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Automation of Smart Buildings and Integrated Message to Voice Technology using Raspberry Pi 3 for IoT Applications

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ABSTRACT

Automation framework has been exists over an extensive stretch of time. These automation frameworks have expanded the attainability for some people groups, by enabling them to control their home machines with either a portable or remote. The majority of this framework have a typical disadvantage that is range and speed, the scope of the most framework is exceptionally low and individual whoever has the remote or web login access can control the appliances. So to defeat this downside, we propose a framework where the whole framework must be obtain to utilizing IoT through a portable application or site enabling can control their apparatuses from any place on the planet and also by utilizing Text to speech technology, we can make the hardware to display and speak the messages sent to it.

Key words : Automation, Text to Speech, MQTT, IoT, Raspberry Pi, Rabbit MQ, AWS.

1. INTRODUCTION

For individuals everywhere throughout the world, the procedure that carries them to move toward becoming independents is testing. This implies they need to deal with their work, be legitimately responsible of their own choices and, in general, be autonomous in regular daily existence. This progress procedure requires time, understanding, and backing from peers, family and the public. The recent studies show that during this amount of conversion people has an interest in routine devices that square measure typically referred as smart devices [1].

The Internet of Things (IoT) has had to build varied computer and electrical devices since 2012 with the development of recent technologies. Through the advent of the Internet of Things (IoT), both electrical and mechanical devices that are manually operated by square measurement can currently be operated accordingly.

The procedure of IoT is to create a effective association between a hub or a network , electronic and electrical things. This effective association tracks down, find and management these connected things. Contingent upon machine to - machine accessibility plan the expansion of good sensing element joined with correspondence advances, as an example, Bluetooth, RF, WI-FI so on, IoT has moved toward changing into reality and its intention is to create devices more and more conscious, intelligent and skilful for a interactive and sacure world [2].

Despite the very fact that IoT technologies have evolved just like the device organize hub that essentially sends collected information to the base station and a touch job done on applying IoT technologies to consumer machines and inserted devices around individuals[3], the IoT technologies have developed over. Due to the overwhelming use of the web, the evolution of smartphone technology and raised principles of portable correspondence[4], the IoT application has become famous in this 21st century. There are different numbers of sensors in this IoT area that need to be connected to the IoT to be monitored.

Currently, a computer system must be rendered to monitor these sensors, which in turn have portability by abstracting all

devices and OS[5]. The interest for home automation framework utilizing IoT have expanded because of the expansion in the interest of correspondence between outside world and the home [6][13][15][16]. In various shapes and frames, the IoT will infiltrate normal life and the inspection network needs to get ready for a security-conscious[7][14]. Smart sensor developments, including WSN, Nanotechnology, and Miniaturization[8], will recognize the key advances that will propel future IoT. With the help of IoT, the customer can screen and deal with their home entrance, various devices, and turn the T.V. on / off without human intercession, even over enormous spans[9][17].

Ongoing headway in distributed computing and information investigation enables clever frameworks to process and break down the information in an increasingly efficient manner [10].

Depending on the learning that were made on the previous home automation system it is found that this system has less speed and range also with some accessibility issues as a result there is need to push the home automation systems a step forward. Combining Home automation and Internet of Things together is the advancement that is required to push home automation system as step forward in this model everything is configured with an IP addresses, and can be observe, access remotely, monitored and controlled with the help out of web technology[11] [12].

2. LITERATURE REVIEW

Weimei Zhang[1] et.al stated in their paper that IOT's function in agricultural farming, logistics and distributions of agriculture goods using IOT's application.

Mircea Murar[2] et.al illustrated in their paper that a packaging company's communication boarder was moved to a control

system and heat using the Wi-Fi safety from an integrated design & two compliant Android machines used for control.

In their paper which produced a package frontend for embedded appliance nodes, defined by Takeshi Yashiro[3] et.al, calculated to reduce the complexity of embedded appliance designers, this graphical user interface can be used with success to deploy sensible IoT applications compared to current embedded systems with little programming logic. In their description, Keerti Kumar M [4] et.al clarified that Wi-Fi is the fastest of all the wireless concepts used for loT and that information sharing is obligatory for network access. Such structure modifications are provided in the operation protocols in V to V correspondence.

In their article, Takayuki Suyama [5] et.al stated that they found a wireless sensor node virtual machine and deployed a virtual machine on three computers, ATmega32, MSP430, and TWE-001.Seung-Chul Son [6] et.al illustrated in their paper that carry both a non-IP environment and an IP network are sundry within a home computerization system using protocols are RBS, TPSN RTSP, and IEEE 1588, have been used to synchronize time in home automation system and proposed scheme comparatively reduces network overhead because it only uses CoAP as an alternative of the extra standards for time synchronization protocol.

Seungho Chae [7] et.al described in their paper that hold up automations in the smart space and to manage devices and the space itself and paying concentration on dropping easy and recurring measures of the users by recognize every user.

Sean Dieter Tebje Kelly [8] et.al explained in their paper that implemented for IOT use for monitor regular household location by means of minute cost ubiquitous sense system.

Pavithra D [9] et.al stated in their paper that controlling residence appliances via cellular phone using Wi-Fi as communication protocol and raspberry pi as wine waiter system and these arrangement is appropriate for RTOs home protection.

3. PROPOSED SYSTEM

Proposed framework essentially centers on computerization over IoT which enable the client to control his home appliances through a cell phone or online interface. It is the pinnacle favorable position of this framework at some point, it so happens we overlook to turn off certain machines or uncertain about whether we have turned off them or not, by this framework the client can see the last status of the machine enabling him to turn it on or off contingent upon his need.

This framework additionally has manual switches incorporated into them and these manual switches can likewise be utilized to on or off the apparatuses and the status of the switch is sent as feedback to the application where it consequently flips the realistic change to coordinate the condition of the manual switch. The system has an additional feature which allows us to send a message from application to

hardware the message is displayed on the LCD and in addition to that it has a speaker attached which reads us the message.

The accessible framework basically centers around Bluetooth and RF which creates a nice outcome in short range like 10 meters and 2 meters individually, yet as the separation between the transmitter and receiver expands the correspondence speed and the unwavering quality of the exchange of information diminishes. To configuration proposed framework, which is having Raspberry pi and RFID Module to defeat the disadvantage of range, speed and availability. In this technique the machine command over IoT is finished by utilizing PHP, HTML, JavaScript programming dialects and MQTT convention.

3.1. Network Architectures

The spine for any IoT base activity is the server. The incorporated disjoin go concerning as the core of the entire IoT well-known task. In this paper the AWS is utilized for information stockpiling, feeler input and manage. A fundamental association between the server and the IoT Devices should be made.

There are a few different ways to make a web association from which we have picked Message Queuing Telemetry Transport (MQTT). The spine for any IoT base activity is the server. The incorporated disjoin go concerning as the core of the entire IoT well-known task. In this paper the AWS is utilized for information stockpiling, feeler input and manage. A fundamental association between the server and the IoT Devices should be made. There are a few different ways to make a web association from which we have picked Message Queuing Telemetry Transport (MQTT).

MQTT is a network convention for the M2 M 'Internet of Things'. It was meant to notify transportation as an extremely lightweight distribute/buy. It is useful for communicating with distant regions where a limited code impression is needed. In AWS, the MQTT configuration is achieved with the aid of the AWS case, this occasion helps us to build a Linux virtual server within the AWS server space and we can add a Rabbit MQ with the aid of this server space.

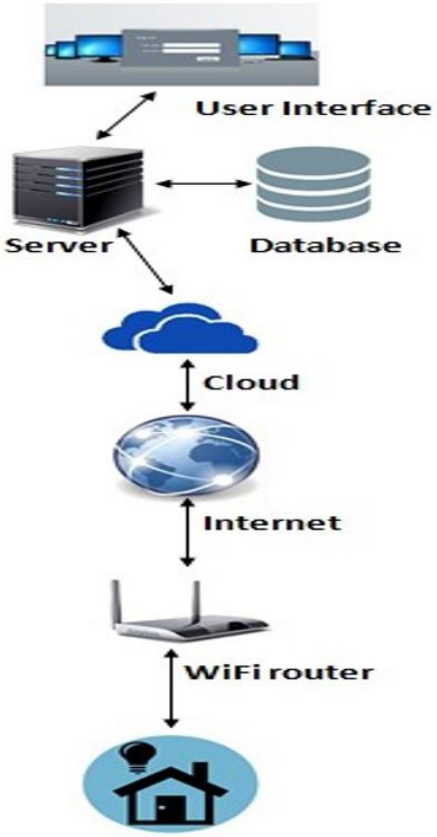

Figure 1: Arrangement Architecture for home automation system.

Rabbit MQ is an open-source message-intermediary programming which enable us to introduce and utilize MQTT convention. The base size of MQTT control message can be as little as two bytes of information. A control message can convey about 256 MB of information if vital. There are 14 characterized message types used to disengage and associate a customer from an agent, to recognize receipt of information, to distribute information and to direct the association among server and customer. The information transmission of MQTT depends on TCP convention.

4. SYSTEM DESIGN AND IMPLEMENTATION

4.1 Software Design

After the foundation of MQTT server we can distribute a message to subject from application side and cause the equipment to buy and by relying on the message got from the application, the equipment can switch the condition of the apparatus. The web side application is structured by utilizing PHP and JavaScript language for server side, the PHP

program sets up an association with the server and distributes and buys in messages to the theme. The plan and body for web application is given by utilizing CSS and HTML.

The login is given to the client after the accreditations are entered in the login page , the qualifications are checked in the database and on the off chance that the username and secret key are coordinated, at that point the GUI of the switches are stacked.

The GUI has virtual flip switch which on contact change its state and after that the java content perceives this change and distributes the message to a theme. The administrator board can include clients and giving them access to explicit number of switches, since administrator board can make changes in the database. Ever user also has a message box in which he can type his message and sent it to the hardware.

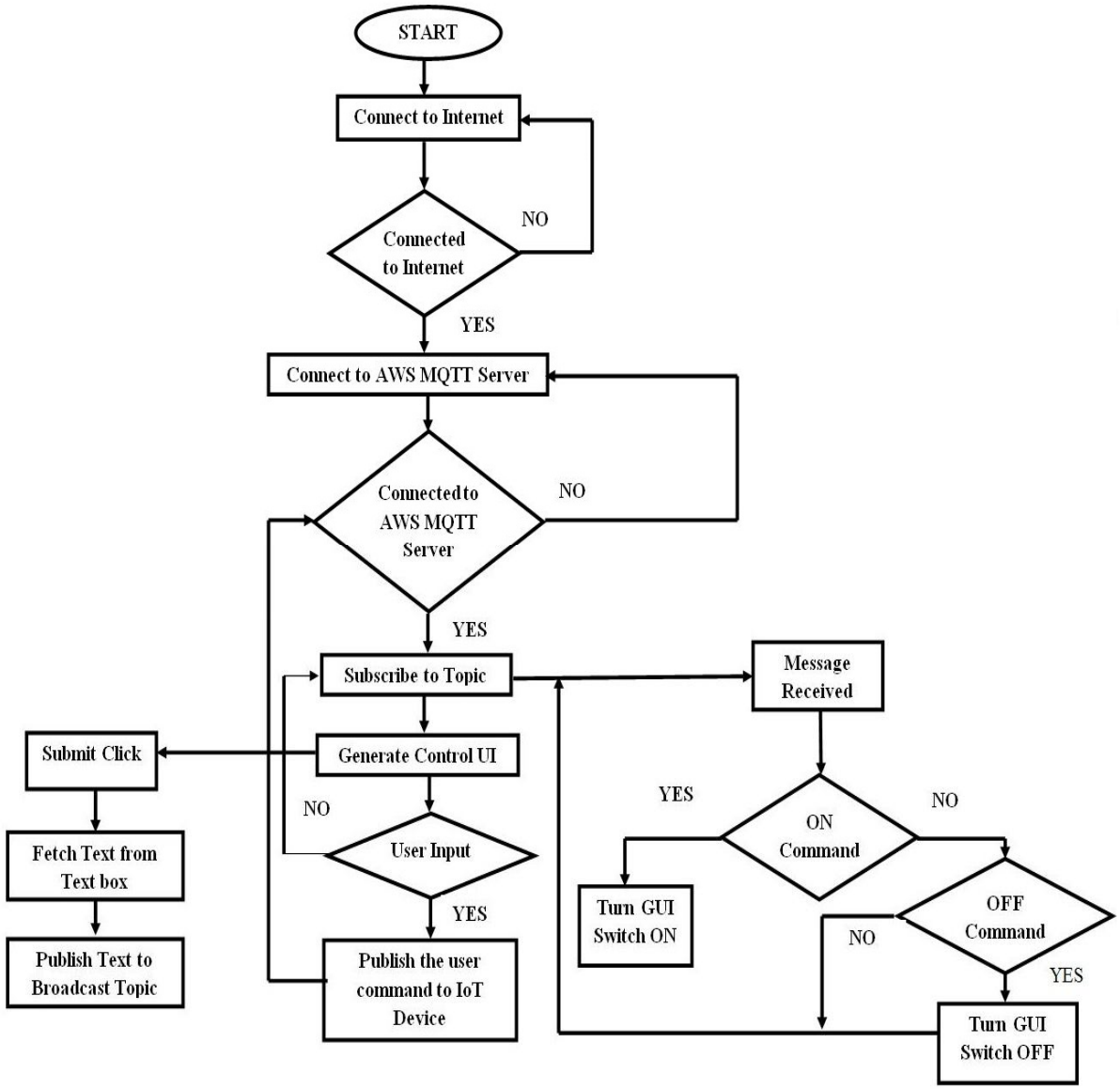

Figure 2: Application Flowchart

4.2. Implementation Setup

To execute our residence automation framework, we have structure an exploratory system as appeared in Fig. 3 wherever we utilized raspberry pi3 as fundamental controlling

unit. What's more, a hand-off board to control electrical apparatuses alongside four manual switches which are likewise associated with the raspberry pi as advanced inputs. LCD 16X 2 presentations is joined to the pi just to see the condition of the switches. This system has a speaker connected to it and by using speak library in python we can convert any text message into speech, this message is sent by from the application by the user and this message is displayed in the display and the message is converted and played through the speaker by raspberry pi 3. A hotspot or Wi-Fi is additionally set up all together for raspberry pi to interface with the web. We have tried our framework on various families and the whole framework worked with no mistakes.

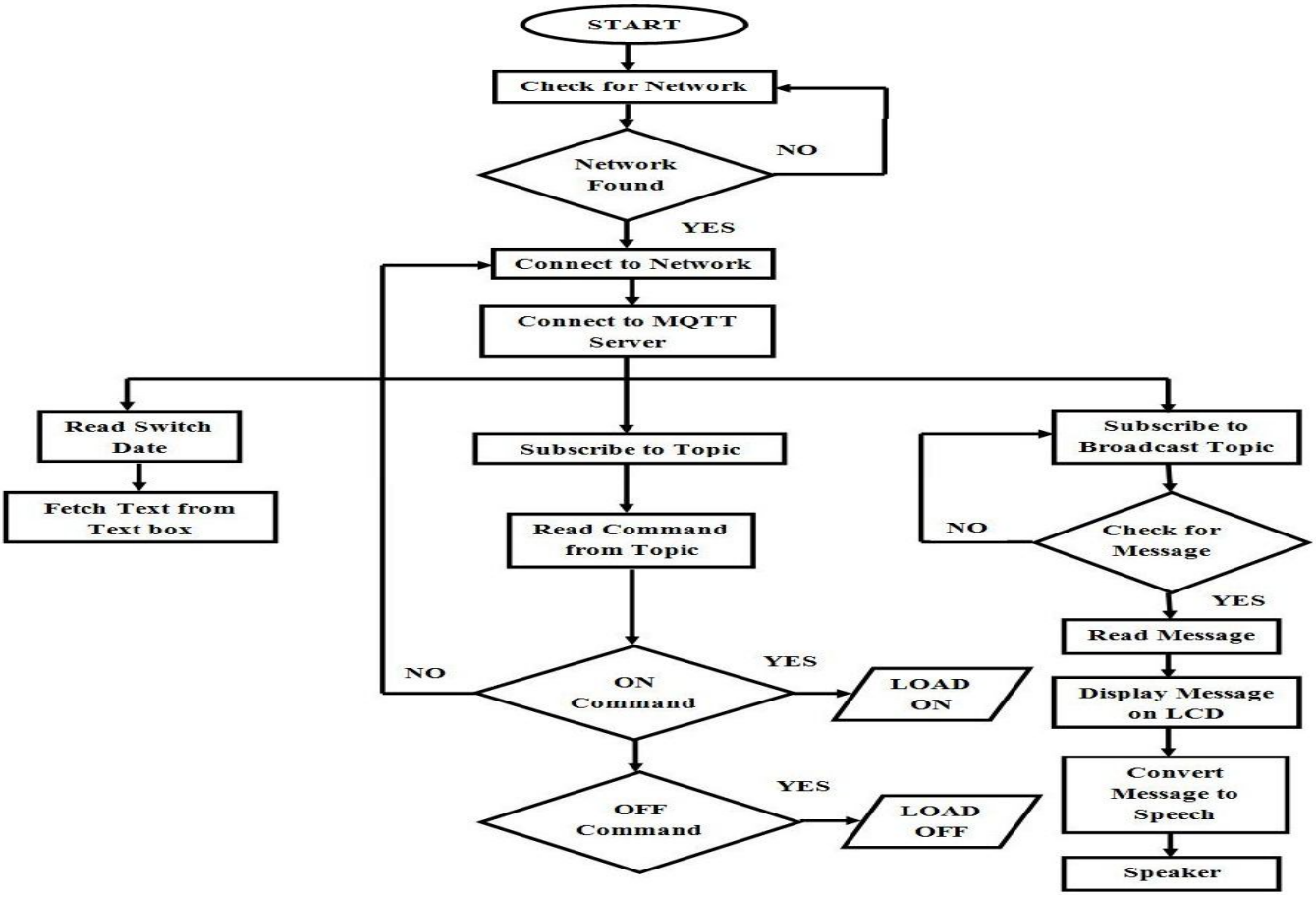

Figure 3: Working flow of home automation system.

5. RESULTS AND ANALYSIS

We've organized the IoT layout and web page by presenting units and setting up a server for a few homes. The client wants to familiarise the item with his / her workspace or wise android phone in the aftermath of the present units. The customer wants to enter the home automation main server after fitting the base of the provided logic and programming.

The customers of any household in which the units are built are given an outstanding user ID and a hidden key. After the client ID and the fascinating secret key are obtained, the client can start their android app with credentials and log in. At the stage where the client begins the initial web application, a login tab will appear as seen. The customer was seen to be able to sign successfully. Our structured model of house automation will likewise have unnatural by utilizing any net page. to figure home computerization framework, shopper should to travel web site page of home automation framework,

then a login page as appeared in Fig. 4 are showed up. By login during this page the first house computerization page as appeared.

The criticism from the manual switches is additionally reflected in the application with fast and exactness the administrator client had the option to make different logins which had the option to control a farthest point number of switches. From this sheet client can control his/her residence appliance around the world with a Personal Computer, or with a brilliant android smart device. Along with this the client can send a message to the hardware from the application itself the message is displayed in the LCD display and the same message is played through a speaker. Our structured model of home mechanization offers 100 percent potency concerning communication with the electrical and electronic devices and moreover offers 100 percent proficiency as so much as security because it includes a solitary administrator to control all the associated devices.

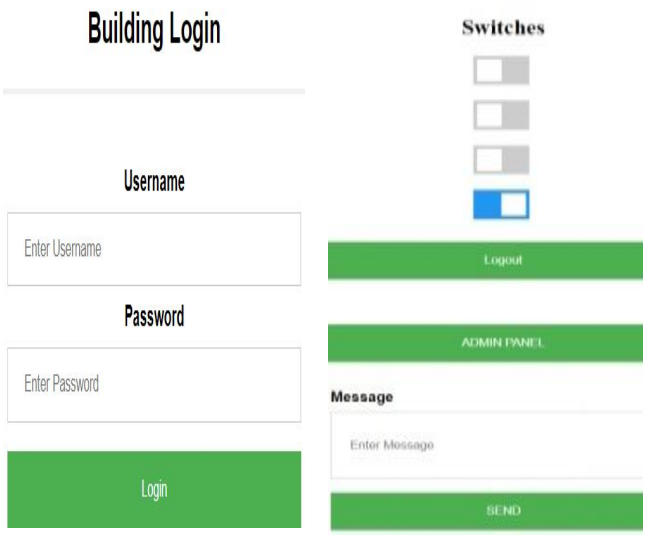

Figure 4: Login and GUI Interface pages.

5. CONCLUSIONS

In this paper, we center principally on controlling different machinery, equipment, and other electronic and electrical apparatuses utilizing different control frameworks remotely. This technique for working the app is referred to as mechanization which has twisted into a basic piece of standard day to day continuation for people. The system utilized Text to speech technology and to display & speak the messages sent to it. The Proposed version contains a tendency to provide 100 percent productivity at its purpose of convergence on home computerization. This proposed version uses an IoT convention known as MQTT that permits gadgets to synchronize with the IoT stage in order that they will be controlled from anywhere on the world. The total system comprise of a solitary supervisor that makes our model a secure one because the supervisor simply have the knowledgeable to get to every one of the hubs present under each client. The model is incredibly prudent even as there's simply a solitary administrator however the number of shopper underneath the administrator might build creating an enormous complicated system however a secure one. For future work we might end eavor to make the number of systems underneath a solitary server creating a whole town medical care utilizing IoT.

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