Automation Society Security Task Assistance

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Abstract:- ***This project works on the real life implementation of security systems for the recent times, where COVID-19 is at its peak. So, we took this project which will maintain the security of the society while keeping social distancing norms, the project fully based on contactless process, as well as keeping a track on people leaving and entering the society as well. Also, keeping a track of the temperature of the person entering the society, along with a timestamp.***

I. INTRODUCTION

In recent time of the Novel Coronavirus, also known as COVID-19 has taken a good grasp on people's daily life and effected the normal surviving of human being it has being declared as global pandemic by WHO, and for the same every people are trying to maintain extreme precautions, like social distancing, wearing masks has became a mandatory outfit of our daily life.Along with the frontline workers contributing and risking their life, the technicians and engineer around the globe are making some recent changes in technologies for making life much easier. So,that's why aspiring freshers and new engineers like us are also making some projects which will help contribute in these tough times.

The project we choose for the final year is also based on this which will help people be safe in their homes We are making a contactless as well as automatic system which will keep track of temperature, person in society along with the timestamp for them. To measure the temperature of a particular individual non contact use of a thermometer is our number one priority. This project was a problem statement from Deep Blue Hackathon. The project we are going to design will be cost efficient as well as reliable for security of the society where it will be installed. The system will have different layers of security checks before entering the society.

II. RELATED WORK

[1] Deals with the face recognition of the system that will be integrated in raspberry pi 3 module as [3] paper deals with the multi face detection algorithms and the related process to implement them. Face recognition is the most futuristic phenomenon that can be easily implemented with current tools available. Facial recognition systems have been used in small mobile environments as well, to recognize images and video. [1]A frontal face is best for face recognition accuracy Non-frontal facial images can be reconstructed to frontal face images to increase the accuracy of facial recognition. More and more samples of the non frontal face should be taken for accurate facial recognition. [2]Deals with the non contact thermometer, The use of non-contact thermometers has become the preferred choice for such applications in which social distancing is first priority.They have also come as a solution for the difficulties involved in the temperature measurements of moving targets but it's ideally most accurate when the object is not moving.

III. IMPLEMENTATION SETUP

Fig 1. Is representation of the project in block diagram format.

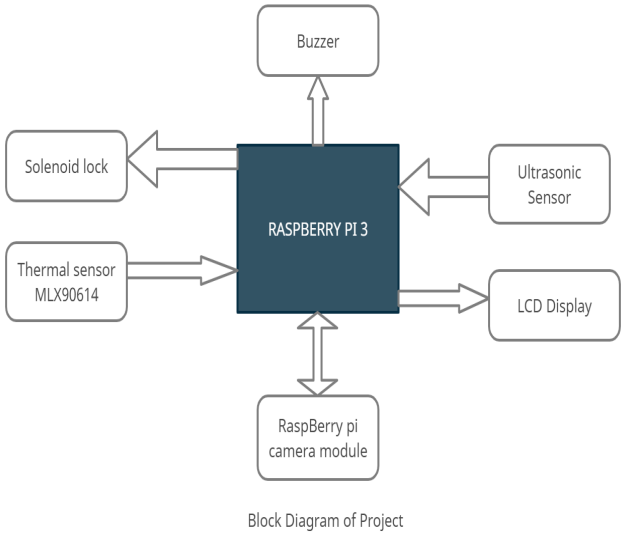

Fig.1 Block Diagram of project

a). HARDWARE REQUIREMENTS

1) *Raspberry pi 3 module* - reason for choosing this is we get high no. of ports and programming can be done using python language which is easy to use.
2) *Ultrasonic sensor* - sensor used for the activation of camera when someone comes into is radius
3) *Raspberry pi camera module* - typically 5mp camera will be used for monitoring and for face recognition feature
4) *Thermal sensor MLX90614* - this is infrared thermal sensor which can effectively used for the contactless measuring of the temperature
5) *Lcd display* - to display the necessary message to the person
6) *Buzzer* - to alert the security on duty that

there's an intruder or some with high temperature is detected.

i. Hardware Design

Here, for this project various hardware components sensors and most importantly a microcontroller board are being used. For board we are using RaspberryPi-3 consists of 1.2 GHz 64-bit quad core ARM Cortex-A5 processor 1GB of RAM and external storage device a micro SDcard for storage ROM for Operating system and other applications as well on-board, it consists of 40 GPIO pins for installing sensors and modules, also Wi-Fi Bluetooth and USB boot capabilities. It also consists o a HDMI and a VGA cable port for connecting the display to the device.

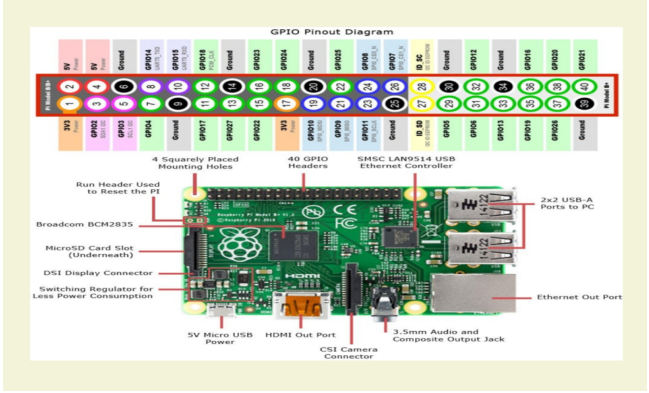

Fig .2 Raspberry pi 3module

At the starting of our system, there will b implementing the HCSR04 ultrasonic distance sensor, i will help trigger the whole system when the senso detects any person in its range of threshold. It range from 2-400 cm of distance and an effective angle o less than 15 degrees.

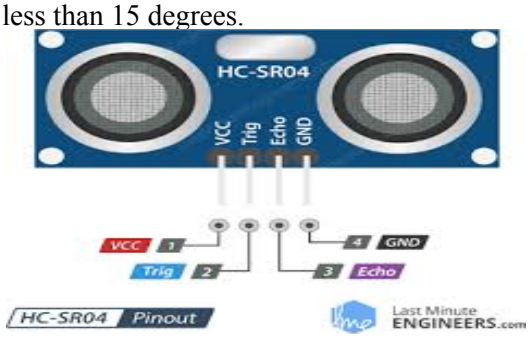

Fig .3 Ultrasonic sensor

After this when the system is on, there will be Raspberry pi camera module for the face detection, i consists of Sony IMX219 5-megapixel sensor, whos resolution is 2592 x 1944 pixels and image area is 3.7 x 2.74 mm, its video quality is 1080p30, 720p60 an 640 × 480p60/90.

Fig. 4 Raspberry pi 3 camera module

Along with the face recognition, there will be a thermal temperature sensor gun which is MLX90614 infrared thermometer sensor.

Fig.4 Infrared temperature sensor

The sensor will measure the temperature and will be set with a threshold of course, if that person's temperature exceeds the threshold, our system will click a picture of that person and will send an alert mail to authorities, to which society authorities will take necessary action, also a database for the same will also be going to maintain by the system.

- Small size, low cost
- Easy to integrate
- Factory calibrated in wide temperature range:
- -40 to +85°C for sensor temperature
- -70 to +380°C for object temperature
- SMBus compatible digital interface
- Customizable PWM output for continuous reading
- High accuracy of 0.5°C over wide temperature range (0 to +50°C for both Ta and To)
- Measurement resolution of 0.02°C
- Simple adaptation for 8 to 16V applications
- Power saving mode
- Automotive grade

If a person has a low temperature then he/she can pass through the check and a timestamp along with his

picture will be saved, if he frequently visits tha society. For the members of the society a separat database of face recognition for security purposes wil be also maintained.
After all this there will be an electrical solenoid locl will also be installed, it will only be opening after thi whole security check is successfully completed by certain person trying to enter the society.

b). SOFTWARE REQUIREMENTS

OPENCV
DATABASE

IV. WORKFLOW

Given below is the flowchart of *Automation Societ Security Task Assistance.*

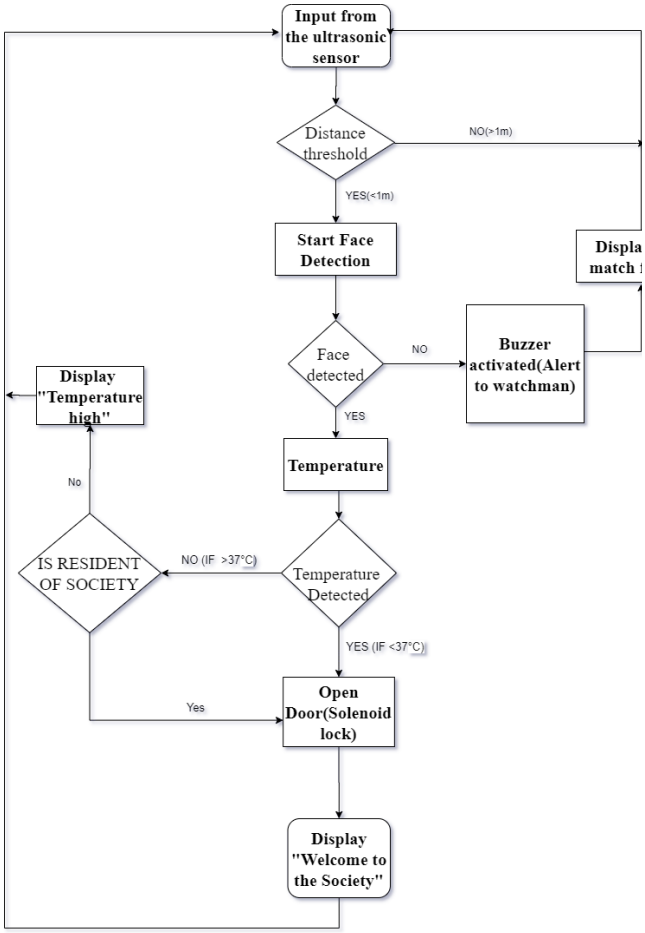

Fig.5 flowchart of the project

When a person comes into the range of the ultrasoni sensor the ultrasonic sensor then gives the high signa to Raspberry pi 3 module that there's an object detecte and later the module sends the command to the camer module to turn on. Then the camera takes the snapsho of the person with the help of face recognition and the compares the image with a database that is created b the user.

There will be two databases: one for the societ member and the other is for the intruders or people who are not part of the society. In the database of society members, member's frontal and side faces will be recorded for the reference purpose of face recognition. Flat no. of the society member will be the strong entity and the name,temperature and sample photos, rfid no. will be the weak attribute. And for the non society member his photo, temperature and time stamp will be uploaded to the database.

Case 1 - when the person is a society member
After the camera takes the photo it will crosscheck in the database whether the person is resident of the society later temperature is noted. If the temperature is less than or equal to 38°C then good to go. But if the temperature is more than 38°Cit will be alerted. Then his information with his current temperature will be sent to the society authorities (chairman, secretary) through email. And the members who have cars should be given RFID tags so that the in and out of the particular car can be kept on track.

Case 2 - when the person is non society member
The camera after taking the snapshot and comparing the photo with the database of society members will come to know that the person is not from society then the photo along with the temperature and timestamp will be stored in the database. If the temperature of the person is greater than 38°C he will not be allowed. And the same alert message will be sent to the society authorities.

i) FACE RECOGNITION

Access control systems are a very important tool to control access of people or personnel to a facility. It is used primarily to put in place a self-managed (non human intervention) system to isolate a secure area versus a non-secure or public area. As compared with other biometrics systems using fingerprint/palmprint and iris, face recognition has distinct advantages because of its non-contact process. Face images can be captured from a distance without touching the person being identified, and the identification does not require interacting with the person.The human face is one of the easiest characteristics, which can be used in biometric security systems to identify a user. Face recognition technology is very popular and it is used more widely because it does not require any kind of physical contact between the users and the device. Camera scans the user's face and matches it to a database for verification. Furthermore, it is easy to install and does not require any expensive hardware. Facial recognition technology is used widely in a variety of security systems such as physical access control or computer user accounts.

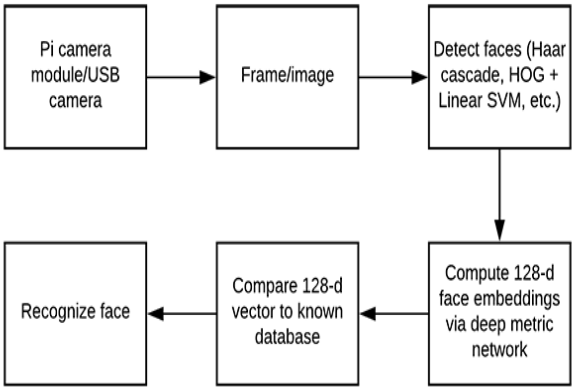

Fig. 6 Faces Recognition Process Using Haar Cascades

We'll be using Haar Cascade classifier which i based on the Haar Wavelet technique to analyz pixels in the image into squares by function. Thi uses "integral image" concepts to compute th "features" detected. Haar Cascades uses th Ada-boost learning algorithm which selects a smal number of important features from a large set t give an efficient result of classifiers then us cascading techniques to detect the face in a image.Haar cascade classifier is based on th Viola-Jones detection algorithm which is traine in given some input faces and non-faces an training a classifier that identifies a face.

ii) SIMPLE MAIL TRANSFER PROTOCOL

We are going to use the SMTP for sending th mails alerts to authorities. SMTP is a set o communication guidelines that allow software t transmit an electronic mail over the internet i called Simple Mail Transfer Protocol.
It is a program used for sending messages to othe computer users based on e-mail addresses.

It provides a mail exchange between users on th same or different computers, and it also supports:

- It can send a single message to one o more recipients.
- Sending message can include text, voice video or graphics.
- It can also send the messages o networks outside the internet.

iii) DATABASE

SQLite is a software library that provides a relational database management system. The lite in SQLite means lightweight in terms of setup, database administration, and required resources.

SQLite has the following noticeable features:

- Serverless
- Self-Contained
- Zero-configuration

V) CONCLUSION

The project will not only help in keeping temperature records of the society members and non members, but it will also provide security to the society by keeping the record of temperature, photo image and timestamp of the non members of the society.With use of basic sensors and sophisticated pocket size computer (Raspberry pi) a compact device for security purpose is possible, which can have high chances of advanced modification depending upon the circumstances.

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