and convenient to automate your house.

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