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Human Intrusion Detection & Alerting System using Raspberry Pi

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ABSTRACT: Recently, the number of break-in bears has climbed in the recent past, creating a very poor mental or physical environment for human beings to live in. The subject of house safety in the present day is troublesome. The established and existing intruder detection system that we use right now is quite expensive, and there's a chance that could be manipulated and resulting in fake alarms. This question is answered by creating a human intrusion detection system that helps in appropriately detecting a person who trespasses in our perimeter by observing changes created by invaders using Python. Their images are captured and then evaluated using specific techniques, which are transformed to grayscale and then processed to detect an individual. In this case, Python assists us in achieving the needed functionality. The video is continuously transcribed and converted into pictures at the site of operation. The images are treated and the information will be delivered to the server. The intruder's status as well as the date and event, are shown by the server. When the trespasser is there in our place, the device takes picture of the intruder's data and matches it with the system's data. If the data match, processing stops. Otherwise, the system will send the proprietor via SMS or email when a thief is identified and send the picture to the owner. Through an application, a buzzer can be activated.

KEYWORDS: Home Security, Intrusion Detection, Raspberry Pi, SMS alert, face recognition, Mail alerting and Surveillance.

1. INTRODUCTION

Trespassing, the act of someone you do not know and who invades your place beyond your acknowledgment, is increasing. A human intruder detection system detects and denies unauthorized access to a building or protected area for the protection of personnel and property. The main application of surveillance systems is to protect from robbery, destruction, or protection from a robber in industrial, commercial, residential, and military properties. The areas in which we cannot fully depend on human presence, for those cases it contributes a complete intrusion detection and security.

In the list of danger some threats, theft, and burglary are among the top 3 in the present world. Home surveillance systems have repeatedly failed to protect homes and places. In a survey which was done by the FBI, the absence of owners of the house or property are leading to intrusion problems. the survey states that in a time of 20 seconds a house is affected by the burglar, and only 10% are getting ended up in prison, the rest are still in danger of robbery. The systems like home automation, alarm detection is the solution for it, but there is still a chance for these types of systems to trigger false alarms. These false alarms can be reduced by distinguishing humans and pets, but the systems available for that detection are economically high and not that effective also in performance-wise. the proposed system helps to decline high maintenance costs and we can also recognize the person or robber. in the system designed we use a camera that helps in continuous recording and it will be placed out of the room. The message is retrieved on the server and provides information about the time and date the intruder entered.

II. LITERATURE SURVEY

The architecture of existing home surveillance systems usually controls some particular place and does not provide physical control of the housing itself. Under current conditions, it is a habit to leave the house alone. Therefore, most people choose a home guarding CCTV as the safest possible way for safeguarding respective houses. Every object generates heat in the way of infrared rays that are unviewable for an individual's eye. However, electronic sensors [1] [2] can be used for recording.

PIR is a pyroelectric infrared sensor or passive infrared sensor. And consists of an ultra-electric sensor that can detect downward thermal copies. All living organisms emit a small amount of radiation. The hotter the body, the more radiation it emits. The infrared sensor usually contains two infrared sensors with opposite polarities and is enclosed in a sealed metal shell with a transparent infrared window. When the sensor is in an inactive state, the transparent infrared window has the same amount of infrared radiation detected by the two slots. When high-temperature objects of humans and animals enter the detection capacity of the PIR, the produced gain of the PIR sensor will change positively sensor. [3] [4]

Part of the house security is one of our jobs, but even if we take care of the house we are responsible for, intruders can enter the house. The most advanced research in the area of international smart buildings. To monitor home security in real-time, an intelligent remote home security monitoring system based on ZigBee and GSM/network technology has been developed. GPRS. Unusual warning messages and images may appear. send. Through the system, MMS and SMS. Receive remote commands for remote monitoring of household appliances. Home security responsibility will depend on smart remote control through the implementation of various sensors and increasing reliability. Describes the hardware, software, and system performance in detail. Experimental results show that the system can provide high availability and stability for home security intelligent remote monitoring [5] [6]

Arduino is an open source electronics board or minicomputer. Arduino is designed to make electronic more accessible to artists, hobbyists and anyone interested in creating interactive objects or environments. The first arduino was introduced in 2005, which is aimed to provide an inexpensive and easy way to professionals, to create devices, or different attractive projects. [14,15] Arduino boards are in preassembled form. For programming arduino board, arduino integrated development environment (IDE) is used, which supports for C and C++ programming languages. An arduino board consists of an Atmel 8, 16, 32 bit AVR controller. An important aspect of the arduino is its standard connectors, which lets users connect arduino board to variety of modules known as shields [7].

Hampapur et al [8,9] gives an overview of what aspects are important for large-scale video surveillance systems. The challenges that are pointed out are: combining multiple sources of information, automatic event detection and deploying systems with a large number of cameras (cost-wise). The article also shows some basic techniques like object detection, [10-13] 2-D and 3-D object tracking, object classification and object structure analysis (specifically: head detection). Moreover, the structure of two designed systems are presented: Face cataloger, which aims at doing high-resolution face detection using 3-D head detection and a pan tilt zoom (PTZ) camera at the entrance of a restricted room. A system for long-term monitoring, which saves the surveillance video fragments in a database in such a way that it can be queried later on. During this saving process, the video fragments are analyzed by the Smart Surveillance Engine which detects, tracks and classifies the objects. Examples of queries: "give all vehicles that drove through this particular part of the camera sight" and "show all vehicles that drove to the east".

III. EXISTING SYSTEM

There are many intruder alarm systems in existence today for supervision and safety systems. They require human and individual interference for finding intruders and also require more efforts for installation, due to this we may have some opportunity for improper alarms. The thief is identified with a recordable Pi camera which is placed in that area, pictures are saved into the sd card. The system requires a large investment to install, store, and monitor the movements. Although the incidents or movements are low, the video must be watched by the proprietor and then should be deleted. It results in

wasted man-hours as you have to see the entire clip. It can cause missing or losing some important details that are needed for the breakdown of the incident that took place.

IV.PROPOSED SYSTEM

In the proposed system, the camera records a continuous video and helps to spot the intruder. It will distinguish the intruder from roaming things by the facial identification libraries from python. if an individual is spotted, images present in the database are used for comparison of the captured photo, to eradicate the wrong type of alarms. the owner will receive the image of the individual and a message through email if the image taken for comparison is not matched with images on the database. use the application to give recognition if it is an intruder. as soon as you do this, the alarm will be generated.

Working Principle: -

The setup has a Raspberry Pi connected to a Pi camera, which can record video continuously and can also take snapshots of intruders. It works as how the regular CCTV works which are connected to PC. It shows the status of the intruder. It uses the Python language packages for the functioning. The client and constantly monitor the trespasser. We can see cameras will frequently monitor places and record video. The recorded video records images of each period. The resulting image will be converted to an RGB image. Perform additional processing on these images to check for intruders. In the presence of an intruder, the system will distinguish between pets and people. If the attacker is a pet or animal, the functioning will stop. Otherwise, the pictures will be sent to the system database. The system shows the position of the trespasser and also the date and timestamp. Compare the refined picture with the system's images. When the picture of the character is similar or the same as the picture in the system memory, the processing ends. Otherwise, users will see the presence of the intruder and the email or message with the photo of the intruder in the developed application. The owner can regulate the device through the application. The sirens sounded from anywhere to remind people.

V.BLOCK DIAGRAM

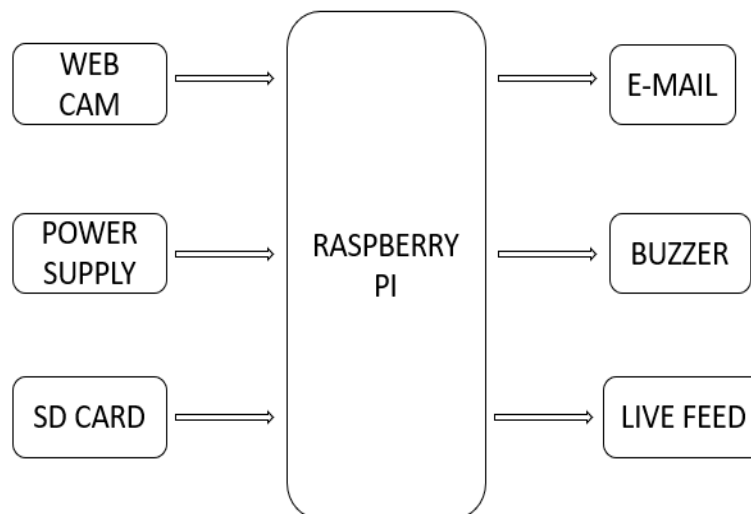


Fig.1 Block diagram

VIFLOW CHART

At the start of the procedure, we store photographs of people who belong to that house, office, or company. After that, it starts recording a video and clicks pictures whenever there is a human. The encoding is written on the faces of the people in the photographs. Those codes are inspected with the codes of the image in the system. If those pictures match, the system concludes that he/she is not a trespasser. This procedure goes on until all the picture in the system has been thoroughly scanned. Although the picture doesn't match, he/she will be a trespasser. This entire mechanism of making face encodings is made using Python.

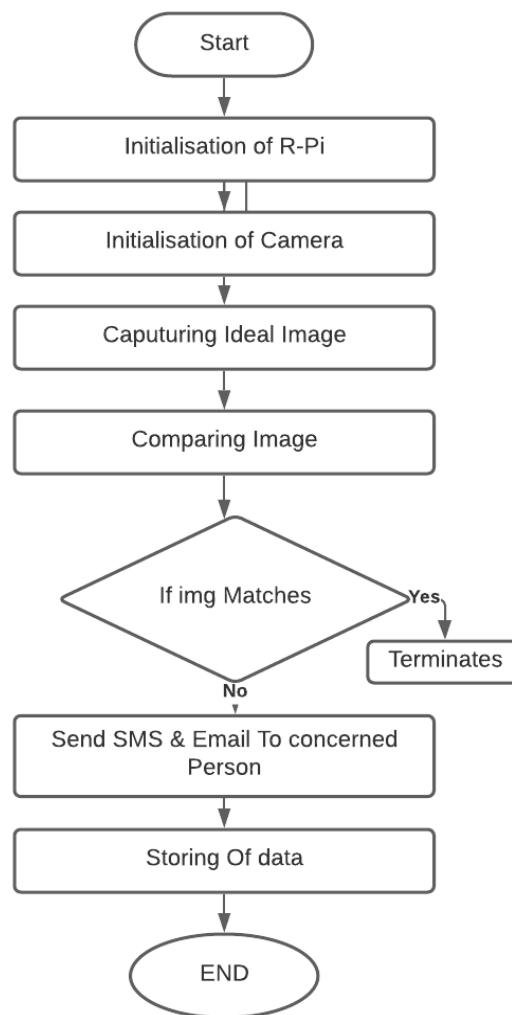


Fig. 2 Flow Chart

VILRESULTS

After installation and setting up the kit, then you enter the instructions that are needed for capturing the footage using the camera. Whenever there is a person in the footage, the system matches the images stored in the system and the person in the footage. If he is an outsider an email will be mailed to the proprietor of that land with the person's image.



Fig. 3 Project Overview.

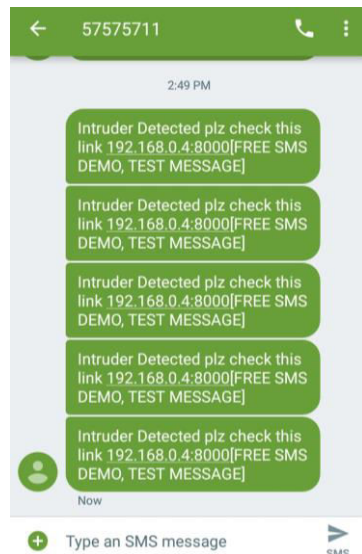


Fig. 4 SMS alert about Intruder

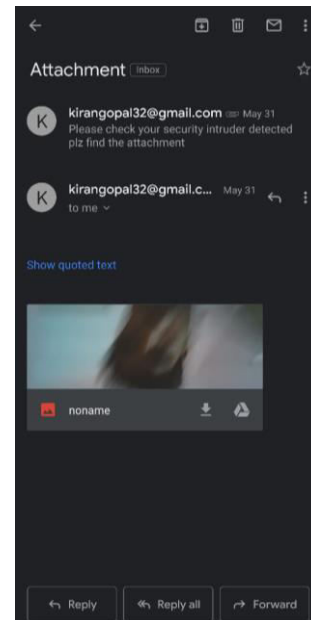


Fig.5 Intruder's picture through email

A notification will be mailed, which contains a command that can start the alarm remotely from the owner's place. SMS can also be sent, which will be more helpful if there is no internet connectivity.

VIII.CONCLUSION

Typically speaking, the public nowadays install surveillance Cameras considering their homes and business places would be safer, but some drawbacks such as it cannot notify the owner about the burglary as well as the CCTV will be unable record some videos as proofs for further reference. To rectify this unnecessary thing or drawbacks of the current utilized system, An alternative like this is proposed by us. Here we utilize the modern technology and advanced security system based on Raspberry Pi and programmed with Python and built to prevent theft. Nowadays we always continuously monitor our homes with the help of our Human Intruder detection system. It provides the proofs in form of images and video can also be retrieved. It is a very real-time application and performs effectively. It warns the proprietor of the place instantly. It doesn't need a dedicated PC as we see in the CCTV camera. This can be implemented anywhere where security is their utmost priority.

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