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HOME SECURITY SYSTEM USING IOT

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***Abstract*–Now a days the technology is increasing rapidly, that leads to an upgradation in home security system.Automation in security sector makes it more authentic. There are many electrical equipment's are available in home which are in necessity of monitoring from a remote area all at a time. In this paper a home security system is proposed along with the face detection technique. A stand alone system through Internet of Things as a network of communication is implemented. Raspberry Pi is used as controlling unit codded in Pyhton language.**

Keywords: The internet of things; Raspberry-Pi;Python Languages

I. INTRODUCTION

The present scenario ensures the safety and security has become an inevitably essential. There is a regressive progress in the security system as the influence of modern technology is reaching its peak. When there is a modern home with minimum human effort, it's well known as modern home. Since there is an advent of wireless and digital technologies, all together it introduces a automated intelligent security system. The automated home security system can be designed with the surveillance camera and multiple sensors, and the use of these sensors will be defining the features of these sensors. Faster data transmission is taking place using the Wi-Fi to security systems which helps the user to control and monitor the system globally.

The new IoT based products and services will grow exponentially in next few years predicted by the analysts. The IoT involves different link layer technologies and a huge range of devices. IoT provides open access to particular set of data. Raspberry Pi is a compact minicomputer which is smart enough to give the good connectivity to the internet as well as boost up the signals. This framework mainly envelopes the home security system from the sensor, networking, integrates real time data and data management. This proposed system has high latency and low cost. The system is highly reliable and consumes very less power in comparison with existing system. The home security system based on some camera connected to the home and the output for this is in real time with the minimum delay in the operation.

The objective of this paper is home security using Raspberry Pi through IoT. Images of authorized person is stored in the data base and when some human encounter the camera, camera will capture the image and compare that with the data base. When the image matches with the data base the name pop us will come of that particular authorized human.

This paper is divided in to six sections. Section I gives the basic idea about the system. Section II discuss about the existing systems. Section III is proposed system. Section IV explains the hardware used in this paper. The experimental setup with the output results been discussed in the Section V & VI respectively. Section VII concludes and section VIII gives the overview for the future work.

II. EXISTING SYSTEM

Gill et al. (2009) explains network enabled digital technology is rapidly introduced in the home automation. For the purpose of home automation this technology introduces new and existing opportunities to increase the connectivity of the devices. The remote-control technology is rapidly synchronizing with the expansion of Internet.

Upadhyay et. Al. (2016) proposed a Home Indoor Positioning System (HIPS), provides location

of mobile devices like smart phones and location based IoT applications. This paper introduces home indoor positioning system using Wi-Fi signals. In proposed system an intelligentmobile robot automatically constructs radio maps for the system.

Shetel and Agarwal (2016) explains in their paper that IoT enables internet connectivity for all kind of devices and physical objects in real time system. The virtualization of this system enables to perform activities without direct physical synchronization between the devices. The IoT enables to manage multiple jobs without any limitation of distances with the help of intelligent devices and high-speed network.

Lee et al. (2017) explains in their paper the web of physical objects is Internet of Thing which contains the embedded technology helping in developing machine to machine or man to machine communication. This paper provides a dynamic data sheet about the city environment parameters taken from the stand-alone system.

Chou et al. (2017) describes in their paper a home automated system has remote controlled operation. This paper discusses about the problem on their installation, finding out the various solutions through different network technologies and trying to optimize the use of these system. The Home Automation System (HAS) requires heterogeneous, an eternal and distributive computing environment's careful study to develop the suitable HAS.

Kamal et al. (2017) explains in their paper how this paper used Raspberry Pi as the network gateway. This paper uses MQTT(Message Queuing Telemetry Transport) protocol for sending and receiving the data. All the sensors used in this paper is been controlled by the web page implementing the Access Control List (ACL) for providing encryption method for the safe transaction of the data's. This paper uses various sensors, wired and wireless, are connected with the Raspberry Pi.

Sahadevan et al. (2017) explains in their paper how the Internet of Things is amazingly impacting the attention of consumers and the enterprise electronics market rapidly implementing in home automation, smart cities, automated industries, etc. To build these applications many power efficient and low cost sensors are available in the market for the developers. The server side is taking care of computational work where as the client side is taking care of sensor actuator work. This requires robust networking infrastructure across the world. This paper proposed an offline online asynchronous communication strategy for Internet of Things application where Message Queuing Telemetry Transport (MQTT) protocol is used. This paper have implemented a portable device system on Intel Galileo which demonstrate the feasibility of such an system without compromising the functionality.

III. PROPOSED SYSTEM

In this paper we are proposing a Home Security System where the input is taken from the live person. In this paper we are using Raspberry pi and Internet of Things. In this project we are making a database for the family and we are taking 30 photos of each of them. As male do have change in appearance in every few days, it will be easy for the algorithm to make sure whether the person is coming is authorized or not. For making this happen we are using haar algorithm in open CV.

The image is taken from the live video streaming and saved into the data base. For saving the memory we are converting each image into the grey scale, using grey scale conversion. Each image has width of 130 pixels and height of 100 pixels for taking the input image form the video streaming. Haar algorithm is basically having a cascaded version of many input for face parts to identify which part is which one. And with the particular calculations of each feature in face we can make a perfect face detection algorithm.

If some unauthorized person is coming near the home the camera will capture their photo and convert it into grey scale and compare with the database. If the image is already stored in database than then the pixels will be more accurate when the output is visible, where as when the input image is not stored in database the pixel will match the least.

Here we are showing how the computer is connected to the RPI. We need Wi-Fi connection for the connectivity of RPI through the system. And the main gateway for connecting the RPI is Internet of Things. IoT helps in the transaction of the data though one device to other, as the RPI is known as the machine to man and machine to machine transaction of the data.

The desktop is not potable and hence we cannot take it everyplace we go, we can share the screen

using same IP address. First we have to connect the desktop with RPI and check the Wi-Fi connection, since the Wi-Fi connection is done, we have to connect our laptop with the same Wi-Fi connection. Now just seeing which IP address the RPI is using we have to give same IP address to the remote desktop connection in laptop and wait for the login screen. Once the login screen appears we have to write the correct credentials and login into the remote desktop, now the screen which we are seeing is as same the one on desktop. Now we can control it from the remote area location.

IV. HARDWARE USED

Raspberry Pi: -

The raspberry pi is small a debit card size single board computer.It has central processing unit with 1.2GH and 64/32-bit quad-core ARM Cortex-A53. It has an internal memory of 1GB. This Raspberry Pi consist of RAM, I/O, CPU/GPU, USB hub, Ethernet, 2x USB, HDMI port, 3.5mm audio jack and a memory card slot. In this paper we are connecting the desktop using HDMI to VGA converter cable. The connection of mouse and keyboard is given from the USB connection. For this project we are using open CV software for the face detection technique. This version of Raspberry Pi is suitable for this project as the specification matches with requirement for this project.

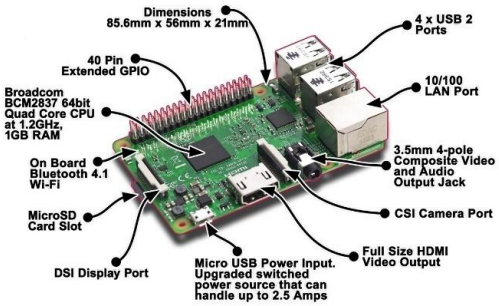

Fig 1.Raspberry Pi

V. EXPERIMENATL SETUP

The experimental setup consists of Raspberry Pi and a desktop connection through HDMI to VGA cable converter. The camera is been connected to the RPI with the USB port. When we run the program the camera automatically captures nearly 30 images according to the clarity of the image taken. There will be a grey scale conversion of those images taken and saved as the data base. As saving the color images will take more space we are doing grey scale conversion. Maximum we are taking six people images for saving into the data base. When the laptop is connected with the RPI using same IP address, the laptop's camera automatically switches on and start making the data base. Since we are using this camera for data base the output can also taken in the same camera and output window will come in the laptop screen. Hence we are using the same IP address we can operate the RPI from desktop as well as laptop, as the share same screen.

The flow of the experiment is given below: -

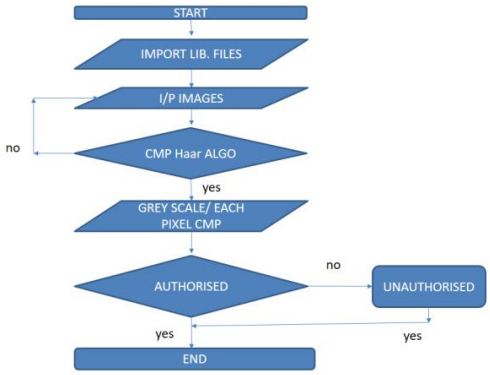

Fig 2. Flow Chart

Algorithm of the given program is given below: -

1. The program will import all the files from library.
2. Giving input image for the comparison with the data base.
3. Grey scale conversion of each image.
4. The image comparison is done in haar algorithm.
5. Decision taking after comparison whether authorized or unauthorized.
6. End of flow.

The haar algorithm is predefined software, where the face detection and rest of the programming's are already available. The one which is in need can be downloaded and with some adjustments it can be calibrated as the user wants it for the use. In this project we have taken 100*130 pixels as the input of the face detection image. The haar algorithm is cascaded form of the inputs, where each and every features is taken and given as the input for their specific portion of the face. In this a face consists of

two eyes, a nose, a mouth, forehead, chin, etc. All these features are taken as the input and calculated distance for it for future use.

VI. OUTPUT RESULTS

The below output Fig 3. is showing the first step of this experiment, where there is a comparison of the already taken still images and comparing them. The below output shows the result comparing from 1000 pixels. The image which is close to the input image we will get the highest pixel value for it. For example in the below output screen when the image 1 is been compared with the image 4 we got the highest pixel value of 888.

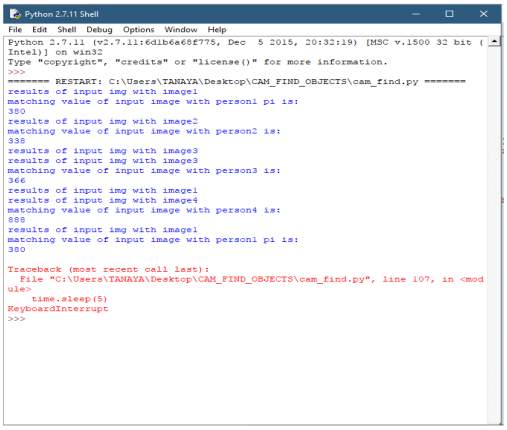

Fig 3. Output Screen for Image Comparison

At this stage of project, we are taking live input images Fig 4 and those images are saved as the database after grey scale conversion. Here according to the program, name is given with the input images.

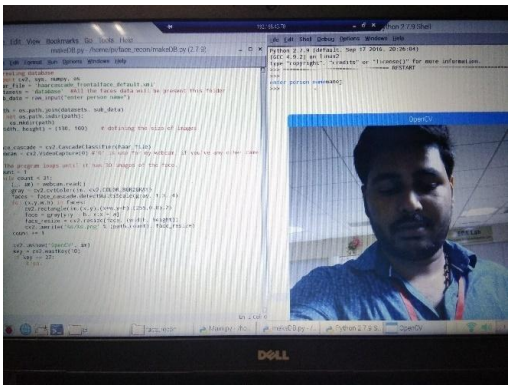

Fig 4. Making Live Database

Fig 5. Shows the training algorithm for identifying the input images stored as the data base. While the training is coming on the top left of the square box, showing it is comparing the live image with the database, where the input images are saved.

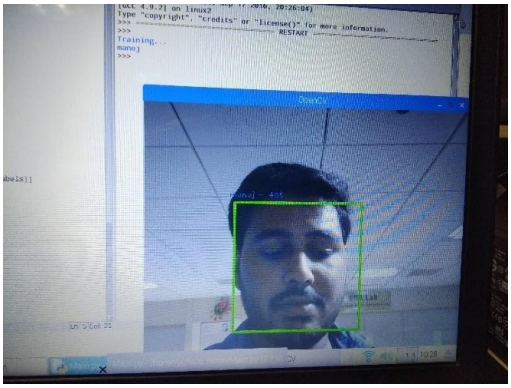

Fig 5. Training Output

VII. CONCLUSION

In this paper, we have designed and developed a wireless Home Security System through Internet of Things module and Raspberry Pi version 3. It is an active system which will show whether the person is authorized for home or unauthorized. It is a friendly user interface system. It is easily installable and can be used anywhere as this is a wireless system. This system is easily operable, low power consumption and low cost. This is developed for remotely controlled and uses the Wi-Fi for transmission of the data's. It is easily installed at any place and can be controlled from any remote area.

VIII. FUTURE WORK

The home security system has a long way to go. As the technologies improving every second, with time we may have many ways for home security with more light protocol and less delay in the output. With upcoming technologies there will be good enhancement in the computer board as well as the communication protocols, which will make it simpler as well as more light and secure.

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