Security System using Raspberry PI & PI Camera

Ashwini Mankal

Department of Computer Science & Engineering

Guru Nanak Dev Engineering College, Bidar, Karnataka, India

Abstract— In recent days the security represents the most significant part of the human being life. As of now the cost is the greatest factor. This system is very helpful for reducing the cost of examine the movement from outside. With the existing surveillance techniques, CCTV is the most commonly used one. Although it has its own limitations. It is a passive monitoring device and it needs continuous human intervention for monitoring. The investigation is a little bit hectic thing since all the previously recorded videos need to be watched manually. Moreover files can be corrupted very easily and this technique is too costly. These limitations lead to the development of active security system. The main goal of this paper is to protect Home, workplace, organization, factories by monitoring peoples. In this paper, if any person wants to come inside, press the PUSH BUTTON after that Raspberry Pi sensor sends command to pi camera to capture the picture & save it. Then gate is opened for while & later it gets closed.

Keywords: Raspberry PI, WSN, LED

I. INTRODUCTION

In the present situation, ensuring safety and security has become an inevitable essentiality. Since it is well known that influence of modern technology has reached its peak, demand for security systems are going up progressively. Modern home needs intelligent systems with minimum human effort. With the advent of digital and wireless technologies, automated security systems becomes more intelligent. Surveillance camera helps the user to get a remote view of his home. Surveillance is the monitoring of the location, behavior or activities for the purpose of directing, managing and detecting intrusion. IOT refers to system of interrelated computing devices and it plays a major role in surveillance. Android phone helps user to view the location from the remote area without human intervention.

Starting from small houses to huge industries, surveillance plays very vital role to fulfill our safety aspects as Burglary and theft have always been a problem. In big industries personal security means monitoring the people's changing information like activities, behavior for the purpose of protecting, managing and influencing confidential details. Surveillance means watching over from a distance by means of electronic equipment such as CCTV cameras but it is costly for normal residents to set up such kind of system and also it does not inform the user immediately when the burglary happens.

A. Components Required:

Raspberry Pi, DC Motor ,Pi camera , IC L293D, LCD, Connecting wires ,Buzzer, LED , Resistor ,Capacitor, Bread Board, Push Button, , Power supply.

II. PROBLEM STATEMENT

Among the existing surveillance techniques, CCTV is the most commonly used one. But it has its own limitations. It is a passive monitoring device and it needs continuous human intervention for monitoring. The investigation is a little bit hectic thing since all the previously recorded videos need to be watched manually. Moreover files can be corrupted very easily and this technique is costly too. These limitations lead to the development of active surveillance system. Several researchers have come up with the idea of active surveillance systems in various papers. Most of the papers utilize the advantage of Wireless Sensor Networks (WSN) for surveillance. Since the sensor nodes being wireless, they can be placed anywhere inside the building, thus it achieves portability in deployment.

III. WORKING

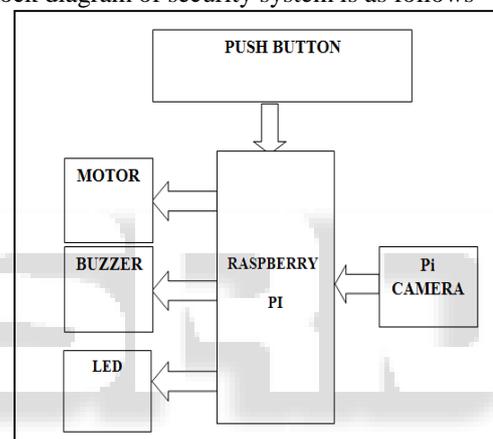The block diagram of security system is as follows

Fig. 1: Block Diagram of Security System

This system consists of PUSH BUTTON, MOTOR, BUZZER, LED, Raspberry Pi, Pi camera. Working of this system is very simple. If anyone want to enter inside the home have to press the PUSH BUTTON. After pressing the PUSH BUTTON sensor Respberry Pi sends command to pi camera to click the picture & save it for future reorganization. Then gate is opened for while and after that gate is closed again. In this system Buzzer is used to generate sound when Button is pushed & LED is used for indication that Raspberry Pi is ready to accept PUSH BUTTON is press that means LED is ON. System is ready for Operation.

Here the photos of visitors are stored in Raspberry Pi with the name which itself contains the time and date of section. Means there is no compelling reason to store date and time independently at some other spot as we have relegated the time and date as the name of the caught picture, see the picture below. We have here taken the picture of a crate as visitor, check its full show in the Video toward the end.

IV. CIRCUIT IMPLEMENTATION

The circuit implementation of security system is as follows:
1) LCD: In this diagram LCD (Liquid Crystal Display) is using for to display the Date & time of visitors & also for other messages. It is connected in 4 bit mode.

2) Pi Camera: This camera is connected at slot of the Raspberry Pi.
3) Buzzer: Buzzer is connected to GPIO pin for the indication purpose.
4) PUSH BUTTON: This component is connected to GPIO pin 19 with respect to ground command is passed to capture the image & open the gate.

5) DC MOTOR: This component is worked as a gate . DC motor is associated with Raspberry Pi GPIO pin 17 and 27 through Motor Driver IC (L293D).

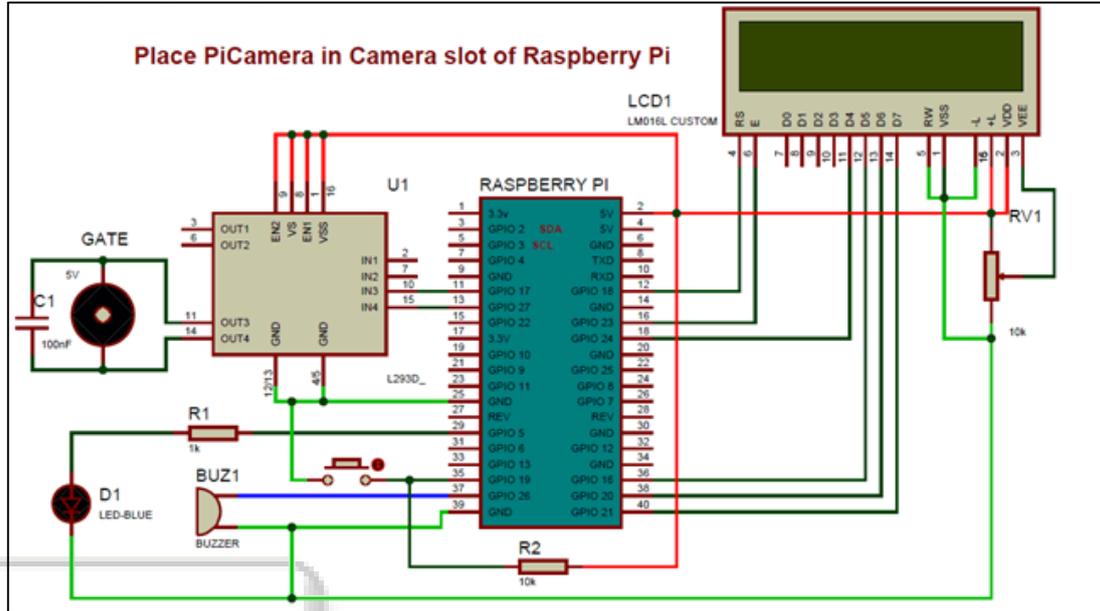Rest of associations are appeared in circuit chart.

Fig. 2: Circuit diagram of home security system

V. RESULTS

The result shows the snap shots & pictures of circuits implementation of real time security system, as follows:
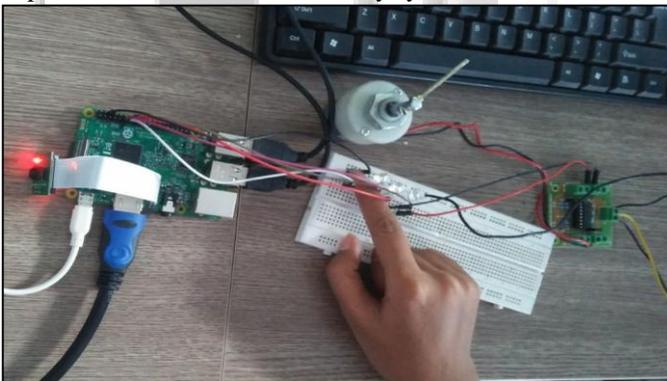

Fig. 3: Insertion of camera and pressing the push button

The blinking of an LED will shows that it the camera is ready to capture the image of the Visitors.
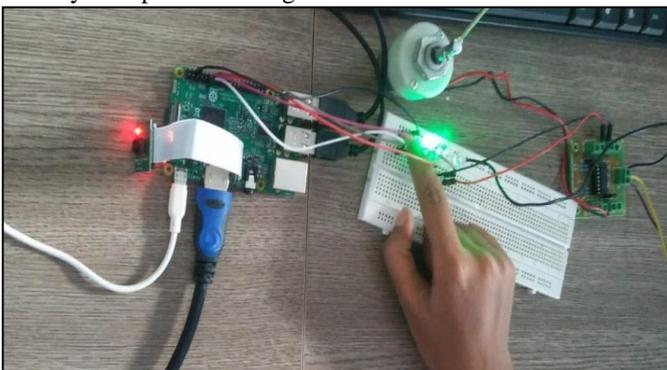

Fig. 4: Blinking of LED

The first step in this project is to design a simple LED circuit. Then we will make the LED circuit controllable from the Raspberry Pi by connecting the circuit to the general purpose input/output (GPIO) pins on the Raspberry Pi.

A simple LED circuit consists of a LED and resistor. The resistor is used to limit the current that is being drawn and is called a current limiting resistor. Without the resistor the LED would run at too high of a voltage, resulting in too much current being drawn which in turn would instantly burn the LED, and likely also the GPIO port on the Raspberry Pi.
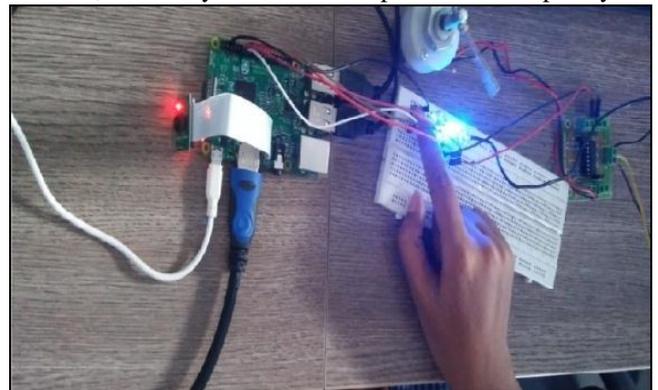

Fig. 5: Working of motor drive and DC motor

Here the pictures of visitors are saved in Raspberry Pi with the name which itself contains the time and date of entry. Means there is no need to save date and time separately at some other place as we have assigned the time and date as the name of the captured picture, see the image below.
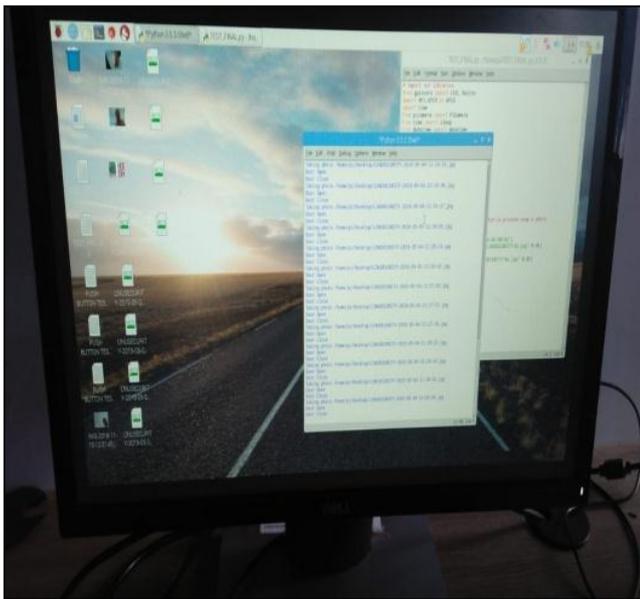
Fig. 6: Captured image with date and time

A. Application

- Security system is very useful in offices or factories where visitor entry record is maintained for visitors and attendance record is maintained for employees.
- It is also acts as Monitoring system will digitize and automate the whole visitor entries and attendances, and there will be no need to maintain them manually.
- Security system can be either operated by the person himself or there can be operator for pressing the button for very visitor.

B. Advantages

- Improve productivity
- Improve data accuracy
- Improve visitor service
- Control emergency response
- Secured

C. Disadvantages

- Any kind of system needs electricity to run on. In areas where there is the shortage of electricity people can't use this software as because the electricity can go any time.
- For working this system any kind of electronic device is needed which makes buying of this software costly.

VI. CONCLUSION

In this paper i designed real time security system using Raspberry Pi and pi camera. It is an active security system which will alert the user when the push button pressed. Live video streaming is an additional advantage of this system. Here I created web server which helps the user to view the live video. This system sends intruder's captured video to the owner by the android mobile. The security monitoring system has been aimed to design in such a way that it can fulfill the needs of the user for particular surveillance area. It has countless applications and can be used in different environments and scenarios.

VII. FUTURE SCOPE

This security system is a combination of face recognition system and IoT. These two technologies are growing technologies and with the help of them, much advancement can be done. There are many face recognition algorithms developed till date but none of them are proper and hence each one has its disadvantages. Hence in the future a proper designing in the face recognition algorithm can be done and a new algorithm can be introduced. The technology is scalable therefore new modifications can be easily done. New hardware can be easily attached hence new smart home concept can be implemented. Everything in that home will be smart. That means we don't need to give command to hardware every time. Hardware itself will know dos and don'ts.

REFERENCES

[1] Ching-Kai Huang and Tsuhan Chen, "Motion Activated Video Surveillance Using TI DSP", DSPS FEST '99,Houston, Texas, August 4-6, 1999.
[2] Lun Zhang Li, S.Z. Xiaotong Yuan Shiming Xiang, Beijing, "Real-time Object Classification in Video Surveillance Based on Appearance Learning", Computer Vision and Pattern Recognition, 2007, IEEE *Conference Issue Date: 17-22 June 2007, Print ISBN: 1-4244-1180-7, pp.1-8.
[3] Stauffer. C, Grimson W.E.L, "Adaptive background mixture models for real-time tracking", IEEE Computer Society Conference on Computer Vision and Pattern Recognition. Volume 2., Ft. 1999, pp. 252–2-58.
[4] K. Srinivasan K. Porkumaran, G. Sainarayanan, "Intelligent human body tracking, modelling, and activity analysis of video surveillance system: A survey", Journal of Convergence in Engineering, Technology and Science Vol.1 December 2009, pp. 1-8.
[5] Wijnhoven, R., de With, P, "3D wire-frame object-modelling experiments for video surveillance", Proc. of 27th Symposium on Information Theory in the Benelux, 2006, pp. 101–108.
[6] Massimo Piccard, "Background subtraction techniques: a review", IEEE International Conference on Systems, man and cyber nets 2004.
[7] Muller-Schneiders, S., Jager, T., Loos, H., Niem, W., "Performance evaluation of a real time video surveillance system", Proc. of 2nd Joint IEEE Int. Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance (VS-PETS), 2005, pp. 137–144.
[8] Nan Lu et. al, "An Improved Motion Detection Method for Real-Time Surveillance", Proc. of IAENG International Journal of Computer Science, Issue 1, 2008, pp.1-16.
[9] R. G. J. Wijnhoven, P. H. N. de With, "Experiments With Patch-Based Object Classification", IEEE Int. Conf. on Advanced Video and Signal based Surveillance, 2007.
[10] R. Wijnhoven, Peter H.N. de With, "Patch-Based Experiments with Object Classification in Video Surveillance", ACIVS 2007, LNCS 4678, 2007, pp. 285–296.

[11] Mohamed Dahmane, Jean Meunier, "Demo: VideoSurveillance application with Self-Organizing Maps".

[12] Rajitha T V, "Object Tracking From Video Sequence", June 2008.

[13] Karan Gupta, Anjali V. Kulkarni, "Implementation of an Automated Single Camera Object Tracking System Using Frame Differencing and Dynamic Template Matching".

[14] Bastian Leibe, Konrad Schindler, NicoCornelis, Luc Van Gool, "Coupled Object Detection and Tracking from Static Cameras and Moving Vehicles".

[15] YigithanDedeoglu, "Moving Object Detection, Tracking And Classification For Smart Video Surveillance" 2004.