Smart Home: Speech Recognition Based Home Automation Using IoT

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Abstract - *Internet of things(IoT) is developing to an immense degree. One of the most advanced technologies like IoT can be utilized for controlling, associating and overseeing devices that are connected to the internet. A portion of the key difficulties in receiving IoT for the standard way of lifestyle from gadget decent variety, security, and associated administrations of IoT gadgets to include a newer usecase value proposition. This paper proposes a device friendly amicable methodology for home automation utilizing discourse. The physical state of the device can likewise be modified dependent on client demand. The productive of Home Automation be improved by including security factor through alarming the client about house door tampering and the kitchen gas spillage. This IoT project executes home automation with the help of an alarm and alerts message to the user mobile phone.*

Key Words: Android, Arduino, ESP8266-WiFi module, Firebase Database, Home Automation, IoT, NodeMcu.

1. INTRODUCTION

Among many IoT applications, home automation assumes a significant job in acknowledging brilliant urban communities. Smart homes can be utilized for remotely observing and controlling electrical appliances fitted inside the home using smart and intelligent physical foundation. The current Government of India (GoI) has suggested creating 100 smart urban communities over the nation, which will make a gigantic interest for savvy home automation arrangements in the near future[1]. The word "smart" in "smart home" signifies context-aware that can be acknowledged using IoT and Information and Communication Technology (ICT).

In this paper, a model of smart home computerization utilizes the android application with firebase as the cloud. Every one of the apparatuses was constrained by Arduino NodeMcu having inbuilt Wi-Fi Module. The design uses ethernet to access commands given by the smartphone and monitor it with the help of Arduino device. For this purpose, an Android application has created by utilizing Kodular Android application designer. Security is another significant capacity should be considered in the mechanization framework. Smartphone frameworks give a special chance to fulfil the most significant factors in home mechanization frameworks that including adaptability, security, and simple to utilize.

2. RELATED WORK

Home automation frameworks can be structured using different technologies. We can regulate all the home gadgets by utilizing Bluetooth home automation framework. In that case, the primary hindrance is Range[3]. We can also do home automation by using GSM, then we either need to make a call or send a message to control the device[4]. The main problem associated with it is the time delay and the complexity of the system. A few creators structured home mechanization utilizing Wi-Fi. Yet, in those structures, only ON/OFF functionalities are only executed.

In proposed system, all home appliances are constrained by utilizing the Arduino and Android application using voice commands which can be implemented ON/OFF functionality and security along with other functionality. The noblest reasons for home automation are to help make the lives of paralyzed individuals a lot simpler. These home automation frameworks based upon voice directions are for the contrastingly abled individuals experiencing quadriplegia or paraplegia (who can't move their appendages however can talk and tune in) and it empowers them to control the different home apparatuses and can incite the bed rise just by the voice directions as indicated by their need and solace. Pranay P.Gaikwad[5] talks about the difficulties and issues that emerge in smart home frameworks utilizing a great deal and propose conceivable arrangements. The proposed system comprises of an android system in which controlling can be done using voice commands and correspond action value get updated to the cloud and the Arduino do the action based on the updated action value on the cloud.

3. IMPLEMENTATION DETAILS

3.1 Software Requirement

3.1.1 Android :

Kodular is an online suite which primarily provides a block-based web application that allows the development of apps. Kodular's graphical UI is like Scratch and the StarLogo TNG UI, which enables clients to drag-and-drop visual objects to make an application that can keep running on the Android platform. Kodular Creator is an MIT App Inventor distribution, meaning it is built on App Inventor open source project, although it offers big improvements over App Inventor.

3.1.2 Arduino IDE:

The proposed system uses Arduino IDE version 1.8.8 and the latest available version is 1.8.9. The project uses ESP8266 module of version 2.4.1 and uses Arduino JSON library of version 5.13.1 and adafruit adx library of version 1.0.1. The libraries can be imported into the Arduino that are required for the NodeMcu environment to provide an easy way to develop the code.

3.2 Hardware Requirement

3.2.1 Single Relay Module :

One separate hardware gadget utilized for remote gadget switching is the relay module, with which it could remotely control gadgets over the web. Gadgets can be remotely controlled on or off with directions originating from. The relay is constrained by a 1 x 3 header – cordial to servo links and advantageous to connect to many development boards.

3.2.2 LDR Light Sensor :

The presence of light and measuring the intensity of light can be detected using LDR Light Sensor. The yield of the module runs high with seeing light and it ends up being low without light. We can adjust the sensitivity of the signal detected using a potentiometer.

3.2.3 MQ6 Gas Sensor:

The gas leakage can be detected using the MQ6 sensor. Equipment in home and industry use this sensor to detect LNG, LPG, propane, isobutane and avoid the noise of cooking fumes, cigarette smoke and alcohol. Due to their high sensitivity and response time, the measurements can be taken as soon as possible. We can adjust the sensitivity of the signal detected using a potentiometer.

3.2.4 NodeMCU :

For IoT, NodeMCU uses an open source platform. Lua scripting language is used for the firmware. The firmware is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266.

3.3 Overall Setup of Proposed System

The overall setup of the proposed system is as shown in Fig-1. This is the combination of security alarming framework and home automation. In this system, the light is controlled by using a single relay which is connected to pin D5. The door is controlled by servo motor which is connected to Arduino using pin D2. LDR sensor senses the result and uploads it to cloud firebase using Arduino pin A0. Gas sensor upload sensed result using pin D1 and door Sensor using pin D0. The working of Air Controller(AC) is simulated using a display and is connected to pin D3 and D4. The buzzer will alarm when the Gas leakage occurred or when the door has tampered. The speech module in Android is used to give a voice command and is updated to

the cloud, it can also control manually. When the security of the proposed system is compromised, an alert message with an alarm notification is given to user using notification module.
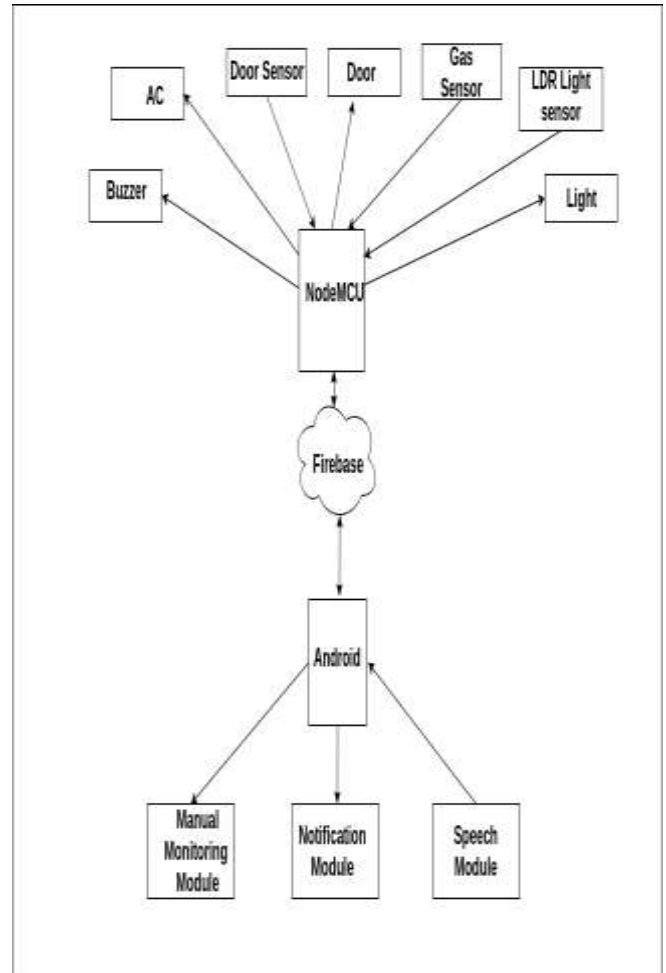

Fig -1: The outline of the Proposed system.

3.4. Proposed System

The proposed system is an upgrade to the regular Home Automation methodologies, ie., the utilization of Bluetooth [2] and Android versatile application. The proposed strategy includes Client-Server connection and the client will notify without any distance barrier. The Proposed framework aims to give the most straightforward and effective approach to connect with home appliances by giving voice commands in human (common) language. We also plan on taking out the tedious procedure of navigating different application screens with only one voice direction as appeared in Fig-2. The regular language processing in the project gives an individual association our framework. Basically, the client is authenticated by entering the predetermined username and password in the mobile. The customer sends voice directions to the mobile, which deciphers the message and updates the cloud and the Arduino sends the correct request to the specific

apparatus. The mobile utilizes Natural Language Processing with the help of Google to decipher the voice order given by the customer. The smartphone goes about as a central console, it figures out what action must be done by which machine to fulfil the customer's solicitation. The central comfort can similarly be either a work area application, web application or a mobile application as most of the data traded can be taken care of by the cloud. In any case, for the solace of the customer and extended compact limits, we will use the smartphone in this proposed framework.
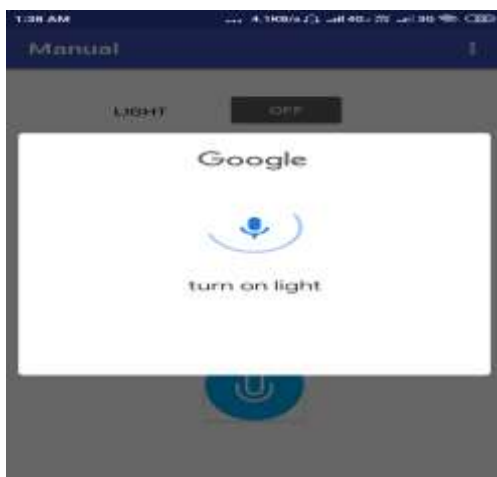

Fig -2: The voice command module.

The machines are controlled with the smartphone through an Arduino NodeMcu Board that sets up the possibility of the Internet of Things. The Arduino Boards are customized so that interfaced apparatuses respond to mobile inputs. Our task automates the activity of each and every machine in the house like light, AC, door as shown in Fig-3., which greatly reduces the power consumption because of abundance use/wastage of the apparatus' administrations.

Fig -3: The simulation of the Proposed system.

To meet the security, two sensors are mainly used, one to detect the door tampering, which when an intruder tries to open the locked door; an alert message notification will send to the owner. The second sensor is used to detect the gas leakage at the kitchen. Then also an alert message notification will send to the owner and the electricity supply to the kitchen will be cut as shown in Fig-4. It can be restored by the owner using smartphone itself. The module will kill the caution after a fixed time delay. The warning will be activated again when the module identifies any compromise to security and the owner will get the notification again and the procedure proceeds so on.

4. PROGRAM FLOW

The flowchart from Fig.5 demonstrates the whole home automation framework and security framework task.

5. PROGRAM FLOW

This system displayed a home automation idea using minimal effort Arduino board to control different electrical appliances using a smartphone. Home automation using loT is one of the fast developing research areas and therefore various challenges can be relate to it. One of the certifiable difficulties is due to the absence of norms for coordinating different sensors, applications and other existing smart embedded gadgets. As loT manages an enormous proportion of information gathered from different sensors passed on in a Smart domain, the reasonable idea thought to be taken in overseeing, verifying and affirming the information. Another immense challenge is to give security in smart home conditions. In future, power monitoring and the board of plenty of gadgets in a smart home condition can be done using data examination and perception.
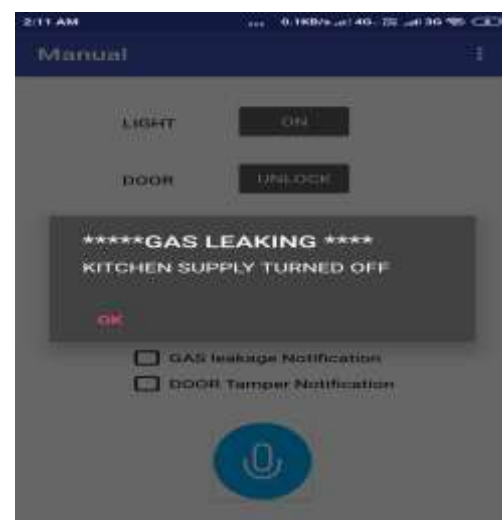

Fig -4: The Gas Leak notification.

5. EXPERIMENTAL RESULT & CHALLENGES

This system displayed a home automation idea using minimal effort Arduino board to control different electrical appliances using a smartphone. Home automation using IoT is one of the fast developing research areas and therefore various challenges can be relate to it. One of the certifiable difficulties is due to the absence of norms for coordinating different sensors, applications and other existing smart embedded gadgets. As IoT manages an enormous proportion of information gathered from different sensors passed on in a Smart domain, the reasonable idea thought to be taken in overseeing, verifying and affirming the information. Another immense challenge is to give security in smart home conditions. In future, power monitoring and the board of plenty of gadgets in a smart home condition can be done using data examination and perception.
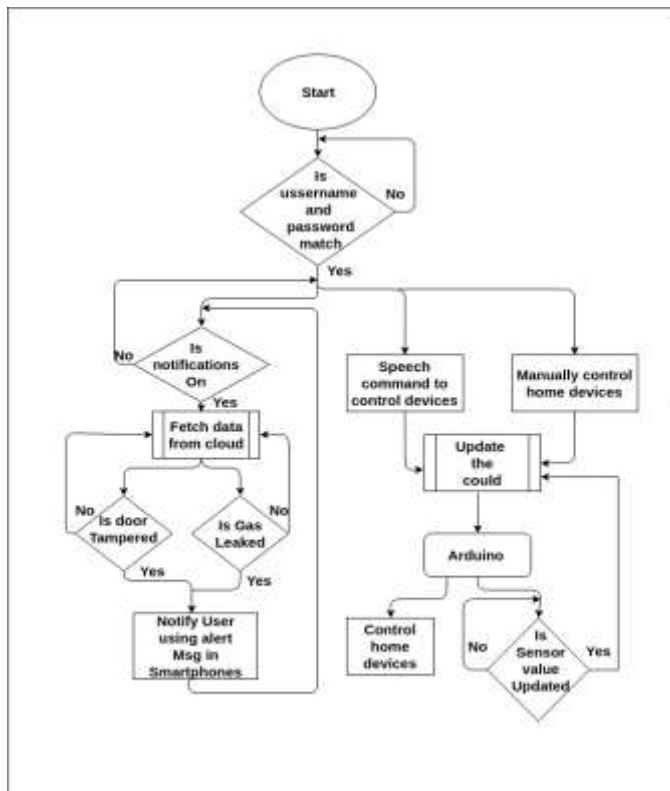

Fig -4: The complete system flow chart.

6. CONCLUSIONS & FUTURE SCOPE

The system proposes a minimal effort, auto-configurable, secure, generally available, remotely controlled arrangement. The strategy examined here is exceptional and has accomplished the engraving to control home apparatuses remotely using voice command with the help of Wi-Fi advancement to relate structure parts, satisfying client necessities and requirements. Ethernet advancement equipped plan has wound up being controlled remotely, give home security and it is insignificant exertion when stood out from the past frameworks. The system design and architecture of the model demonstrate the basic component of home appliance control that can remotely monitor. As the system is liable to the customer's discretion and judge ability of the situation by the usage of a camera related with the small scale controller may help the customer in settling on decisions on whether to impel the security aking choices on whether to actuate the security framework.

ACKNOWLEDGEMENT

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