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Raspberry PI based Home security Robot

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Abstract:

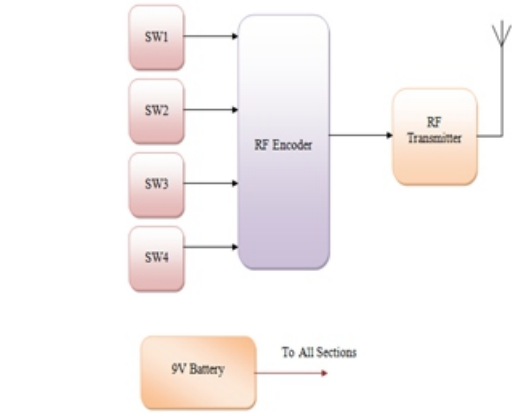
Security is primary concern everywhere and for every one. Every person wants his home, industry etc to be secured. This project describes a security system that can monitor an industry and home. This is a simple and useful security system. Here our application uses Raspberry Pi as its controller. A PIR 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. DC motors are interfaced to the controller through H-bridge circuit to drive the Robot through RF technology.

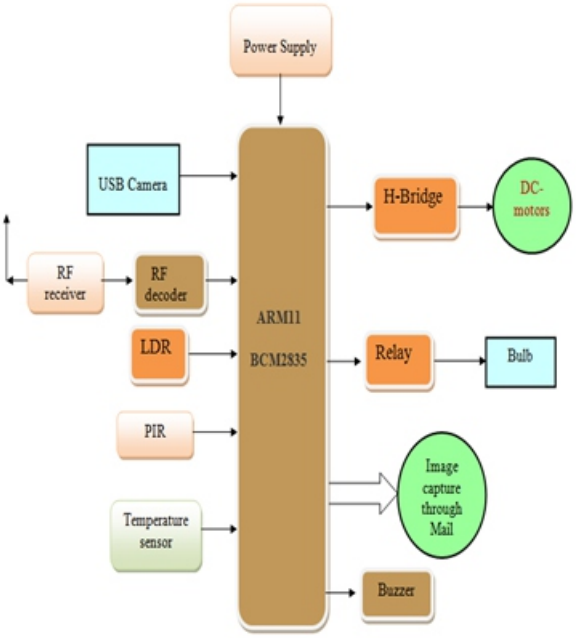
We also have a LDR sensor to check whether there is day light or not and also to switch on the light during darkness. In this way security is provided through all aspects. We can move this robot either at home or at offices, factories or any other place where we need monitoring every minute for the purpose of security. The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation . The Raspberry Pi has a Broadcom BCM2835 system on a chip which includes an ARM1176JZF 700 MHz processor Video Core 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. This project uses regulated 5V, 1A power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

INTRODUCTION:

The Raspberry PI is a credit-card-sizedsingle-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip which includes an ARM1176JZF 700 MHz processor Video Core 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. This project uses regulated 3.3V, 1A 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.

Block Diagram: Transmitter





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II. COMPONENTS USED

A.Camera :

Cameras are imaging cameras that use USB 2.0 or USB 3.0 technology to transfer image data. USB Cameras are designed to easily interface with dedicated computer systems by using the same USB technology that is found on most computers. The accessibility of USB technology in computer systems as well as the 480 Mb/s transfer rate of USB 2.0 makes USB Cameras ideal for many imaging applications. An increasing selection of USB 3.0 Cameras is also available with data transfer rates of up to 5 Gb/s.

B.H Bridge:

It is an electroniccircuit that enables a voltage to be applied across a load in either direction. These circuits are often used in robotics and other applications to allow DC motors to run forwards and backwards.

C.DC geared motor:

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction.

D.LDR :

A photoresistor or light-dependent resistor (LDR) or photocell is a light-controlled variable Resistor. Theresistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibitsphotoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits.

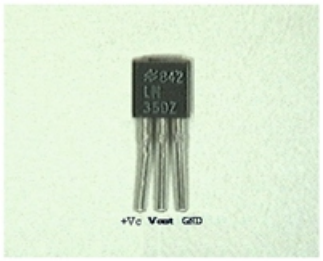
E. LED:

A light-emitting diode (LED) is a two-lead semiconductor lightsource. It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

F.Temperature sensor:

Thermistors are thermally sensitive resistors whose prime function is to exhibit a large, predictable and precise change in electrical resistance when subjected to a corresponding change in body temperature. Negative Temperature Coefficient (NTC) thermistors exhibit a decrease in electrical resistance when subjected to an increase in body temperature and Positive Temperature Coefficient (PTC) thermistors exhibit an increase in electrical resistance when subjected to an increase in body temperature.



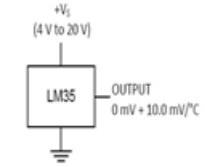


Figure 1. Basic Centigrade Temperature Sensor (+2°C to +150°C)

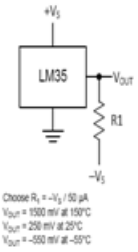


Figure 2. Full-Range Centigrade Temperature Sensor

G. PIR :

A PIR-based motiondetector is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems. They are commonly called simply “PIR”, or sometimes “PID”, for “passive infrared detector”.

H. BUZZER:

Abuzzerorbeeperisanaudiosignallingdevice,whichmaybe mechanical,

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electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarmdevices, timers and confir mation of user input such as a mouse click or keystroke.

I. RELAY:

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-staterelays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

J. ARM 11:

The ARM11 microarchitecture (announced 29 April 2002) introduced the ARMv6 architectural additions which had been announced in October 2001. These include SIMD media instructions, multiprocessor support and a newcache architecture. The implementationincluded a significantly improved instructionprocessing pipeline, compared to previous ARM9 or ARM10 families, and is used in smartphones from Apple, Nokia, and others. The initial ARM11 core (ARM1136) was released to licensees in October 2002. The ARM11 family are currently the only ARMv6architecture cores. There are, however, ARMv6M cores (CortexM0 and CortexM1), addressing microcontroller applications ARM11 cores target more demanding applications.

III. Raspberry Pi:

The RaspberryPi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation . The Raspberry Pi has a Broadcom BCM2835 system on a chip which includes an ARM1176JZF 700 MHz processor Video Core 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.

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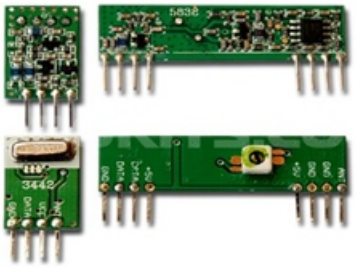
Radio technology:

Radio frequency (RF) is a frequency or rate of oscillation within the range of about 3 Hz to 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves. Since most of this range is beyond the vibration rate that most mechanical systems can respond to, RF usually refers to oscillations in electrical circuits or electromagnetic radiation

RF modules:



V. WORKING:

•If a person is detected through PIR sensor then his/her image is captured and forwarded through E-mail immediately.
•LDR sensor is used to detect whether there is day light or not. If there is no lighting found then our bulb will be on through triac.
•Temperature sensor(LM35) is connected to sense the temperature changes and gives a buzzer alert in abnormal condition.

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•In this way three sensors will make the home secured.

VI. CONCLUSION :

The project " Raspberry pi based Home security Robot" used for many applications in security purpose for Industries, Houses, Banks, Jewellery shops. By using this project we can protect our important things from robbers.

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