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Home Automation Using Amazon Echo

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Abstract

Nowadays everything is automated. Home automation is part of it. This is becoming popular due to numerous advantages. Initially the home automation system was managed by text messages and by emails but with the advancement in technology the scenario is changed by the Internet of Things (IoT). There is a lot of investment in IoT by the industry and research community. The voice activated devices like Amazon Echo, Google Home, Samsung Smart came within the market with the focus on smart home. The industrial growth has resulted in innovative solutions which are economical and are having advanced solutions. The system provides a robust and low cost system thus making our homes smart. The system is powered using voice activated devices such as Amazon Echo, it's cloud services, it's speech services. The heart of the system is Arduino ESP8266 which provides smart features for homes. The system works successfully to switch on/off the electrical devices at home. This control can be done by the voice command and also through the app. This smart home can not be just viewed from a luxury point of view but also it helps physically impared and elderly people.

Keywords*- Internet of Things (IoT), Alexa , Amazon Echo, Arduino ESP8266, relay, home automation.*

I. INTRODUCTİON

Home automation is an expensive luxury which most of the people cannot afford. Instead of looking at home automation as a luxury moreover this can be a boon for physically impared person as well as for elderly people. The objective of the system is not just to provide luxury but to provide a cost effective solution to control the electronic appliances by voice commands. Amazon echo may be a sensible speaker developed by Amazon. The system is configured such that the Amazon echo interfaced with Arduino micro- controller to control the devices.In case to switch on/off desired appliance, that can be done just through a command to Amazon Echo or through the mobile application.

II. RELATED WORK

Technology is growing so fast to make our lives easier, better. This is by controlling devices by voice commands. The intelligent voice assistants that are available in the market as on date are Siri,Google home and Amazon echo are discussed below.

A well-liked application Apple names as Siri [1] it's a video game program. It uses a language

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computer programme to form respondent queries and to form recommendations. Siri was introduced as an associate degree iOS application that is obtainable within the App Store Google Home [2] may be a sensible speaker developed by Google as a part of its "Made By Google" business line. This product is competitive with Amazon Echo within the sensible speaker trade. Amazon Echo [3] (also known as Echo) may be a sensible speaker developed by Amazon. It connects to the devices through the "wake word" "Alexa". It will even manage the range of sensible devices mistreatment itself as a home automation hub.

The systems are proposed to control electrical appliances at home using Arduino Uno. The system in [4] is a hands free Alexa voice service. It is a prototype which is built on Particle photons. The users can command to their Alexa-enabled devices with the wake word Alexa. A cell-phone and Arduino based home automation system [5] that works through DTMF decoder, Arduino Uno and Relay connected to different appliances is discussed. In [5] the system is proposed for security purposes. A smart door locking system that triggers the alarm during an intrusion is introduced. The system [6] developed controls a few of the home appliances such as fan, light, door cartons, energy consumption and gas level of the gas cylinder and Arduino UNO. In [6] the sensor is used to detect human presence. Even provides information regarding the energy consumed by the house owner frequently as a message. The level of gas in the gas cylinder is checked in this system. In case the gas level is less than the threshold automatic gas booking is done along with sending a message to the house owner. In [7] the various appliances and devices are commanded. The control is provided through the integration of IoT, cloud computing, and rule based event processing. The various appliances that have been considered [7] are humidity and gas systems, fire prevention systems, lighting systems , Air conditioning, smart thermostats, doors, fans , surveillance cameras, Smart TVs. This system ensures the safety, comfort, and convenience required for a smart premises.

The articles are also found wherein the energy consumption in smart homes is analyzed. In [8] the analysis is presented due to the negative effects in the environment for a full home automation system. The paper includes the electricity consumption analysis. The paper [8] comprises energy management showing energy consumption between the devices on a regular interval basis. The article [9] comprises home automation energy management that shows energy consumption between the devices at regular intervals. Also, provided a future challenge to tasks in security problems during a sensible home atmosphere.

III. PROPOSED SYSTEM

1) Objectives

• To implement an inexpensive, reliable and scalable Home Automation System that can remotely turn on or off any HouseHold Appliances.

• To control appliances with voice commands or without voice commands through mobile applications.

2) Implementation Details

- Physical Layer:
  - Arduino ESP8266 - enabled with WiFi
  - Amazon Echo – This is activated by voice commands. It is present in the user's home. Depending on the request made through voice commands, echo will respond.
- Application Layer:
  - Consists of Alexa Skills Kit (ASK) and Amazon Web Services(AWS)
- Programming Layer

  Arduino IDE is used to write source codes of all programs.

3) Hardware

Amazon's Echo is used as an input device. . Echo voices result from speech-unit technology. It

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understands the user's oral communication victimization tongue process algorithms built into the Echo's text-to-speech (TTS) engine. The Arduino microcontroller is the integral part of this system. It is implemented with Arduino ESP8266. It is an Arduino core that comes with libraries to speak over wireless fidelity

4) Software

The Arduino language is just a collection of C/C++ functions. Fig. 1 shows the flow chart of the system.

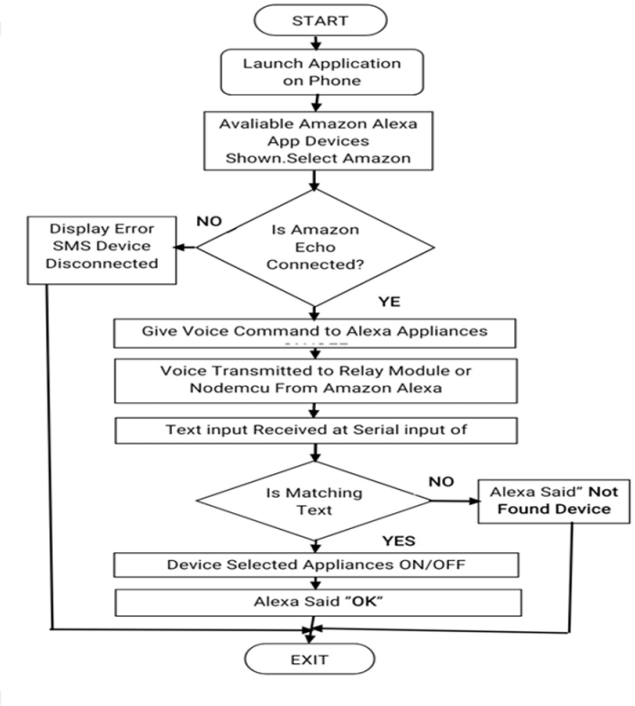

Fig.1. Flow Chart of Home Automation System using Amazon Echo

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IV. SYSTEM DESİGN

The system is shown in Fig. 1 and Fig.2 UsesESP8266 NodeMCU, Amazon Echo Dot and Alexa Voice Service.

1) Alexa Voice Service (AVS)

This is a sensible voice management service that powers the device, Amazon Echo. This is an intelligent voice management service that powers the device, Amazon Echo. It uses linguistic communication process that are pre trained by the developers and the user community of Amazon.

2) Arduino Microcontroller

ESP8266 is a small controller. It contained wireless fidelity networking resolution. It is also capable of running self-contained applications.

3) Amazon Echo Dot

Echo Dot connects to dual band Wi-Fi (2.4 rate / 5 GHz) networks.

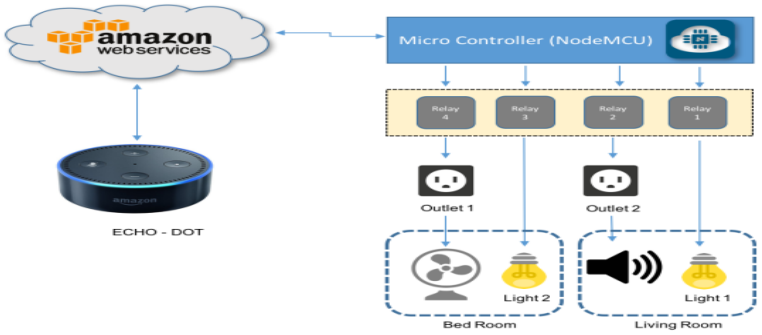

Fig. 2. System Design of Home Automation System Using Amazon Echo

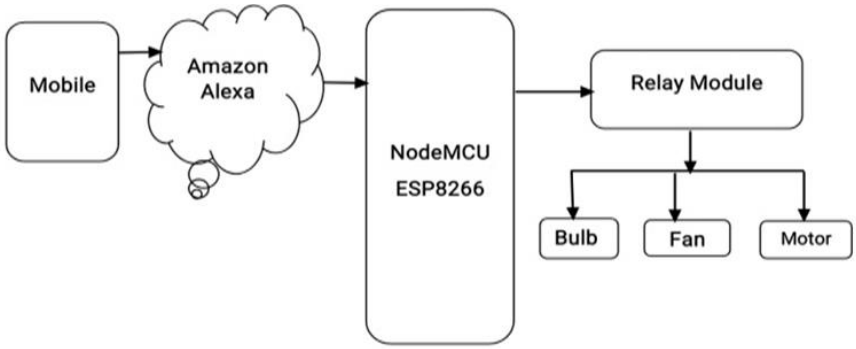

Fig.3. Block diagram of Home Automation System Using Amazon Echo

4) Hardware connections

- Connect the Echo Dot to the available Wi-Fi network.
- Configure Node MCU ESP8266 to the USB port. It is important to connect Node MCU to the same Wi-Fi network.
- Wi-Fi connection has been established successfully and can be ensured through serial connector logs.
- The appliances connected to the system using relay sockets are powered up.
- Now, the setup is ready to control your smart home through Alexa or using mobile App
- Ardunio is hooked up with Node MCU, Node MCU is connected to the Relay module & relay module connected to Bulb and other electronic appliances. Amazon alexa connected with

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Amazon cloud. Using alexa as we are managing home applications saves electricity.

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V. RESULTS AND DİSCUSSİONS

This is an IoT project on Alexa home automation. The system controls the house appliances with voice command. The Node MCU and Echo Dot ought to be connected with the same wireless fidelity. This is often a sensible home IoT that combined with the ESP8266 and Alexa app. Fig 4 shows a working model of the system where a bulb is turned on using Alexa and Fig. 5 shows the same bulb is turned off using Alexa.

Fig.4. Bulb turned off using Alexa

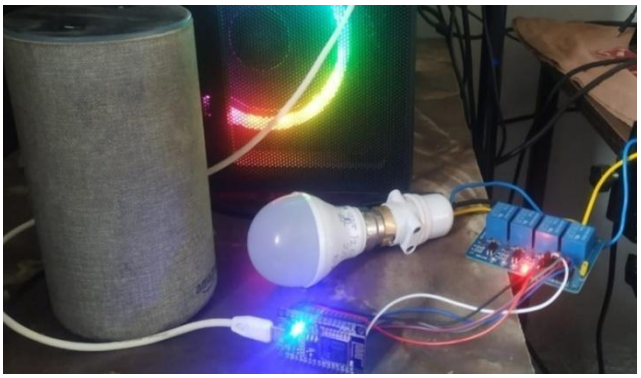

Fig.5. Bulb turned off using Alexa

To voice trigger Node MCU through Alexa echo maximum coverage range is 15 feet. As far as efficiency is considered on standby i.e., plugged in, switched on, and connected to Wi-Fi systems consume between 2W and 4W of power per day. The power consumption is low. The system can be expanded up to maximum up to 11 devices can be connected and one can operate different home appliances.

VI. CONCLUSİONS

The designed system is a simple and cheap product and may be used with any electric appliance to turn it on and off. The system is flexible where the control of electronic appliances can be done through mobile apps or also can be through voice commands. This interactive home automation system makes life luxurious. This product makes life easier alongwith the efficient use of electricity.

Moreover, this system can help physically impaired and elderly people to control their home appliances. This is a cost effective and flexible product for elderly and physically impaired people.

VII. FUTURE SCOPE

The systems can be made even smarter. This can be done by interfacing homes with sensors such as motion sensors, light-weight sensors and temperature sensors and supplying automatic toggling of

devices supported conditions. Energy preservation is made by controlling appliances of the house before turning it on. Such as, checking brightness in the home and turning off lights if not necessary. Also the stepwise control of speed of fan etc. can be done as an extension of this work. The safety features can be added along with home security for house owners.

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