

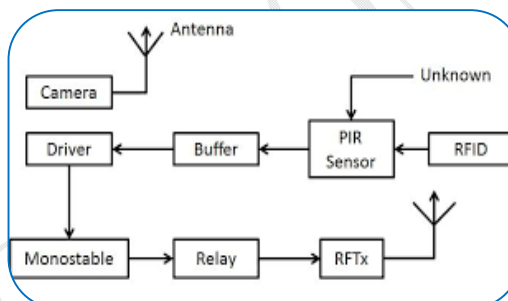


SURVEY PAPER ON SEARCHING TECHNIQUE USING PIR SENSORS

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ABSTRACT :

This paper presents the method for the detection and localization of moving targets in passive infrared (PIR) sensor networks in both indoor and outdoor settings. Reports our design and implementation of PIR sensor network, especially, we proposed a detection algorithm, which uses Adaptive Threshold with Constant False Alarm Rate; and developed a localization algorithm using direction search in the grid space of the network. The experimental results have shown that our PIR sensor network can detect and locate the moving targets with reasonable accuracy. In this paper, an innovative localization method is proposed for tracking humans' position in indoor environments based on passive infrared (PIR) sensors aiming at providing intelligent services. Then the PIR sensors, which placement depends on the training results in the accessibility map, get the rough location information.



KEYWORDS : Atmega 328 microcontroller, DC motor, RF transmitter and receiver, PIR sensor.

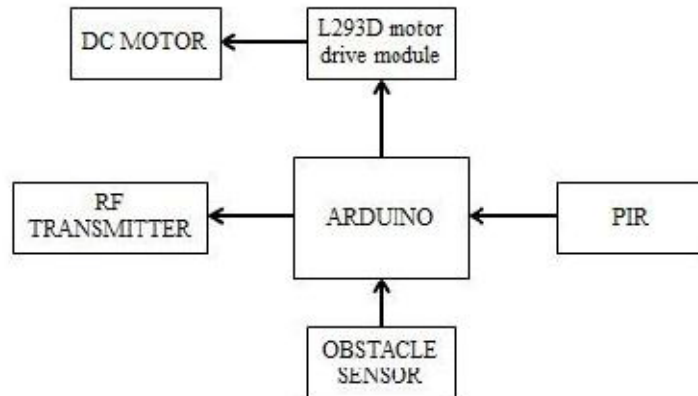
INTRODUCTION:

The PIR sensor itself has two slots in it, and here each slot is made of a special material that is sensitive to IR. And lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a *positive differential* change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

WORKING PRINCIPLE –

The Robot has two sides, receiver side and the transmitter side. The transmitter side consists of ATMEGA328 microcontroller (Arduino Uno); the inputs to the microcontroller are PIR sensor, and an Obstacle sensor. The outputs are RF transmitter and L293D motor drive module, to which a DC motor is connected. And a DC motor is used to move the robot in left, right and forward and backward directions. L293D motor drive module controls the DC motor to move in the direction. The direction of the movement is decided from the signals given by the obstacle sensors. Obstacle sensor uses infrared signal to find if there are any obstacles present in front of it, its range is up to 5 cm. The obstacle sensors are placed in front, right and in left directions. If any sensors sense any obstacle it changes to the direction where there is no

obstacle. This makes the robot move automatically without external source controlling it. Human can be detected using a PIR sensor. A PIR sensor is a sensor that produces passive infrared signals, these signals can detect heat. Human being produces heat which is detected using this sensor. Human being produces 9 to 10 microns of heat. A PIR sensor's angle of detection is restricted to 180. i.e. except the area below the robot it can sense in all the other directions. The distance up to which PIR sensor can detect is restricted within 12 ft. As the sensor's range is less, the sensor is mounted to a robot that can move automatically. If the sensor detects the human, it sends the signal to the RF transmitter to produce Radio Frequency signals. Radio Frequency signals can travel up to 200 ft. The diagram below shows the connectivity for the transmitter side.



The Receiver Side consists of ATMEGA328 microcontroller (Arduino Uno). Its input and output are Radio frequency receiver and a buzzer respectively. Once the signal from the transmitter is received by the RF receiver it notifies the Arduino. Arduino in turn sends a signal to the buzzer, which triggers the buzzer to produce continuous beeps. This continuous beep indicates that there is a presence of a human.

PIR SENSORS:

PIR sensors are used to detect any object that radiates heat. It can detect humans, animals and other objects. Fresnel lenses are used in PIR sensors which increase the range of detection. These lenses are made up of translucent which capture the radiation from visible spectrum of light. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose.

ATMEGA 328 MICROCONTROLLER:

It's a high performance 8-bit AVR RISC microcontroller. It consists of a 32KB ISP flash memory, and it also consists of a read while write capability. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, USART, a byte-oriented 2-wire serial interface, SPI serialport, 6-channel 10-bit A/D converter, programmable watch dog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz^[1]

DC motor: DC motor is an electric motor which converts the electrical energy into mechanical energy. **DC Motors** are continuous actuators that convert electrical energy into mechanical energy. The DC motor

achieves this by producing a continuous angular rotation that can be used to rotate pumps, fans, compressors, wheels, etc.

L293D MOTOR DRIVE MODULE:

L293D motor drive module is a motor driver which acts as a current amplifier. They take low current signals and then convert it into high current signal. C motor is an electric motor which converts the electrical energy into mechanical energy. The Motor Driver is a module for motors that allows you to control the working speed and direction of two motors simultaneously. This Motor Driver is designed and developed based on L293D IC. L293D is a 16 Pin Motor Driver IC. This is designed to provide bidirectional drive currents at voltages from 5 V to 36 V.

OBSTACLE DETECTION SENSORS:

In the robot there can be obstacle sensor which can detect obstacles and helps in navigating without crashing. These sensors produce Infrared signals, if these signals hit any obstacles, the signals bounce back to the IR receiver, indicating it has found an obstacle.

BUZZER:

A buzzer is an audio signaling device. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. The vibrating disk in a magnetic buzzer is attracted to the pole by the magnetic field. When an oscillating signal is moved through the coil, it produces a fluctuating magnetic field which vibrates the disk at a frequency equal to that of the drive signal.

RADIO FREQUENCY TRANSMITTERS AND RECEIVERS

The radio frequency transmitters transmit the radio frequency signals. Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. The RF Receivers receive the radio frequency signals and demodulate it.

Batteries:

Battery is used to power the robot. The batteries used are 9 volts of battery.

CONCLUSION –

So due to PIR sensor in future we can make automatic street light, we can record audio and we can hear that audio also. And PIR motion sensor doorbell can be made. We can make electric doors. Indeed, simple passive infra red detectors achieve this very successfully and are a common feature in many households. However, detecting human presence in an area without movement is not so simple. However, this is what is by Omron's D6T non-contact MEMS thermal sensor, a super-sensitive infrared temperature sensor that makes full use of Omron's proprietary MEMS sensing technology.

- 1 .Thermal sensor -most extensively and commonly used by defence to detect the presence of human body. It can detect by knowing the variation in temperature in the body.
- 2 .IR sensors - Usually the IR cameras used especially in the night .IR couple emits and reflects back the thermal radiation, which can further be altered and processed into a image, the image taken from IR camera.

Both thermal sensor and IR sensor gives the same processed image output Unlike typical pyroelectric human presence sensors that rely on motion detection, the D6T thermal sensor

is able to detect the presence of stationary humans by detecting body heat, and can therefore be used to switch off unnecessary lighting, air conditioning, etc automatically when people are not present (regardless of whether they move or not). As the D6T sensors are also able to monitor the temperature of a room, they can also be used to maintain optimal room temperature levels, instantly sense unusual changes in temperature, thereby detecting factory line stoppages, or discover areas of overheating for early prevention of fire outbreaks, etc.

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REFERENCES

1. Afak Sekmen, Ali S., Kawamura, Kazuhiko, and Wilkes, Mitch "An Application of Passive Human– Robot Interaction: Human Tracking Based on Attention Distraction" IEEE, Vol. 32, No. 2, March 2002, PP. 248-259
2. Binoy Shah and Howie Choset. "Survey on Urban Search and Rescue Robotics" Journal of the Robotics Society of Japan, Vol.22, No.5, Page.582-586, 2004.
3. Carlos Marques, Pedro Lima, Rodrigo Ventura "Semi-autonomous robot for rescue operations" Proceedings of the 2006 IEEE/RSJ International Conference on Intelligent Robots and Systems, October 9 - 15, 2006, Beijing, China.
4. Chou.Wusheng.Wang Tianmiao,usong,"sensor based autonomous control for tele-robotic system",proceeding of the 4th world Congress on intelligent control and automation ,2002,vol.3, pp.2430-2434. Australian Bureau of statistic, robotics, 2003 Marior A.hersh and Michael
5. A. Johnson(Eds.), Department of Electronics & Electrical Engineering, Springer-Yerlag London limited, Assistive technology for injured people in natural disasters 2008.



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