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Technology to Effectively Manage Home Security Using OpenCV with Raspberry PI 3

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ABSTRACT:

In this project to open the door and closing the door was in the control of the owner and he can do that only from the web page after he get confirmation about the approval of the person who want to entry into the house by getting his image by mail from the Raspberry Pi 3 processor. This was done by the PIR sensor, which senses the moment of the people at the door and trigger the processor to take the photo by using the USB web camera. Whenever the PIR sensor detects then the owner of the house will get the instant alert message to his mobile, then he will check his mail for the (verifying someone's identity). The RF transmitter sends the signal to the receiver and vibrates the motor in the hand of the blind person in the home to let him know of the entry of the new person in the home.

INTRODUCTION:

The demands on video (secretly recording/watching people) systems are quickly increasing in the present day. One of the first things people will want to know about their (secretly recording/watching people) system is whether or not they have the ability to connect to it over the internet for remote viewing. In the past, security systems had to be watched/supervised by a guard who was locked away in a room all day watching the monitors to make sure that nothing would happen. The other option was to come back and review the video but damage could have happened. Therefore, (people who work to find information) and scientists had to come up with ways of overcoming that and so improving security at large.

Commercial spaces, universities, hospitals, casinos and warehouses require video (recording on a camera or computer) systems that have the ability to alert and record beside live video streaming of the intruder. The (times of moving ahead or up) in video (secretly recording/watching people) technology have made it possible to view your remote security camera from any internet-enabled PC or smart phone from anywhere in the word. This includes the use of CCTV (DVRs) systems and IP cameras. This technology is awesome but its cost of putting into use has proven to be an obstacle especially for a small home computer program.

Therefore, new new and interesting technology revolves around (ability to be easily paid for) of a product in terms of its cost and ease of putting into use. The Raspberry Pi crosses both judging requirements in that it is a cheap, effective computer which can be connected/communicated with other modules to (understand/make real/achieve) systems with huge ability to do things. A lot can be done on it ranging from motor speed control, automatic lighting, VPN server, security system etc. [1] [2]. The last thing just mentioned is of great interest in this project. The Raspberry Pi microcomputer is capable of starting a cost effective security system for different computer programs. This new arising technology related to security provides a comfortable and safe place for small homes. The different goals of the system are to detect an intruder, take an image of the intruder and also bring across an alert message to the facility owner.

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In doing so it this way allows for remote watching/supervising of homes from anywhere in the world. The system to be designed cannot completely replace the role of CCTV and IP video cameras (for recording people) especially in large commercial set ups but will make it easy for poor home owners to watch (for changes, unusual things, etc.) their homes at a very low-priced price. In addition to the fact that the Raspberry Pi board is cheap, the camera to be used in this case is (compared to other things) cheap compared to the others. The whole security system circuitry is simple and easy to put into use.

Image processing is a term which points to/shows the processing on image or video frame which is taken as an input and the result set of processing is may be a set of related limits/guidelines of an image. The purpose of image processing is seeing (in your mind) which is to watch/ notice/ celebrate/ obey the objects that are not visible. Analysis of human movement is one of the latest and popular research topics in digital image processing. In which the movement of human is the important part of human detection and motion analysis, the aim is to detect the movements of human from the background image in a video sequence. It also includes detection and watching and following [2]. The process of object 2 watching and following is separating/dividing an area of interest from a video frames and keeping track of its movement and position.

OBJECTIVE OF THE PROJECT:

The goal of the project is to help the user with a simple and customized technology to effectively manage his/her visitors flowing to the (reasons for doing or saying something).

AIM OF THE PROJECT:

This project aims at controlling the doorbell in a smart way and to suggest the user with a picture and text message of the visitor at the door step.

This project also includes the 'Eye-Secure' part which makes a blind person's life style more secured and comfortable without care takers.

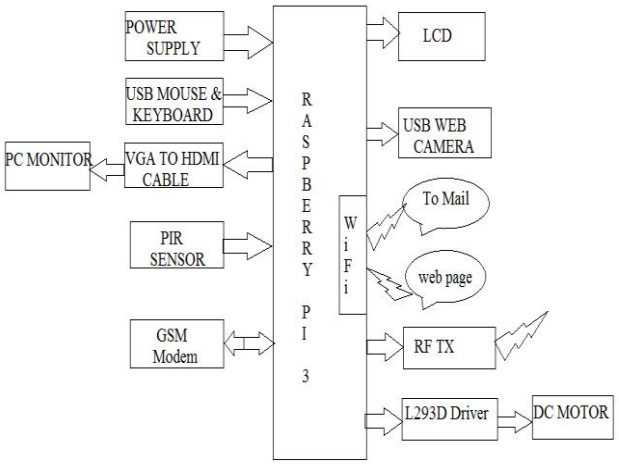
EXISTING SYSTEM:

In the existing system, there is no chance to know the information by the older (person) people already existed in the home about the entry of the new people. So they were facing the problems. And in the earlier system we get used the MSP430 microcontroller to put into use the project. This controller does not have the internal Wi-Fi module so that we need to add the external one to communication over the web page and to the mail. To avoid these (bad results or effects) we are developing the project by using the Raspberry Pi 3 processor.

PROPOSED SYSTEM:

In the proposed system, we are using the Raspberry Pi 3 microprocessor to put into use the project. It has the in-built Wi-Fi module so that there is no need of the external one and we are using RF technology to bring across the information to the person in the house by vibrating the motor in the hand stick. Whenever the PIR sensor detects then the owner of the house will get the instant alert message to his mobile, then he will check his mail for the (verifying someone's identity).

BLOCK DIAGRAM:



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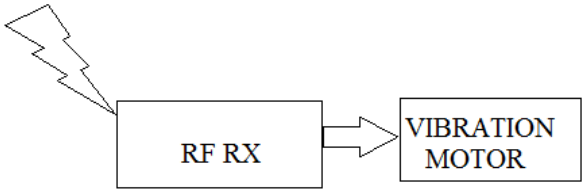

Fig 2.1: Block diagram of proposed system

Now/recently, people want one only thing that is to make them feel safe and secure. The most commonly used security system is the CCTV (closed circuit Television). The cost of (putting into) use of CCTV differs/changes depending upon the size and use of the system. It is usually installed in hospitals, malls, parking lots etc... However, with the help of CCTV one can monitor the area 24/7, or the video if stored in a location can be retrieved when needed/demanded. Although, it can be used to discourage crime and allows the people in charge to identify and solve a crime, it doesn't detect neither recognize the person who is involved. We have put into use a system which provides both face detection and face recognition with the help of Raspberry pi 3 which is a credit card sized minicomputer and a Pi camera which is made especially for the raspberry pi 3.

So, when dealing with the (happening or viewable immediately, without any delay) image processing, Open source computer vision (openCV) software, a powerful library of image processing tools, is a good choice. With the help of a smart (secretly recording/watching people) system, we have (accomplished or gained with effort) a system that can record the event, detect and recognize the person. A GSM module is used to send a message stating whether the person is an intruder or a visitor. If it is a visitor, then a command is sent by the user to (do/complete) some operation like- open the door (any type of automation is used) however if it is a stranger an alarm is created to point to/show that there is an intruder.

RASPBERRY PI 3:

The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. We want to see it being used by kids all over the world to learn how computers work, how to control/move around/mislead the electronic world around them, and how to program.

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore figuring out/calculating, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from (looking at web sites on) the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide organized row of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

There are now four Raspberry Pi models. They are the Model A, the Model B, the Model B+ and the Figure out/calculate Module. All models use the same CPU, the BCM2836, but other hardware features differ.

The Model B+

Released in July 2014, the Model B+ is a updated rewriting/redoing of the Model B. It increases the number of USB ports to 4 and the number of pins on the GPIO header to 40. Also, it has improved power circuitry which allows higher powered USB devices to

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be attached and now hot plugged. The full size (made up of different things) video connector has been removed and the ability to do things moved to the 3.5mm audio/video jack. The full size SD card slot has also been replaced with a much more strong and healthy micro SD slot.

The following list details some of the improvements over the Model B.
-Current monitors on the USB ports mean the B+ now supports hot plugging.
-Current limiter on the 5V for HDMI means HDMI cable powered VGA converters will now all work
-14 more GPIO pins
-EEPROM readout support for the new HAT (act of something getting bigger, wider, etc.) boards
-Higher drive ability (to hold or do something) for analog sound out, from a separate (device that controls something/group of people that ensures rules are followed), which means a better sound DAC quality.
-No more back powering problems, due to the USB current limiters which also stop back flow, together with the "ideal power diode"
-(made up of different things) output moved to 3.5mm jack
-Connectors now moved to two sides of the board rather than the four of the original device.
-Ethernet LED's moved to the Ethernet connector
-4 squarely positioned mounting holes for more stiff/not flexible attachment to cases etc.
The power circuit changes also means a reduction in power needed things of between 0.5W and 1W.

General Purpose I/O (GPIO):

General Purpose Input/Output pins on the Raspberry Pi This page talks more about/adds to the technical features of the GPIO pins available on BCM2836 in general. For usage examples, see the GPIO Usage section. When reading this page, reference should be made to the BCM2836 ARM (things that attach to computers) Datasheet.

GPIO pins can be configured as either general-purpose input, general-purpose output or as one of up to 6 special alternate settings, the functions of which are pin-dependant.

Power-On States:

All GPIOs go back to general-purpose inputs on power-on reset. The default pull states are also applied, which are described/explained in the alternate function table in the ARM (things that attach to computers) datasheet. Most GPIOs have a default pull applied.

Interrupts:

Each GPIO pin, when configured as a general-purpose input, can be configured as an interrupt source to the ARM. (more than two, but not a lot of) interrupt generation sources are configurable:
-Level-sensitive (high/low)
-Rising/falling edge
-(not happening at the same time) rising/falling edge
Level interrupts maintain the interrupt status until the level has been cleared by system software (e.g. by servicing the attached (off to the side) creating the interrupt).

The (usual/ commonly and regular/ healthy) rising/falling edge detection has a small amount of (making two or more things look the same or happen at the same time) built into the detection. At the system clock frequency, the pin is sampled with the judging requirements for generation of an interrupt being a stable change (from one thing to another) within a 3-cycle window, (in other words) a record of "1 0 0" or "0 1 1". (not happening at the same time) detection bypasses this (making two or more things look the same or happen at the same time) to enable the detection of very narrow events.

Different Functions:

Almost all of the GPIO pins have different functions. (off to the side) blocks internal to BCM2836 can be selected to appear on one or more of a set of GPIO

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pins, for example the I2C kisses can be configured to at least 3 separate locations. Pad control, such as drive strength or Schmitt filtering, still applies when the pin is configured as an alternate function.

The block diagram for an individual GPIO pin is given below:

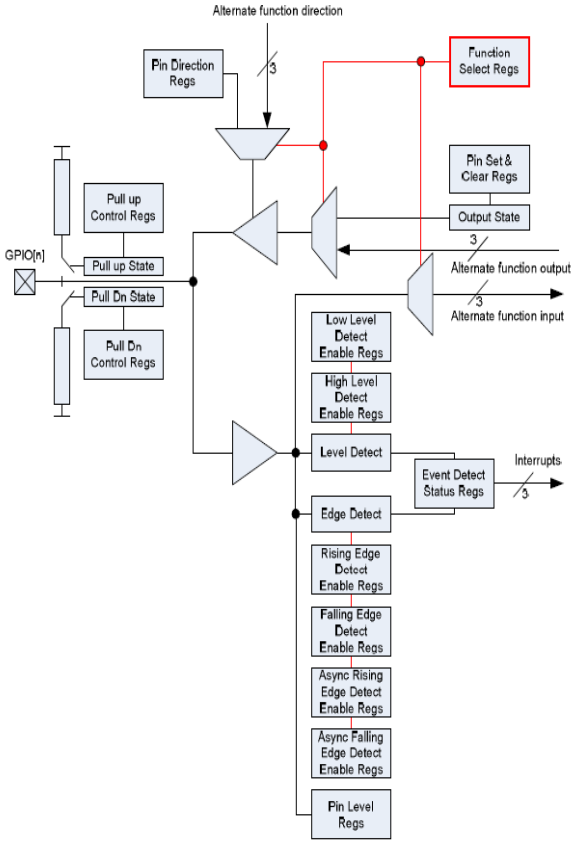

Fig 2.9: GPIO block diagram

Raspberry Pi based Security Systems for Homes:

(more than two, but not a lot of) judging requirements have been used to select a security system needed/demanded to safeguard a facility. The chief among all these has been the cost of (putting into) use of such a system. The Raspberry Pi is also a very (able to do many different things well) device whose ability to do things is not limited. It can be extended from being only a security device to harden (chemically) ature control device, automatic lighting and (related to being a substitute for someone or something) server.

The following reasons explain the need to have your home security system based on Raspberry Pi:
An IP Camera system has the ability to distribute upset messages over the internet as well as the Raspberry Pi based security system. However, the cost of an IP Camera makes it not easily low-priced to small home owners.(insert cost plus citation) This way they can be sent out and used in large industrial set ups, defence forces, police departments etc. Arduino microcontroller based security system can be (compared to other things) cheaper to put into use as compared to Raspberry Pi based system but its memory ability (to hold or do something) makes/gives it more ineffective especially when trying to connect/communicate with other modules e.g. camera, monitors, motion sensors, mouse and keyboard.

Raspberry Pi has an extendable SD card storage and can be expanded to suit the needs of an individual. More than that, Arduino 9 microcontroller needs/demands a GSM modem to enable it move (from one place to another) information through the internet. The Raspberry Pi has a port to connect it to the internet. A CCTV (secretly recording/watching people) system is expensive to buy and install compared to the system in question. It needs/demands a DVR system to connect it to the data networks through TNP/IP. A DVR on its own is very expensive.

Because of this such a system may not be afforded by poor home owners.

RESULTS:

The (putting into) use of (understanding/achieving a goal) of "Electronic EYE for Home security using OpenCV with Raspberry pi 3" is done successfully.

The communication is properly done without any interference between different modules in the design.

Design is done to meet all the (detailed descriptions of exactly what is required) and needed things.

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PROPOSED SYSTEM RESULTS:

The main aim of this project is to provide the security to the home from the entry of the strangers and intimate the older (person) people in the house (related to/looking at/thinking about) the entry of the any person into the house. The project was done by using the Raspberry Pi 3 processor.

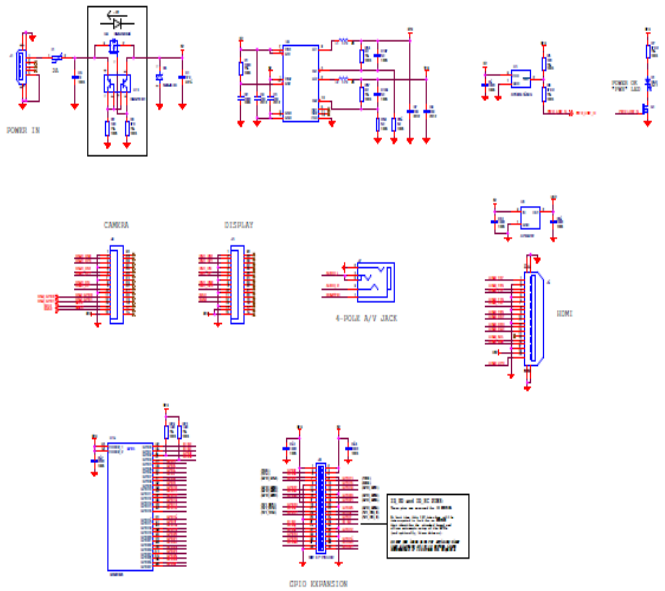

Fig 5.1: Schematic diagram of proposed system

Fig 5.2: Proposed transmitter

To PIR sensor was used to detect the human moments at the entrance door of the house. Whenever the PIR sensor detects any person moment, then it will send the signal to the Raspberry Pi 3 processor.

Then the Pi 3 processor can trigger the USB camera to take the snapshot of that person and sent that to the Pi3. The Pi 3 processor in turn sends that photo to the predefined email ID given in the program. Then the user can get alert mail and if he wants to open the door of the house then the user can login into the predefined web page and send a predefined command button from that web page. Then the command will get by the processor and open the door by rotating the DC motor by the L293 motor driver. Whenever any person enters into the house then the RF transmitter connected to the Raspberry Pi 3 processor will get the high logic from the Pi and send that signal to the RF receiver side, which is placed at the hand stick of the older (person)/ blind person exist in the house. The RF Receiver will get that data and trigger the vibration motor placed to the stick. Then the older person can get the information about the entry of the person into the house.

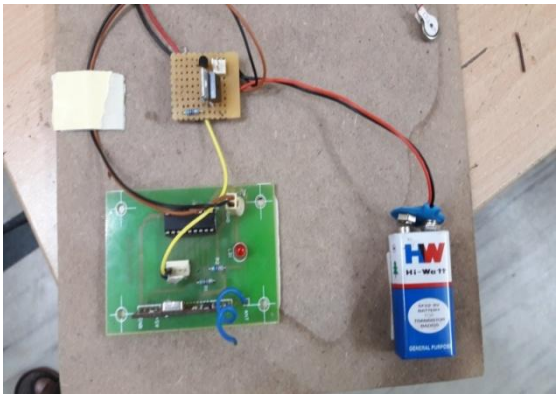

Fig 5.3: Proposed receiver

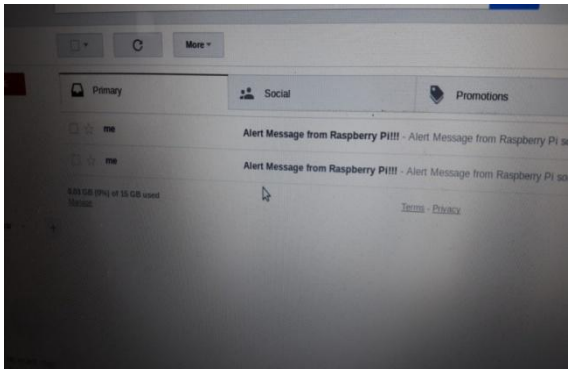

Fig 5.4: Alert message from raspberry pi

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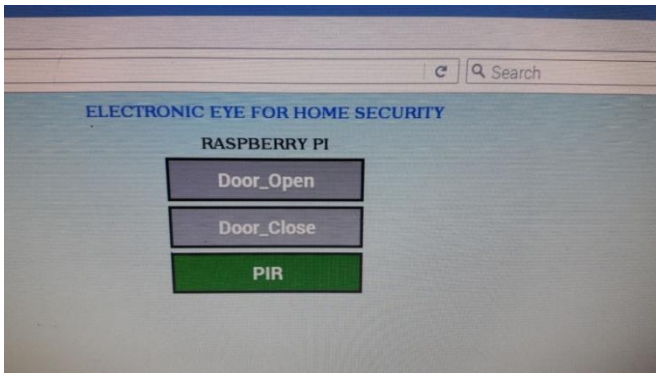

Fig 5.5: Alert message when Human (PIR) sensor detected

ADVANTAGES AND APPLICATIONS:

ADVANTAGES:

1. This system can monitor remote area Cash machine machines from theft.
2. It can avoid fire (sudden unplanned bad events/crashes)
3. We can see status of Cash machine machine through web server
4. It can (record by a camera or computer) image of person who is trying to theft Cash machine machine
5. It can spray some kind of GASs on person who trying to theft Cash machine machine

APPLICATIONS:

1. Cash machine Applications
2. Security applications
3. All security applications

CONCLUSION:

So, we have developed electronic eye which is able to provide both face detection and alarm system, rather than using different modules for (doing/completing) the (pertaining to each person or thing) operations. Also the camera system is compact and can be put into use with low cost. The used face detection set of computer instructions (Haar like waterfall classifier) is very effective, with a (quality of being very close to the truth or true number) of 88.9 % which can be increased further by effectively improving the lighting up/education of the area. However, this system is connected with the help of Ethernet cable to the laptop to communicate with the raspberry pi. This can be overcome by making the system wireless.

FUTURE SCOPE:

In future we can embed the face recognition technology, by which we can recognize the face of the person at the door by compare the face of his with the already existed (computer file full of information) and if it was compared then the door will be opened automatically without any command from the owner of the house.

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