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The Smart Surveillance System by using Raspberry Pi Technology

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Abstract: Implementation of Smart surveillance system using Raspberry pi technology for smart phones is represented by this paper. This project provides security to homes and other control applications. In this project Linux operating system has been used. The raspberry pi system is simple to implement, small size.. With help of infrared sensor raspberry pi operates and controls motion detectors and video cameras for remote sensing.by using web application captured data transmit to smart phone through 3G dongle. With help of possible instruction raspberry pi alters the owner which having smart phone.

Keywords: Raspberry pi, smart phone, PIR sensor.

I. INTRODUCTION

Raspberry pi is a device which operates like a smart computer .This device can be easily plugged into your TV and a keyboard. The Linux kernel-based operating system has been used in raspberry pi system. The system can automatically initiate image capturing or send notifications if any kind of motion is detected then capture the image and send it to smart phone .The raspberry pi model is developed in United Kingdom by the raspberry pi foundation. In raspberry pi for long term storage SD card is used. The Raspberry pi is nothing buts microcomputer squashed onto a circuit board measuring approximately 9cm x 5.5cm [4].

II. FUNCTIONAL DESCRIPTION

A. Block Diagram Description

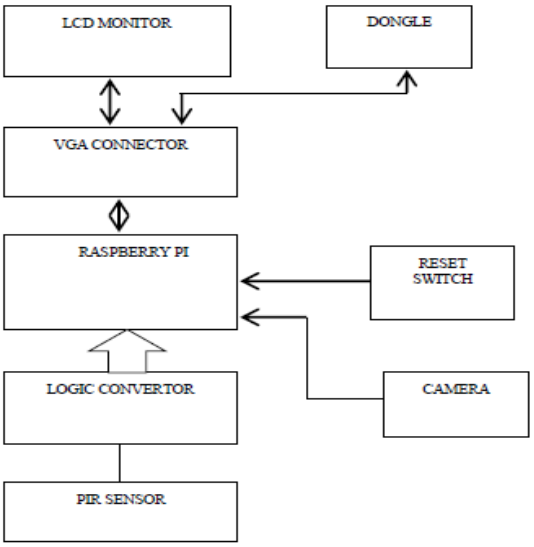

Fig 1. Functional Block Diagram

The raspberry pi model having four inputs such as logic converter, VGA connector, reset switch, camera. The logic converter is used for interfacing between raspberry pi module and PIR sensor. The function of logic convertor is to convert voltage from high level to low level and vice versa. Here logic converter gives sufficient voltage to raspberry pi module. Raspberry pi module operates at 5 volt. The VGA camera is use for capturing the image and sends this image to raspberry pi module. The picture resolution of VGA camera is high so here we use VGA camera. Raspberry pi receives image from camera and send this image to smartphone through internet dongle. The reset button is used for reset the device.

B. Hardware Implementation

1. Raspberry PI

Various generations of Raspberry Pi have been developed. The first generation of raspberry pi was released in February 2012 in basic Model A and a higher specification Model B. After some year Improved A+ and B+ models were released. The Raspberry Pi 2 was launch in February 2015 and Raspberry Pi 3 in February 2016. Prizes of these models are between US$20 and 35.

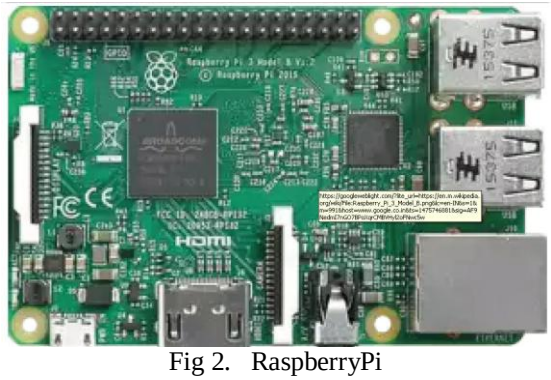

Fig 2. RaspberryPi

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The raspberry pi may be operated with any generic USB computer keyboard and more. The raspberry pi does not "know" the time of day because it does not having real time clock. The raspberry pi performs on various applications such as surveillance system, military application, industrial application etc. [1] [2].

2. VGA Camera

In terms of camera feature, "VGA"stands for "video graphics array" and it is a standard resolution size for camera sensors, displays, photos and videos. GA measures at 640 pixels wide by 480 pixels tall. Resolution is low for standard photos and it is nothing but equivalent to a standard definition television for videos based on raspberry pi technology. The VGA interface is mostly used for high definition video because, while its bandwidth supports high resolution playback, then picture can support degradation depending on quality and length of the supporting cables [7].

3. PIR Sensor

In terms of camera feature, "VGA"stands for "video graphics array" and it is a standard resolution size for camera.A passive infrared sensor (PIR sensor) is an electronic sensor that measure IR light radiated from objects in its area of view. PIR is mostly used for motion detection. This type of motion detectors are used to sense movement of people, animals, or other objects. They are mostly used in burglar alarms as well as automatically activated lighting systems. These sensors are called as simply "PIR". An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies accordance with temperature and surface behavioral characteristics of the objects in front of the sensor. When an object, such as a human, passes in front of the background, like a wall, then the temperature at that point in the sensor's area of view will rise from room temperature to body temperature, and then back again.

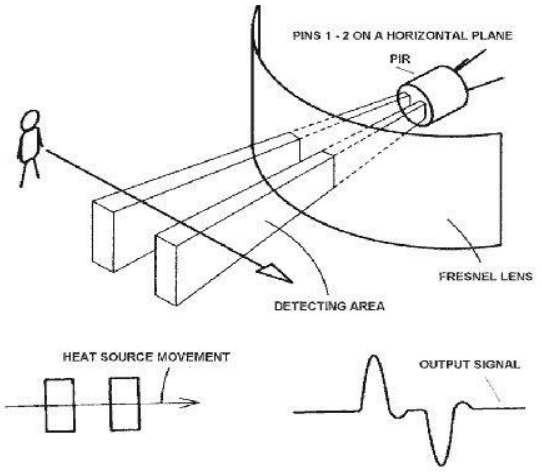

Fig 3. PIR Sensor

The PIR sensor converts the incoming IR radiation converts into an output voltage, and this triggers the detection. The most common models have an effective range of about ten meters (thirty feet), and a field of view less than 180 degrees. Models with wider fields of view, including 360 degrees, are available-typically designed to mount on a ceiling. PIR sensor sense changes in infrared energy over one hundred feet away from the PIR. There are also PIRs designed with reversible orientation mirrors [6].

4. Logic Converter

The logic level converter is a small device that safely steps down 5volt signal to 3.3 volt and step up 3.3 volt to 5 volt. Each level of logic converter has ability to converting four pins on the high side to four pins on the low side .Two inputs as well as two outputs are provided for each and every side. Logic converter can be used with normal serial, I2C, SPI and any other digital signal. Logic converter not works with an analog signal. The level converter is very easy to use. The board needs to be powered from the two voltage sources i.e. high voltage and low voltage that your system is using. High voltage to the HV pin low voltage to the LV pin. Two inputs to logic converter, convert the low voltage to a higher and the other two line convert bi-directionally (high-to-low and/or low-to-high) [5].

5. VGA Connector

VGA Connector is a three row 15-pin DE-15 connector. The 15-pin VGA connector is used for many video cards, computer monitors, laptop computers, projectors, and high definition television sets. On laptop computers or other small devices, a mini-VGA port was sometimes used in place of the full sized VGA connector.DE-15 has been conventionally referred to ambiguously as D-sub 15, incorrectly as DB-15 and often as HD 15(high density to distinguish it from the older and less flexible DE-9 connector used on old VGA card which has the E shell size but only two rows of pins).the video connector is an E size D-sub connector with 15 pin in 3 rows which is the high density connector version. GA connectors and cables carry analog components RGBHV (red, green, blue, horizontal sync, vertical sync) video signal, and VESA display data channel (VESA DDC) data.in the original version of DE-15 pin out, one pin was keyed by plugging the female connector hole; this prevented non VGA 15 pin cable from being plugged into VGA socket. Four pins of VGA connector carried monitor ID bit signal which were rarely used. VESA DDC redefined same of these pins and replaced the key pin with +5volt DC power supply. Device that complies with the DDC host system standard provides 5volt and supply minimum of 300mA to maximum of 1A [7].

C. Software Detail

1. Python Programming

Python is widely used high level, general purpose, interpreted, dynamic programming language its design emphasizes code readability; the syntax allows programmers to express concepts in fewer lines of code

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than possible in languages such as C++ or java. The python language constructs both small and large scale programing and large scale. Python firmware supports multiple programming languages such as paradigms, including object oriented, imperative, functional programming as well as procedural styles. Python programing having a dynamic type system and including automatic memory management. Python interpreters are available many operating systems, allowing python code to run on a wide variety of systems. Python is easy to read and look good because of it is an open source programming language. The name of programmer Guido van rossum which was made it in 1991 .Python run itself in any kind of computer therefore it is called interpreter. This means python programming is give fast result if programmer changes the code quickly. Python does not running machine code directly so python slower than the compiled language like c. Python is a simple programming language compare to other. It is a high level language, which means programmer can focus on what to do instead of how to do it.Writing program in python take less time than in another language. Python drew inspiration from other programming language like C, C++, java Perl, and Lisp [3].

2. Linux Software

Linux is free and open source software. An operating system is a collection of the basic instruction that manage the electronics ports of the computer allowing running application programs. Linux is free and open source software. Free and open source software means that everyone has the freedom to use it, see how it works, change it or share it. Linux is having lot of software. This means user does not required lenience. Therefore people like to use Linux software. The Linux kernel is defining compound of Linux. For personal computers Linux was originally developed as a free operating system. Linux in its original form is also the leading operating system on servers such as mainframe computers and supercomputers but is used on only around 1.5 % of desktop computers. Linux software also runs on embedded system. Linux is operating system for computers. Examples of free and open source software collaboration are development of Linux. For both desktop and server use Linux is packaged in a form known as Linux distribution . Some of popular mainstream Linux distributions are Debian, Ubuntu, Linux Mint, fedora, opens use [8].

D. Flow Charts

To detect the motion of live person we optimize the algorithm. Linux operating system is a collection of the basic instruction that manage the electronics ports of the computer allowing running application programs. Linux is free as well as open source software. PIR sensor gets the data from Linux operating system. The PIR sensor converts the incoming IR radiation converts into an output voltage, and this triggers the detection. A PIR sensor sense movement of people, animals, or other objects. Based on PIR sensor data calibrate the movement of live person at precise level. If live person is detected then start the camera, captures the image and send SMS and image to authenticate person. If live person does not detected then camera goes into sleep mode. After performing this operation program will go to PIR sensor. After completed require task operation will be repeated

III.LIMITATION AND FUTURE SCOPE

It does not have a hard disk associated with it for permanent storage PF files, we have to connect one externally or have to use SD card for the purpose. This can include observation from distance by means of electronics equipment's such as CCTV cameras. Surveillance is used by governments for intelligence gathering, the prevention of crime, the protection of process, person, group or object, or the investigation of crime. It is also used by criminal organization to crime and commits crimes such as robbery and kidnapping, by businesses to gather intelligence and by private investigators.

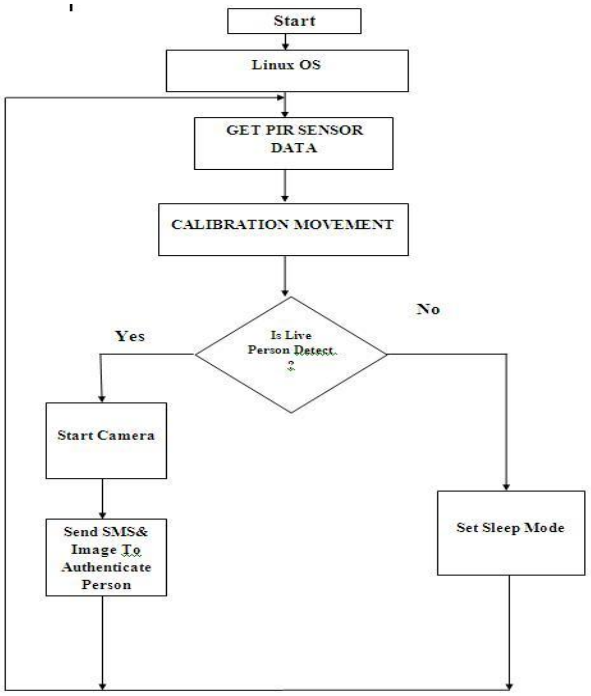

Fig 4. Flow Diagram

IV.CONCLUSION

Thus we have studied raspberry pi is an innovative technology also we have designed a smart surveillance system which is capable to recording or capture image and transmitting to smart phone of owner. This project offers reliability and privacy.

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