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IOT BASED SURVEILLANCE SYSTEM AND HOME AUTOMATION

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Abstract— *Internet of Things (IoT) conceptualizes the thought of remotely connecting and observance universe objects (things) through the net . once it involves our house, this idea is capably incorporated to form it smarter, safer and automatic. This IoT project focuses on building a wise wireless home security system that sends alerts to the owner by victimization web just in case of any trespass and dominant home appliances through speech recognition by victimization raspberry pi as a server system and deploy in cloud platform that the system is accessible from anyplace and anytime. Raspberry pi called one Board laptop (SBC) is projected during this paper to realize these goals. The voice command operate are going to be given to regulate any appliances or devices reception. This will give a higher communication in automatic home as compared to traditional homes. Home automation-dominant the fans, lights and different electrical appliances in a very house victimization net of things. During this paper, we tend to propose an internet application victimization that the fans, lights and different electrical appliances will be controlled over the net. The necessary options of the online application is that any device connected to the native space network of the house will management the devices and different appliances within the house. The online application accustomed modify home automation conjointly incorporates a security feature. The door lock will be controlled by giving voice commands. The system incorporates a speech recognition module victimization language process and therefore voice commands will be understood and therefore the home will be automatic consequently.*

Key Words: **Home Automation, Internet of Things, Speech Recognition, Smart Homes, Sensor System, Raspberry pi.**

1. INTRODUCTION

The essential intention in the origin of the possibility of an IOT based reconnaissance framework was to take care of the issue of theft and interruptions and to render a place protected and secure. This undertaking depends on a discourse acknowledgment programming that has been designed to control general electrical and gadgets apparatuses as home robotization highlights. These home apparatuses can be directed and controlled by an arrangement of voice orders which have been pre-introduced likewise. Alongside the home computerization highlight, a face acknowledgment programming has been used for giving home security to examine the nearness of an interloper and snap their photographs to be communicated to approved staff telephone. This element when detects the nearness of a break in, on perceiving a face, the Pi Cam clicks a photograph of the trespasser and sends the photograph to our approved gadget or handset. As an additional element of our home computerization venture, a simple access mechanized door has likewise been accommodated a keyless programmed section. An IOT based home observation has been so composed as to modernize a family unit as per the innovation age to keep in pace with security alterations being executed in the west. Ideally this framework will be executed monetarily when mass delivered, considering it fit and possible for business use.

Over the world, IOT (Web of Things) and M2M (Machine Relational Correspondence) advances which were produced for brilliant home framework are ending up understood. The framework is produced by utilizing Bolstered Versatile Correspondence and

Wellbeing Controlled Multifunctional Savvy Entryway Framework.

The proposed framework will permit to impart amongst guests and proprietors of the house. Camcorder framework (the photograph of guests will be sent to the proprietor of the house), text warning, SMS/MMS notice and double sound/single sided process will be furnished with videophone. Also, distributed storage of picture information with a high determination will be furnished utilizing the framework with expanding wellbeing and security is-sues, the utilization of keen entryway framework expanded reliably with the appearance of security related hardware, for example, computerized entryway locks, propelled video discussion gadgets, and wire-less home security systems. There are numerous shrewd frameworks proposed to give wellbeing and

security at home and workplaces. The framework is incorporated to the door for acknowledgment individuals.

In this project, we have constructed an IOT doorbell utilizing a Raspberry Pi with the assistance of AWS IOT stage. Once the guest squeezes the doorbell, it will broadcast a message that will be sent utilizing AWS SNS benefit by Email or SMS, so we know somebody is thumping our entryway regardless of where we are. Guests never again need to call us and basically let the IOT doorbell carry out the activity. Hard of hearing individuals additionally advantage utilizing it so they can be notified by the vibration of their telephone.

To make it further developed, Pi Camera is included so our IOT doorbell will take a photo of the guest, transfer it utilizing FTP (or you can utilize AWS benefit for putting away the picture) and append the connection in the email or SMS message sent. On the off chance that you need, you may include voice/video call ability using Raspberry Pi so you can converse with your guest via telephone, or you can add sensor to get ready when somebody attempts to break into your home. It can likewise cooperate with other IOT apparatus inside home to verify the presence of an intruder. Alongside controlling the keen doorbell, the raspberry is utilized to set up a changeless observation framework with a camera surveilling the home all through the clock. A face detection programming is joined to recognize The Smart House is an advancement of the current power. It contains a two-way correspondence where power and data is traded by the purchaser and utility to amplify proficiency. Raspberry Pi is a Visa estimated single-board PC created in the UK by Raspberry Pi establishment. Home mechanization is a critical point of reference in accomplishing savvy lattice. Headway in innovations have made homes more helpful, productive and significantly more secure. The Raspberry Pi gives various customizations to transform a standard home into a brilliant home. Raspberry Pi gives a minimal effort stage to interconnecting electrical/electronic gadgets. IP camera can be utilized as a part of different spots, for example, distribution center, office, store, and doorkeepers and so on.

Home computerization or domotics is building mechanization for a home, called a shrewd home or keen house. A home computerization framework will control lighting, atmosphere, stimulation frameworks, and machines. It might likewise incorporate home security, for example, get to control and caution frameworks. At the point when associated with the Web, home gadgets are an essential constituent of the Web of Things. A home robotization framework normally associates controlled gadgets to a focal center or "door". The UI for control of the framework utilizes either divider mounted terminals, tablet or work stations, a cell phone application, or an Internet interface, that may likewise be available off-website through the Web.

Likewise, we have actualized a home mechanization framework in which electrical apparatuses, for example, lights and fans can be controlled utilizing voice summons. This is actualized utilizing a product known as JASPER.

This paper is organized as follows, Section II provides details about the existing systems and their drawbacks. Section III presents system hardware and software requirement to measure the parameters. Section IV introduces Methodology to achieve the required system. Section V presents the test results of notifications.

The last section concludes our work and presents future work plans.

2. LITERATURE SURVEY

In the existing system, the studies on Home Automation System focuses on addressing the problems or power consumption range of operation and cost of the whole system. To automate the appliances, various methods are used like SMS and Email. The work presented here is focused on fast and easily accessible of a wireless smart home automation system to reduce the manual work and everyone accesses this system. It is having low cost, secure, and quick access model design as compared to the previous systems and it has an additional advantage i.e. Security system.

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Miss. Pradnya R. Nehete, Dr. K P Rane [2] demonstrates a door locking system which takes a code input from the GSM module to grant access to the house.

A.M. Weeratunga, S.A.U. Jayawardana, Hasindu P.M.A.K, W.P.M. Prashan and S. Thelijjagoda[3] introduces an interactive project which an intelligent assistant for visually impaired to interact with the internet services.

Jatin Chatrath, Pankaj Gupta, Puneet Ahuja, Aryan Goel, Shaifali M.Arora[4] uses a software known as OpenCV which has different xml modules that are used to identify different facial patterns. This system is capable of identifying face in real time and tracks its movement Andreas Schmeil, Wolfgang Broll[5] were able to create MARA- A mobile augmented reality based virtual assistant which was able to do jobs like SIRI, and Google Assistant providing the useful assistant to those with disability to see.

3. SYSTEM HARDWARE AND SOFTWARE REQUIREMENT

In this section, the signal flow of information is discussed along with the various hardware and software components being used in the system.

3.1 Block Diagram of System with Hardware and Software Requirement

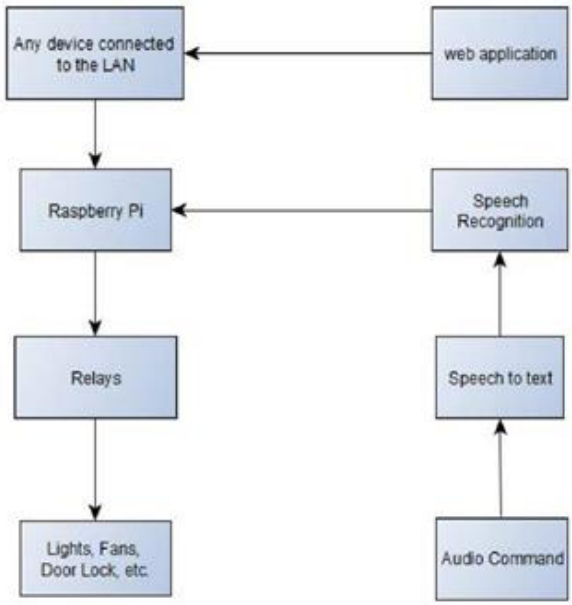

Fig. 1. Block Diagram of Proposed System

3.2 Components Required:

1) Software Requirements

- Wiring Pi: To enables GPIO control over Local Area Network through a Web App.
- Python Language:For Raspberry Pi Programming
- Putty:For creating a tunnel to connect to Raspberry Pi to laptop.
- Jasper: For Voice Assistance
- Google STT:Converting speech to text online and returning the text to pi for further controls.
- PHP:PHP is the programming GPIO pins of Pi to be controlled over LAN.
- Open CV:Contains different modules for face and body detection that can be programmed according to our requirement

2) Hardware Requirements:

- Raspberry Pi
- Relay board connected for home appliances i.e. Lights, Fans.
- DC Motor for Opening and Closing the Door.
- PiCam for Live video Streaming.
- Webcam for capturing photo of visitor.
- Microphone for receiving voice command.

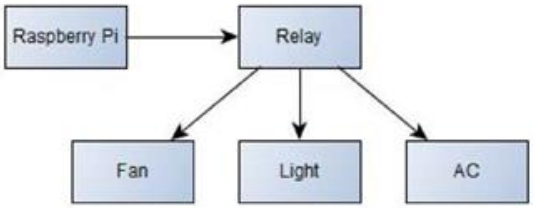

Fig. 2. Block Diagram of Raspberry Pi Connection

4. METHODOLOGY

4.1 Working of Home Automation:

The Smart Home Automation System is an integrated framework to facilitate people with an easy to use home automation system that can be fully operated based on voice/ speech commands and through web page. The system is constructed in a way that it is easy to install, configure, run and maintain by any type of people.

The system is operated as the voice command is given through a microphone so that the raspberry pi is performing an action on the basis of voice commands. The speech is mapped through commands by using the Jasper Jasper enables outsiders to add intelligent voice control to any associated product that has a microphone and speaker. Users can ask jasper to play answer questions, get news and more on voice enabled product like the home intercom.

- Steps of Jasper: The process starts with the command "HEY".
- After it has detected the command it will respond with a high note We can then give the command as per requirement. After taking the input it responds with a low note.
- If the command is in its database, Pi will do it,otherwise it will ask to input again.

The front end is designed by using the PHP. PHP is a Platform for wiring together hardware device, APIs, and online services as part of the Internet of Things. According to the requirement the option will be pressed in the web page.

For the security of home camera is can be attached at door and access those camera records from anywhere in the cell phones.

The wireless smart home automation system that will control appliances in a home over LAN. This work will be utilizing platforms like Apache, Raspberry Pi and relay module.

4.2 Working of Door Control.

When the visitors press the doorbell, it sends a signal to the Raspberry Pi saying that someone is at the door, then automatically webcam will take the visitors photo. It will send an SMS to the authorized persons mobile by saying "Someone is at the door", And a link will be generated. By clicking on the link, the authorized person can see the visitors photo and send a signal for opening or closing the door. This can be controlled inside the home connected over LAN.

4.3 Live video Streaming:

It allows user to view data from the Pi camera via the internet to detect intruders. If an intruder is trespassing, then the Pi camera detects the persons face through face detection technique. As video is streaming continuously, the authorized personnel can detect any break-ins. Because of this possibility of spying and trespassing can be eliminated.

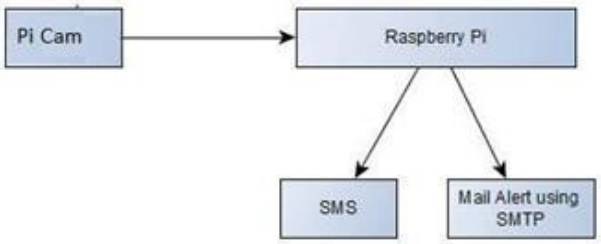

Fig. 3. Block Diagram for intruder alert.

5. PROPOSED SYSTEM DESIGN

The proposed design contains Raspberry Pi at the center which receives all the commands. It is connected to internet for IOT services and sending email to the authorized in case it has detected face in its operating area. Pi is connected with the appliances through the relay module which will control the same through voice or through web page. Microphone and speaker is also used for taking voice input and output respectively.

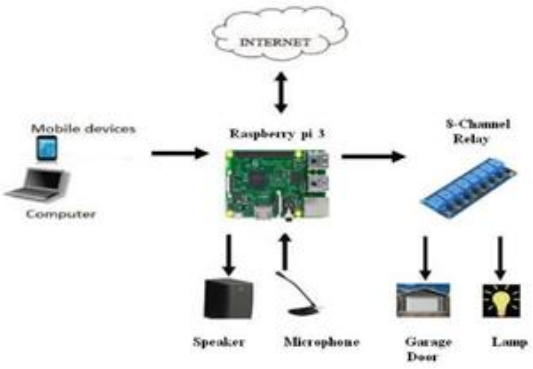

Fig. 4. Proposed System design

6. RESULTS AND DISCUSSION

This section explains functioning of the system using the demo of website and notifications.

6.1 Alert Notifications

As per the procedure when visitor presses the doorbell authorized person will get an alert notification by stating that someone is at door.

The Alert Notifications is sent in two forms: Online notifications and Offline notifications. The Online notifications will consist of E-mail alert and live video link. The Offline notification is SMS. Both the notifications will be sent to the Authorized person.

1. SMS Alert: The result of SMS alert is shown in Fig.5 . The SMS is sent using AWS SNS (Simple Notification Services) to provide notification to owner if he don't have access to internet. The SMS is sent to show the presence of visitor, alert can be handled using SNS service

Fig. 5. SMS Alert Sent to Owners Registered Mobile

2. E-mail: The E-mail is sent using the IMAP (Internet Message access Protocol) of G-mail at Port 587. The mailing uses the IMAP access to avoid spamming of mail and this provides a high priority to the mail. Fig. 6. shows the sample E-mail. The subject of the mail can be customized accordingly. The mail consists of the photo of the visitor.

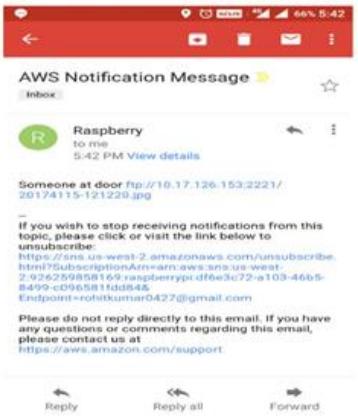

Fig. 6. E-mail Alert to owners account

B. Photo of the visitor:

The photo of the visitor is shown here in fig.7, the link which comes through the mail contain the photo of the visitor.

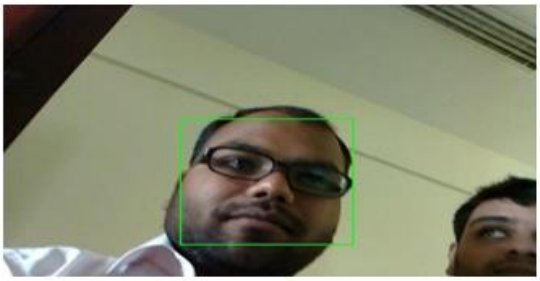

Fig. 7. Photo of the visitor.

C. Live Video Stream: Fig. 8. shows the demo of video feed using its screenshot. The video is accessible soon as the link is arrived in the notification mail. The live video stream enables the house owner to monitor trespassing of an intruder.

Fig. 8. Detecting face on live video stream over LAN

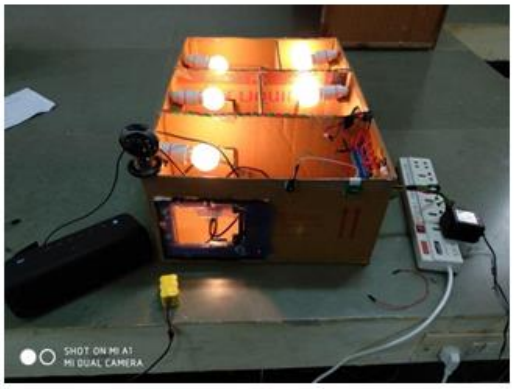

Fig. 9. Proposed System.

7. CONCLUSION

Our project titled "IOT Based Surveillance System and Home Automation" has been successfully executed with each of the proposed components of the system working according to commercial standards. The system designed in our project has been so designed in order to improve existing security systems by modernizing traditional systems into an IOT system for feasible control and access. The most important use apart from security is to provide a simple solution to aid people with disabilities. Controlling the access into the home or controlling electrical appliances can be done from a stationary point without having to move. These applications of the system prove to help a wide array of people.

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