

IOT devices to cater home automation through AI search engine- A Review

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Abstract— As we advances in technology, Day by day we are getting acquainted with new results to simply our daily routine. Through Artificial Intelligence, Three big giants in technology namely Google, Apple and Amazon trying their level best to introduce different forms of user experience through talk-back answering assistant. This AI machine can do a lot of work even getting your appointment to barber shop, setting up the ambience of home lighting, temperature and shop the exact product online without any physical existence. A small portion of such system can be developed through an IOT device which is aimed in this paper. The various home appliances which are connected to wireless network can be monitored and controlled by AI system such as Alexa by Amazon, Google Assistant by Google, Siri from Apple and Bixby by Samsung. We will proceed with one of them and with Arduino we will search it out to get our own home automation system.

Keywords- IOT, Smart Home-Automation, AI, Arduino, Wi-Fi, Alexa, IFTTT

I. INTRODUCTION

Building a smart home today is not as intimidating or overwhelming as it's an easy task, especially if you start small. Picking and choosing the tech features that best suits your needs means you don't have to consider it an all-or-nothing ordeal. In this paper we will deal with such things to turn that DIY aspect into an easy task.

Technology in the world is getting integrated as internet spreads rapidly in this century. More than that internet of things has been bringing new sets of technological changes in our daily lives, which helps us to make our life simpler and more comfortable. IOT can be defined as- "An open and comprehensive network of intelligent objects that have the capacity to auto-organize, share information, data and resources, reacting and acting in face of situations and changes in the environment". [4] The IOT has different sets of objective mentioned below-



Fig. IOT Objectives

There are several ways by which we can start building our own home automation system such as we can start with a voice controlled smart speaker like "Amazon Echo" & "Google Home". Every smart speaker is powered by a smart assistant, and usually, these speakers also come with an app that acts as a hub of sorts. We can use the app to register and access our other smart home devices; we can control them all with voice commands. Also, smart plugs can make almost anything smarter. Smart plugs are connected to Wi-Fi to control the power output from which we can on/off the switch. Smart lighting is easy to setup and it's also inexpensive. Smart home security devices for a piece of mind which can give you more security features. IFTTT- IF This Then That which try and connect other application in more creative way like, scheduling your appointment with barber. Latest Google I/O summit talked about it.

II. LITERATURE REVIEW

Alkar A. Z. and Buhur U. have developed wireless home automation system for multifunctional devices. Low cost, wireless and flexible solution is introduced to the home automation by the presented paper. There is one central node which is connected to the server with several other home appliances. With SSL algorithm unauthorized access is removed.

M. Tazil and R. Piyare provides a low cost solution, they designed and implemented a flexible and wireless home automation solution. Cell phone using Bluetooth technology interacts client module and host server. Various appliances that are require to on-off switching applied without internet connection. Only the drawback is of range constraint.

N. S. Sirsath, et. Al. proposed home automation system that employs the integration of multi touch mobile devices, cloud networking, wireless communication and power

line communication to provide user with remote control of various lights and appliances within their home.

Basil Hamed proposed the home automation controlling using the simulation software lab-VIEW. It controls the home appliances and monitor smart house management using simulation.

III. DESIGN AND IMPLEMENTATION

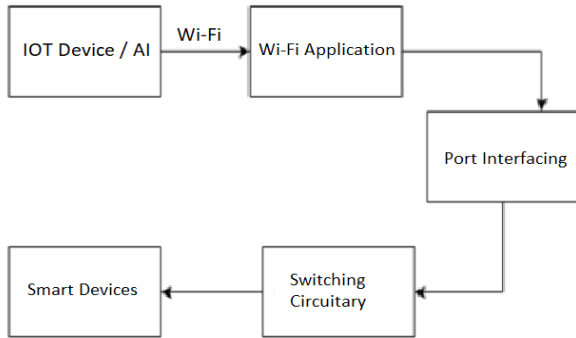


Fig. System Implementation

The model of home automation system is as shown in the figure above. IOT devices which consists of AI will be connected to Wi-Fi where Wi-Fi will be in connection with number of appliances like Printer, Lightning system, Air-conditioner, Television, Security systems, now-a-days we have auto-clean vacuum cleaner and Wi-Fi enabled other devices. On just providing command to ALEXA, we can control the required equipment easily without any physical action or certain efforts. This is all possible because of smart devices which are present due to IOT innovation and AI enabled ALEXA.

A. ALEXA-

Alexa is an intelligent personal assistant which is based on cloud-based voice service developed by Amazon. It is very intelligent and capable of voice interaction, music playback, making daily notes, setting alarms, streaming podcast, playing audio books and providing weather, traffic, sport, and real time news updates. Alexa can control home automation system equipments using smart devices.



Fig. Alexa Echo

B. ARDUINO-

Arduino is an electronics platform which is open source and based on simple hardware and software combination. Anyone who is interested in developing or creating new project or interactive objects or environments can simply program the Arduino and develop the same. It's like a super small computer system which can be programmed through PYTHON and can interact with different input output forms. There are multiple forms of Arduino according to the requirement of the project. The Arduino Mega is small as it can rest on human hand easily and operable with minimum 5V power supply. It has 54 input output pins and functions between 5v-20v. ATmega1280 microcontroller which is onboard has many features like 128 KB of flash memory, 4 KB boot loader, 8 KB SRAM, 4 KB EEPROM. The Arduino Mega is featured below-



Fig. Arduino MEGA

Arduino Mega has many advantages over its predecessors. The below table will distinguished those things with different Arduino boards. Microcontroller ATmega1280 has four hardware UARTs for TTL (5V) serial communication. Also, the ATmega1280 has I2C pins and SPI pin communication.

Arduino Type	Mega2560	UNO	Nano	Galileo
Digital I/O Pins	54 pins	14 pins	14 pins	14 pins
Analog Input Pins	16 pins	6 pins	8 pins	6 pins
Processor	ATmega 1280	ATmega 328	ATmega 168	Intel
Memory Size	128 KB	32 KB	32 KB	8Mbyte
Clock Speed	16 MHz	16 MHz	16 MHz	400 MHz
Cost	Normal	Cheap	So Cheap	Expensive

Table. Different Arduino Boards

VARIOUS TOOLS

C. PYTHON-

Python is a general purpose programming language, developed by Guido van Rossum in 1991. It specifically developed for code readability, notably using significant whitespace. It consist of automatic memory management, supports multiple programming paradigms, including object-oriented, functional and procedural support. Home automation can be easily developed by using python language.

D. ARDUINO IDE-



Fig. Arduino IDE Symbol

The open-source Arduino Software (IDE) makes home automation easy as it is easy to write code and upload it to the board. Its platform independent means it runs on Windows, Mac OS and Linux. The IDE environment is written in JAVA and based on processing and other open source software.

APPLICATIONS

1. **Medical Applications-** Medicine alerts, Health tracking, Diet alerts, Exercise alerts ...etc.
2. **Home Automation-** Light ambience, temperature control, power saving, security alerts....etc.
3. **Office Automation-** Performance tracing, Biometric tracking, Digital notice boards...etc.
4. **Smart-Vehicle automation-** Popup displays, Traffic management, sleep attention, parking assistance...etc.
5. **Agriculture automation-** Green house environment control, Weather forecast, Drone spray...etc.

And many more.....

FUTURE SCOPE

In various options like motion detector which can enable us to open-close door, on-off air-conditioner, lightning system with integration to AI. Weather monitoring using calculated subject with outside weather forecast and accordingly internal monitoring. Energy consumption will be based upon the solar system output and the day-night arrangement which saves us lot of energy and creates a green environment friendly home. Other scopes like curtain management, water supply to gardens etc will be operational using IOT.

CONCLUSION

With the above knowledge, we can conclude that the home automation will be possible in upcoming days for the betterment of society in all matters like green system of energy saving, weather monitoring, security management, health management and daily effortless working. We can be able to deliver the framework that brings numerous options to systematically govern the daily lifestyle of a particular person in the following environment.

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