Speech Based Controlled Techniques using NLP

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Abstract: The main objective of our project is to construct a fully functional voice-based home automation system that uses the Internet of Things and Natural Language Processing. The home automation system is user-friendly to smartphones and laptops. A set of relays is used to connect the Node MCU to homes under controlled appliances. The user sends a command through the speech to the mobile devices, which interprets the message and sends the appropriate command to the specific appliance. The voice command given by the user is interpreted by the mobile device using Natural Language Processing. The system utilizes a node microcontroller unit (Node MCU) as a Wi-Fi-based gateway to connect to the Google Assistant. It determines operation must be completed by which the appliance to fulfill the user's request. The user increased mobile capabilities we will be using a smart phone in this project. A smartphone application as nearly all of the data transferred can be processed by cloud. The user increased mobile capabilities we will be using a smart phone in this project. The IoT -based system for home automation can easily and efficiently control appliances. The Node MCU is interfaced with the appliances and programmed in a manner that they respond to mobile inputs.

Key words: Internet of Things (IoT), Node MCU, Natural Language Processing(NLP), IFTTT Service

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Introduction

Home Automation

"Home automation" automatic and electronic control of household features, activities, and appliances. The utilities and features of our home can be easily controlled via Internet. There are three main elements of a home automation system: sensors, controllers, and actuators.Having day to day developing technology is a proud moment to the whole world. The foremost aim of the technology is to increase the efficiency and to decrease the effort. In this trendingrefersworld, Internettoof Thingstheis being given extreme importance. In that, Automation, leads to have less effort and much efficiency. By using IoT, we are successful in controlling the appliances in various areas, in which one of them is to control the home automation by using Node Microcontroller. We can also use other boards like raspberry pi, beagle bone etc., In the present day technology, the whole work is done through communication so the effective way of communication can be done through voice.

Even though the technology is developing in our day to day life, there is no help coming into existence for the people who are physically not good on the basis of technology. As the speech enabled, home automation system deploys the use of voice to control the devices. It mainly targets the physically disabled and elderly persons. The home automation will not work if the speech recognition is poor. The speech given by the user will be given as input to the Microphone. Microphone recognizes the speech given by the person and sends it to the recognizing module. It searches for the nearest word even if there are any disturbances in it. If the command (ON/OFF) is given, the action is done. Similarly, the line following robot functions with respect to the speech commands given to it. The line following robot moves forward and backward with the help of sensors and a motor driver board.

Internet of Things

The major concept using in the Google assistant-controlled Home automation is the Internet of Things. The Internet of Things (IoT) can be connecting various types of objects like smart phones, personal computer and tablets to the internet, which brings new-fangled type of communication between things and things, and things and people. The Home automation system Any man-made objects that can be assigned an IP address and it has the ability to transfer data successfully over a network, the interaction through a network is called IoT. The internet helps us to bring immediate solutions for many problems and able to connect from any of the remote places. The Internets of Things technology is used to come in with innovative idea and large development space for smart homes to improve the living standards of life. The growth of the Internet of Things will reform a number of sectors, like healthcare, automation energy, transportation, etc. The cloud computing can be used in such case to implement the IoT

infrastructure that augmented with sensors and actuators to result. Also, to use of this in medical field using data science.

Fig 1. Basic Applications of Home Automation

Remote home monitoring allows users to manage and control various aspects of home. These include motion detection, water leak detection, monitoring temperature against and fire, and controls for lights, locks, fans and more from Laptop or Tablet or Smartphone. 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 labor of washing clothes. In developed countries, homes are wired for electrical power, doorbell, TV outlets, and telephones. The different 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 avoid distraction and lock the audio and video components and can also make an announcement. Current systems are generally proprietary, closed and not very user friendly Based on Arduino or low-cost home security system and home automation system.

literature Review & Problem Identification.

Inventions to Home Automation

When people think about home automation, most of them may imagine living in a smart home: One remote controller for every household appliance, cooking the rice automatically, starting air conditioner automatically, heating water for bath automatically and shading the window automatically during night. To some extent home automation equals to smart home. They both bring out smart living condition and make our life more convenient and faster. Early home automation began with labor-saving machines. Self-contained electric or gas-powered home appliance became viable in the 1900s with the introduction of electric power distribution led to the introduction of washing machine (1904), water heater (1889), refrigerator, sewing machines, dishwashers and clothes dryers. Currently there exists system neither at cheaper rates nor easy to handle. Various systems are hard to install, difficult to use and maintain.

Literature Review

Tan, Lee and Soh (2002) proposed the development of an Internet-based system to allow monitoring of important process variables from a distributed control system (DCS). It proposes hardware and software design considerations which enable the user to access the process variables on the DCS, remotely and effectively rent designations. Potamitis, Georgila, Fakotakis, and Kokkinoss, G. (2003) suggested the use of speech to interact remotely with the home appliances to perform a particular action on behalf of the user. The approach is inclined for people with disability to perform real-life operations at home by directing appliances through speech.

Existing Method

A home automation system allow users to control electric appliances of varying kind. Many existing, well established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through Internet from anywhere around the world. Internet or IP protocol-based communication in home automation systems is always a popular choice[1-9].

Proposed Method

The proposed system eliminates the complication of wiring in case of wired automation. Considerable amount of power supply is also possible. Operating range is more than the Bluetooth. The existing system does not allow remote monitoring and controlling of appliances. But where as in the proposed system the system using the Wi-Fi based home automation system it allows to monitor and control the appliances. The home automation of the existing system in 1990's,the people[10-17] in every home has electronic devices which are controlled manually but in our proposed system we are controlling all electronic appliances through remotely. The IOT application have become this popular in this 21st century is due to dominant use of the internet, evolution of smart phone technology and raised standard of mobile communication.

Problems of Home Automation

Wired or wireless systems, while in the house not very likely to face many problems. However, when controlling through the application locally or remotely, we can face problems such as delays in performance and that is frustrating [18-22].

Delays could be due to poor internet connection and planning in the house. If we are having battery operated devices and their usage is more than normal, then battery problems could be another issue for what we to deal with and also the voice-recognition of Google assistant is not up-to the mark if there is noisy Environment. Due to Interference of the nearby noise, the Google assistant commands may also not work proper.

Problems Resolve using Home Automation Devices

Firstly, Home Automation will save time in daily recursive activities like turning of lights, geysers and other home appliances. Users don't need to think about whether the lights are turned off or did geyser or AC turned off or not while they are in office. Users can sit anywhere in the globe access our home away from home.

Secondly, security, users can secure their home while they are away from home. There are devices which keep monitoring the home and notify them when any incident occurs. The notification can be a simple SMS or a voice call which can alert and take necessary action. These devices can also run on Batteries. So need not worry about even when electricity is turned off.

Thirdly, Convenience, users don't need to manually go-to each and every room to see if any light or fan is switched on and turn off, instead they can on/ off all lights in a room or entire home. Users will have the convenience of controlling devices through smart phone or tablet. The next one is Safety, in every home, situation arise when parents have to leave outstation and kids stay alone at home. In this scenario, Automation helps safety. One can install surveillance cameras and keep monitoring through mobile from anywhere in the globe. Also, there are devices which won't allow to unlock the main door from outside once it is locked from inside. Also, Sensors can be placed outside which can turn on light automatically in the night if someone try to intrude into home. These are the main problems resolve using the Home automation devices. There are many more benefits from Home Automation.

Google Assistant

The Google Assistant is an Artificial Intelligence based Virtual assistant software which allows its users to control all the apps in their device. It allows the users to control and command most of the apps in their devices using voice commands. This provides more convenience to the people as they only have to command the google assistant thorough voice command.

IFTTT

An applet is triggered by changes that occur within other web services such as Gmail, Facebook, Telegram, Instagram, or Pinterest. For example, an applet may send an e-mail message if the user tweets using a hashtag, or copy a photo on Facebook to a user's archive if someone tags a user in a photo. IFTTT is an initialism for "If This Then That. In addition to the web-based application, the service runs on iOS and Android. IFTTT users created about 20 million recipes each day. All of the functionalities of the Do suite of apps have since been integrated into a redesigned IFTTT app.

Arduino

It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards (for Windows, macOS, Linux) that is written in the programming language Java.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Conclusion

In this paper, voice commands are given to the Google assistant. The voice commands for Google assistant have been added through IFTTT website and the Adafruit account is also linked to it. In this home automation, user have given commands to the Google assistant. Home appliances like Bulb, Fan and Motor etc., are controlled according to the given commands. The commands given through the Google assistant are decoded and then sent to the microcontroller and it control the relays. The device connected to the respective relay turned On or OFF as per the users request to the Google Assistant. The microcontroller used is NodeMCU (ESP8266) and the communication between the microcontroller and the application is established via Wi-Fi (Internet).

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