

PIR Based Security Home Automation System with Exclusive Video Transmission

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Abstract: Security is primary concern everywhere and for everyone. Every person wants his home, industry etc. to be secured. This project describes a security system that can monitor an industry and home. This is a simple and useful security system. Here our application uses Raspberry Pi as its controller. A PIR sensor is interfaced to the controller to detect the presence of a human and immediately captures the image using camera attached to controller and forwards through E-mail and also a buzzer alert is given to intimate others. A temperature sensor is also present at this end to find out increase in temperature and intimate others with a buzzer alert. A wireless camera is also interfaced to monitor each and every minute at the remote place in a TV. DC motors are interfaced to the controller through H-bridge circuit to drive the Robot. We also have a LDR sensor to check whether there is day light or not and also to switch on the light during darkness.

Keywords: PIR, Raspberry Pi , LDR, Wireless Camera.

I. INTRODUCTION

Security is primary concern everywhere and for everyone. Every person wants his home, industry etc to be secured. This project describes a security system that can monitor an industry and home. This is a simple and useful security system. Here our application uses Raspberry Pi as its controller. A PIR sensor is interfaced to the controller to detect the presence of a human and immediately captures the image using camera attached to controller and forwards through E-mail and also a buzzer alert is given to intimate others. A temperature sensor is also present at this end to find out increase in temperature and intimate others with a buzzer alert. A wireless camera is also interfaced to monitor each and every minute at the remote place in a TV. DC motors are interfaced to the controller through H-bridge circuit to drive the Robot. We also have a LDR sensor to check whether there is day light or not and also to switch on the light during darkness. In this way security is provided through all aspects. We can move this robot either at home or at offices, factories or any other place where we need monitoring every minute for the purpose of security. This project aims at designing and executing the advanced development in embedded systems for energy saving of street lights with light depending resistor.

Now a day, human has become too busy and he is unable to find time even to switch the lights wherever not necessary. This can be seen more effectively in the case of street lights. The present system is like, the street lights will be switched on in the evening before the sun sets and they are switched off the next day morning after there is sufficient light on the

roads. But the actual timings for these street lights to be switched on are when there is absolute darkness. With this, the power will be wasted up to some extent. This project gives the best solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. In our project we are using LDR, which varies according to the amount of light falling on its surface, this give an indication for us whether it is a day/night time. In our project we use regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. In the present project street lights are taken into consideration where the above discussed factors are rectified in them. This is achieved with the help of an embedded system. By using this as the basic principle we can design centralized intelligent system for the perfect usage of streetlights in any place (Viz Village, Town) can be developed.

II. SYSTEM DESCRIPTION

The main component of this project is the Raspberry Pi module (computer). The Raspberry Pi, temperature sensor, IR sensor, camera and the H-bridge require +5v to run the Robot. So, the initial power supply 12v has to be reduced to +5v and we ON the switch that allows the movement of the Robot. ON the wi-fi router and connect the smart phone/monitor through this wi-fi where there is the possibility of enabling the live video transmission. The controller in the Raspberry Pi board is BCM2835 where inbuilt processor is ARM11. This project runs by installing the Linux packages available directly to the SD and mounting

the SD card to the Raspberry Pi module. After the power and the wi-fi router are turned ON, then the Robot moves and overcomes obstacles if any. In the smart phone the live streaming is visible. In particular we are giving a temperature sensor to the Robot where if the temperature increases there will be a buzzer indication alerting the Owners of the house/neighbors. The Robot is ON and left in the house, where the security of the house is assured.

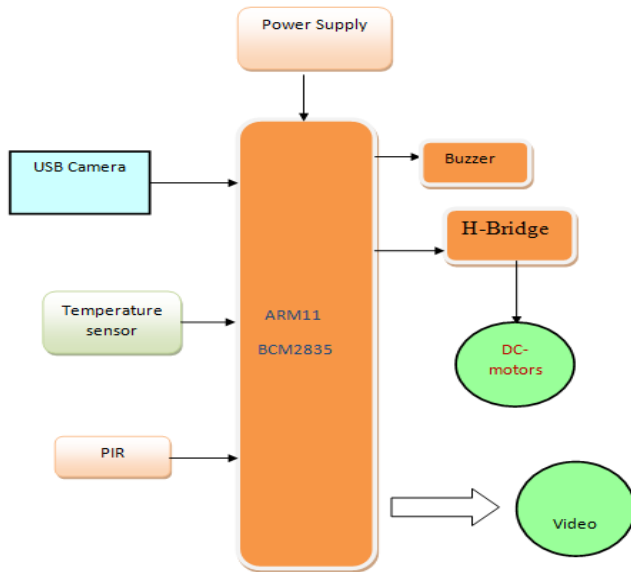


Fig1. Block Diagram.



Fig2. Lightening system.

III. HARDWARE DESCRIPTION

A. Raspberry-Pi:



Fig3. Raspberry-Pi.

The Raspberry-Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi is

manufactured through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Egoman. All of these companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers. The Raspberry Pi has Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor (The firmware includes a number of "Turbo" modes so that the user can attempt overclocking, up to 1 GHz, without affecting the warranty), VideoCore IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage. The Foundation's goal was to offer two versions, priced at US\$25 and US\$35. They started accepting orders for the higher priced model B on 29 February 2012, and the lower cost model A on 4 February 2013. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the "Brandy Basic" clone for Linux), C, and Perl.

B. PIR Sensor :

A Passive InfraRed sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors (see below). Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation. "Infra" meaning below our ability to detect it visually, and "Red" because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy.

C. Permanent Magnet Motor

A permanent magnet DC motor is characterized by its locked rotor (stall) torque and its no-load angular velocity (speed).

Principles of operation: In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

D. Light Dependent Resistor



Fig4. Light-dependent resistor.

Light-dependent resistor alternatively called an LDR, photo resistor, photoconductor, or photocell, is a variable resistor whose value decreases with increasing incident light intensity. An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. A photoelectric device can be either intrinsic or extrinsic. In intrinsic devices, the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire band gap. Extrinsic devices have impurities added, which have a ground state energy closer to the conduction band - since the electrons don't have as far to jump, lower energy photons (i.e. longer wavelengths and lower frequencies) are sufficient to trigger the device. Two of its earliest applications were as part of smoke and fire detection systems and camera light meters. Because cadmium sulfide cells are inexpensive and widely available, LDRs are still used in electronic devices that need light detection capability, such as security alarms, street lamps, and clock radios.

E. WIFI

The components, organization, and operation of Wi-Fi networks will be presented. There is an emphasis on security issues and the available security protocols. Wi-Fi is the name given by the Wi-Fi Alliance to the IEEE 802.11 suite of standards. 802.11 defined the initial standard for wireless local area networks (WLANs), but it was considered too slow for some applications and so was superseded by the extensions 802.11a and 802.11b, and later by 802.11g (with the release of 802.11n still pending). At its most basic, Wi-Fi is the transmission of radio signals. Wireless router offer the embedded systems engineer many benefits in a wide range of applications.

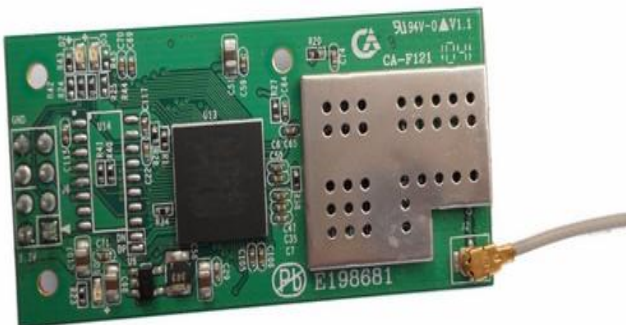


Fig5. Wi-Fi Module.

VSD03 is the new third-generation embedded Uart-Wifi modules studied by VSD TECH. Uart-Wifi is an embedded module based on the Uart serial, according with the WiFi wireless WLAN standards, It accords with IEEE802.11 protocol stack and TCP / IP protocol stack, and it enables the data conversion between the user serial and the wireless network module. Through the Uart-Wifi module, the traditional serial devices can easily access to the wireless network. VSD03 does a comprehensive hardware and software upgrades based on the products of the first two generations, now it's more functional and more Convenient to use, its main features include:

Interface:

- 2*4 pins of Interface: HDR254M-2X4
- The range of baud rate: 1200~115200bps
- RTS / CTS Hardware flow control
- Single 3.3V power supply

Wireless

- Support IEEE802.11b / g wireless standards
- Support the range of frequency: 2.412~2.484 GHz
- Support two types of wireless networks:
 - Ad hoc and Infrastructure
- Support multiple security authentication mechanism
 - WEP64/WEP128/ TKIP/CCMP(AES)
 - WEP/WPA-PSK/WPA2-PSK
- Support quick networking
- Support wireless roam

Others

- Support multiple network protocols
 - TCP/UDP/ICMP/DHCP/DNS/HTTP
- Support two types of work modes:
 - auto and command
- Support the transparent transmission mode
- Support AT+ instruction set
- Support a variety of parameters configuration methods:
 - Serial/ WEB server / wireless configuration

Application

- Intelligent bus network, such as wireless credit card machine
- Small financial payment network, such as wireless POS machine
- Industrial equipment networking, such as wireless sensor

IV. RESULT

Finally project comes to physical existence and looks as below.

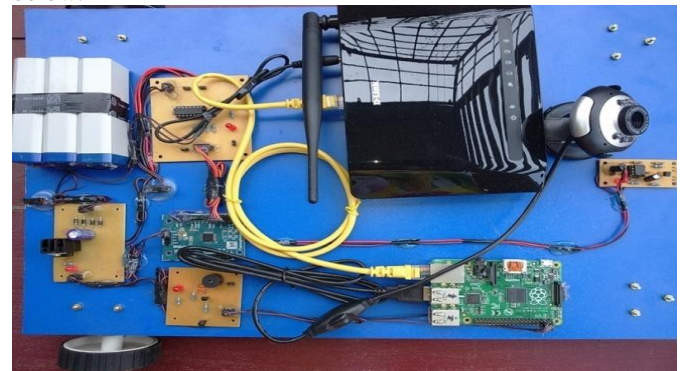


Fig6. Home Security Robot.

The hardware components i.e., Raspberry Pi module, IR sensor, temperature sensor, wi-fi module, H-bridge, DC motor, buzzer and camera are mounted over a wooden plank and are connected parallel, to form a Robot. This robot movement is obtained by fixing the free wheels in order to attain 360 degree rotation.

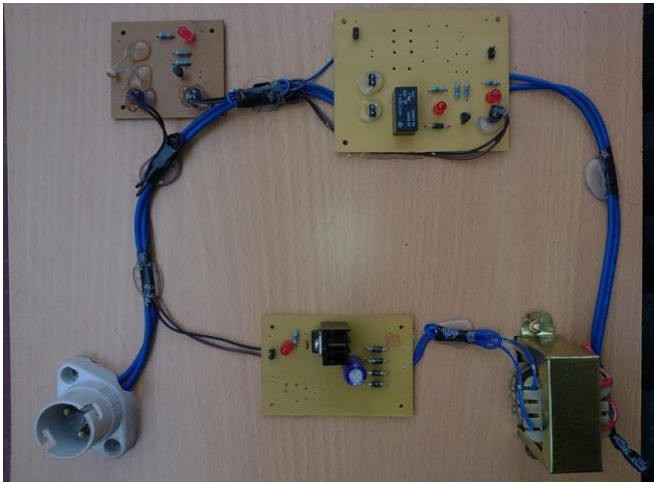


Fig7. Home Automation System.

Constructed home automation module keeping in mind the general appliance i.e. light.

V. CONCLUSION

By using different sensors, high security is provided. Experimental work is done carefully. This project is implemented using advanced microcontroller Raspberry pi. The project with its corresponding demonstration shows the effective Home security Robot with live video transmission and Home automation module. This Home security Robot and the Home automation system runs automatically, providing home security through live video transmission and is cost effective as compared to previously existing systems. The basic level of home appliance controls has been implemented.

VI. REFERENCES

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