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VIDEO CALL BASED HOME SECURITY SYSTEM USING RASPBERRY PI

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Abstract: *This paper enhance human comfort. Now a days security to the home as become biggest challenge. Utilization of IOT provide essential security to our home. Here Raspberry Pi camera and sensors are installed. Door open automatically if person face matches to the database. If not there will be notification via video call to the owner. There will be a automatic call for the near by police station when animal or unauthorized person try to hit the door.*

Keywords- *Raspberry pi cam web, Internet of Things, Facial recognition, video call, cloud server, Sensor system, APR voice message.*

I. INTRODUCTION

IOT allows object to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based system. Security is a important factor today. Technology improving day by day in the world. The crime gang also improves technology to perform operation, IOT

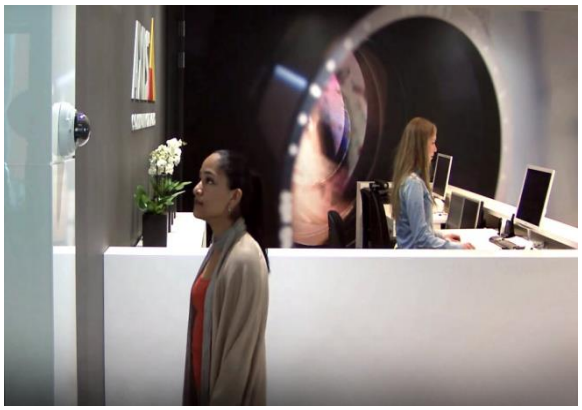

Fig.1: Facial Recognition

based security system enables the user to view the activity from the remote location. It collects useful data with the help of various device and automotive flow data between other device. The proposed system has, automatic door open for matched face,(image frames). Video call to smart phone at the detection of unmatched face. Based on mobile app usage, voice alert will be mobilized. The system detect the visitor's entrance, capture and pass those group of frames automatically to the owner to identify the visitor and sends the text and that text message covert to voice message. And also produce SMS alert to near by police station whenever a animal or thief try to hit the door forcefully.

II. LITERATURE SURVEY

As the system becomes fully automatic the amount of error decreases. The use of machine to machine technology facilitates user to view the location from remote area. This module is used for wireless communication where system collects the information from sensor nodes on demand and provides it to the end user through wireless network. [1].
The advantage of sending push notification is explained when the system users Raspbian OS as operating system. Raspberry Pi is a credit card sized portable stand alone device which is energy efficient and sends out signal when intrusion is detected. The captured image is sent to the user where user view can view the captured image from the remote location but controlling power of Raspberry Pi from window is not established. [2]
Had implemented security system where if any person came at the door it was notified to the home owner via e-mail and twitter then the user could see the person standing at the door using camera from remote location. The image of the person got captured and sent to twitter and e-mail. They stated that user couldn't control the door remotely. They had concluded that this system was useful for preventing unauthorized access. The limitation of this work was that the alert generated was sent to the mail and twitter account but if the user didn't have internet connection on his/her phone, he/she couldn't check the mail and couldn't recognise that any unauthorized person was trying to access the door.[3]
Web cam is a mini video camera that as the capability to feeds are streams its image in real time to, or computer to a computer network. When a image is "captured" by the computer, the video stream is saved, viewed or sent on to other

networks via systems such as internet, and email as an attachment. When sent to a remote location, the video stream may be saved, viewed or sent there. Unlike an IP camera(which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable ,or built into the computer hardware, such as laptops. [4]
Developed to connect any door with internet. In this system user also implemented PIR sensor and camera. PIR sensor used for detecting person and camera used for capturing the video of the person who comes at the door. The video was sent through 3g dongle to authorized person. They had also discussed some advantages of this system. They had concluded use of this system in banks, hospitals etc. But their proposed model didn't provide the facility of sending messages to the authorized people.[5]

III. HARDWARE COMPONENTS

- RASPBERRY PI
- PI CAMERA
- IR SENSOR
- GERTBOARD
- GEAR MOTOR
- SPEAKER

RASPBERRY-PI
Raspberry Pi is a credit-card sized computer manufactured and designed in the United Kingdom by the Raspberry Pi foundation with the intention of teaching basic computer science to school programming and DIY-Do-it Yourself projects.
The Raspberry Pi is manufactured in three board configurations through licensed manufacturing deals with Newark element 14 (Premier Farnell), RS Components and Egoman. These companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.
The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage, with the Model B+ using a Micro SD.
Something had changed the way kids were interacting with computers. A number of problems were identified: majority of curriculums with lessons on using Word and Excel, or writing webpages, the end of the dot-com boom, and the rise of the home PC and games console to replace the Amigas, BBC Micros, Spectrum ZX and Commodore 64 machines that people of an earlier generation learned to program on.

Fig..2: Raspberry Pi model

The major aim behind the Raspberry Pi was to educate people, especially children and teenagers, towards programming and basic hardware interfacing. The open body structure of the Raspberry Pi makes it a machine on which one can learn computer concepts.
Applications of the Raspberry Pi can be given as follows:

- Teaching programming concepts.
- Teaching hardware interfacing.
- Raspberry Pi being very cost effective can be deployed in large numbers in underdeveloped and developing countries like Africa, India, China, Brazil etc. to schools and colleges and to everyone who is interested in computers and

electronics.

- It can be used in robotics for controlling motors, sensors, etc.
- It can be used as a downloading machine replacing desktop computers. It consumes very low power and also can be accessed remotely.
- It can be used as a media centre at home. Any television can be converted to a smart TV with internet capabilities with the Pi.
- It can be used for designing prototypes of DIY projects and certain embedded devices. It becomes very cheap option for testing and evaluation purpose.
- Can be used in creating and handling small servers.
  It can be used for making digital photo frames, tablets etc at home.

TWILIO

Twilio is a developer platform for communications. Software teams use Twilio API to add capabilities like voice, video, and messaging to their applications. This enables businesses to provide the right communication experiences for their customers. Behind Twilio API is a super network, a software layers that connects and optimizes communications network around the world. This is what allow your users to reliably call and message anyone anywhere.

With Twilio, you can reach customer in the ways they prefer, and engage with them effectively using context related to that interaction. As customer become more crucial than ever to the success of business today.

The Twilio Cloud Communication Platform:

Twilio has taken the global telecom network and turned it into cloud communications platform with these capabilities and more.

Voice:

API and SDKs to build calling capabilities within web and mobile apps. Connect to landlines, mobile devices or even Web RTC clients to make calls from apps or power multinational call centers.

Video:

Real-time video infrastructure and SDKs to embed video collaboration and context-sharing into your web or mobile app. A global infrastructure that handles signaling, registration, and media relay.

Messaging:

API and SDKs are send and receive SMS, MMS, and IP messages globally from your web and mobile app, and intelligent delivery features to ensure messages get through.

Authentication:

Two-factor authentication services to strengthen-and even replace-traditional username and password login for websites, SaaS products, and mobile apps

Connectivity:

Global carrier connectivity services made simple and available instantly with no upfront contacts. Local and toll-free phone numbers around the globe along with SIP connectivity made available as APIs.

Monitoring and support:

Console to see every operational detail of your Twilio accounts and applications. Expert help when you need it.

IV. DESIGN AND IMPLEMENTATION

We can observe that it is difficult to control the thief or Criminal, Having a wireless home security system means that you can worry less about a criminal breaking in and taking your items. If a criminal does actually get into your house, he or she will only have seconds before the police are alerted. This means you may not suffer a loss as large as one you may have incurred if you didn't have the system in place. Nothing is more scary than having to fight off or confront a burglar in your home. You may not be equipped to handle this type of situation, so leave criminals to the police, even when you have a wireless home security system. If you come home to an alarm going off, you know there is a chance someone entered your house. You can avoid danger by staying out of your house until the police arrive to investigate.

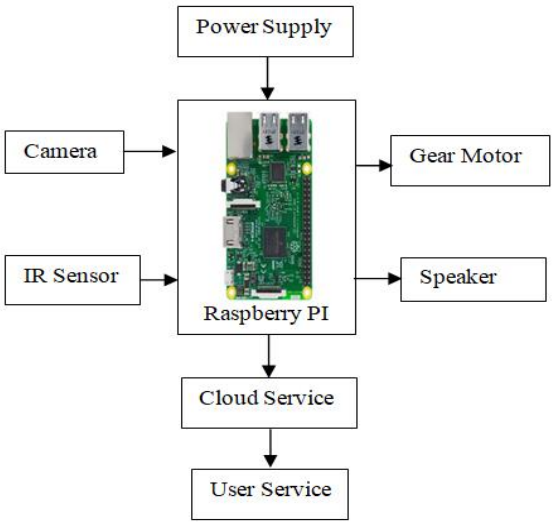

Fig.3: System architecture

This model consists of Raspberry Pi, Pi-Camera, IR sensor, Speaker. Initially we will store some images of all the family members and we will train the images by using opencv software installed in the raspberry pi after training all the images. Camera detect the face in front of it and compares with previously stored data base, door opens automatically if it is valid. IR sensor sense obstruct in front of it and closes the door. When the detected face is not match with database. Video call notification is send to owner through cloud service. Owner is given with the options to click after seeing video. On clicking accept option, they can send message that convert to voice note. Voice note is announced in speaker. On clicking decline option message is send to police station.

V. EXPERIMENTAL RESULTS

The result in the model of real time database are recorded. This database is created by using python. While implementing it produces 10 images of each person. Same way,database should be created for family members.

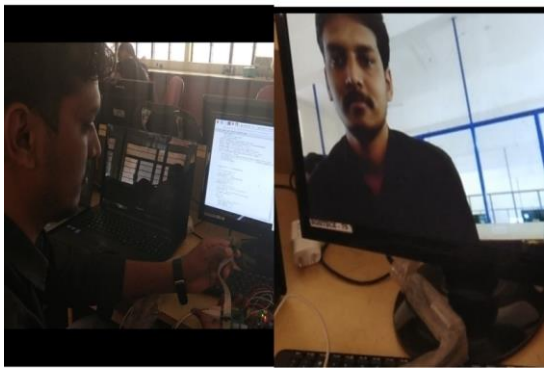

Fig.4: Database Creation

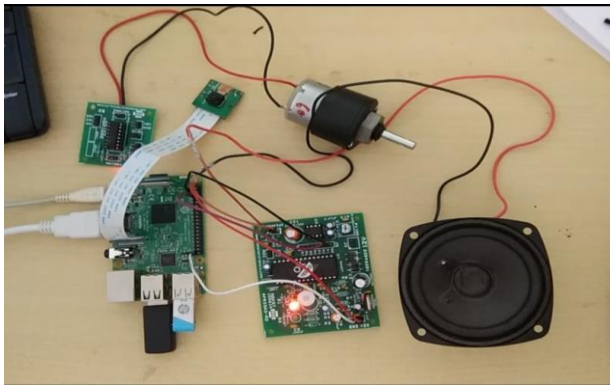

Fig.5: Implementation of facial recognition door access control home security system using raspberry pi

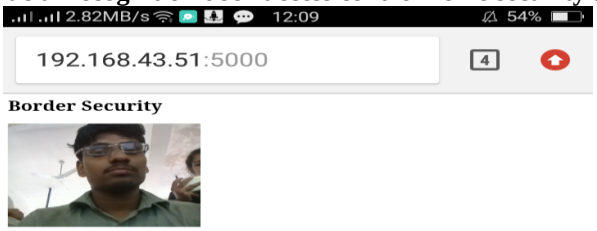

Fig.6: Call from raspberry pi module

Through the Internet user can control the application using his mobile phone or laptop from any part of world. In this, paper we proposed a unique technique that will gives us better result. Which include video calling at the unauthorized person.

Images captured are collected and analyses with database which can be monitored and controlled by IR sensor and motor driver.

Improvise the security than older method.

Process is fast.

Result is accurate.

Database is linked to cloud in case of power failure and data loss.

Also the time after successful detection of face is definite. This is set according to user needs. A real time speaking assistant can be deployed to make the system more user friendly and efficient. If blacklisted person tries to open the door, the system will send video call to the admin using internet.

This system is applicable for

i. Home

ii. Bank

iii. Military Purpose

iv. Agriculture field

VI. CONCLUSION

This paper is based on IOT home security system, enables the user to view the activity from the remote location. Android app facilitates when force entrance is detected. We are trying to enhance computed intelligence by attenuating human interaction;these system achieves efficiency and human comfort. Our current system consist of video call notification, voice alerts at the front door. In future we try to implement security to entire building by using wide range sensors.

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