

REAL TIME MONITORING AND DETECTION OF WILD LIFE ANIMALS THAT CROSSES THE RAILWAY TRACK IN FOREST / VILLAGE AREAS THROUGH WIRELESS SENSOR NETWORK

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Abstract

As human race or human society is growing, the wildlife animals or wild animals are in danger. But as per nature's rule, every living creature on this earth is important and has important role ecosystem. Railway tracks contribute to the onslaught on wildlife in more ways than the most direct one, which is of course, having animals killed and maimed by trains. Every kind of animal-including elephant, tiger, lion have been mowed down by trains on Indian tracks. We have proposed a system to improve our safety record in protecting our wildlife on and around. Wireless sensors nodes have found useful applications in varying number of civilians and defense. In this proposal, the idea is to monitor wild animal's movements. The system is to detect and inform to the forest office via, RFID and the automatic drum alarm system can be used to prevent the animal movements not to cross the railway track in forest / village area and to avoid animal death.

Keywords: Load cell, IR Sensor, PIR Sensor, RFID transmitter receiver, LCD display, PIC microcontroller.

1. INTRODUCTION

In this project, wireless sensors device can be placed in different location around the border areas to detect the animal movements near the railway track through vibration, pulse and temperature. Also the presence of animal is notified to the forest office via RFID transmitter Receiver. This system provides an automatic drum alarm to threaten the animal near the railway track. This can be defensive mechanism to prevent animals not to cross the border areas of forest/ village.

2. LITERATURE REVIEW

The existing method of this project is Roadside Animal Detection System (RADS).It is an innovative project designed to help protect wildlife traveling near US 41 from just west of the entrance to the Skunk Ape Research Headquarters and Trail Lakes Campground to just east of Turner Road (1.3 miles).RADS provide early warning to drivers about the presence of large animals near the highway. Motorists can reduce their speed and be more prepared for animals crossing the roadway in this segment of US 41.This system cannot prevent the animal death in the railway tracks.

Researches related to animal's detection in image processing have been an important aspect to numerous applications. Many algorithms and methods have been developed related to Intelligent Video surveillance systems deal with the real-time monitoring of persistent and transient objects within a specific environment. [1] [3] [4] [5] [6] [8] [10]. Moreover, all the system is used to provide an automatic interpretation of scenes and to understand and predict the actions and interactions of the observed objects based on the information acquired by video camera but it has drawback of cost of purchase and installation, complex to use, privacy issues, risk of vandalism, visibility [2] [7] [9].

3. PROPOSED SYSTEM

This system comprises of sensors such as load cell, IR sensor and PIR sensor. Load cell is a sensor that performs functionality of converting force into an electric output which can be measured. This is highly accurate which provides user with required information that is difficult to obtain by other technologies.

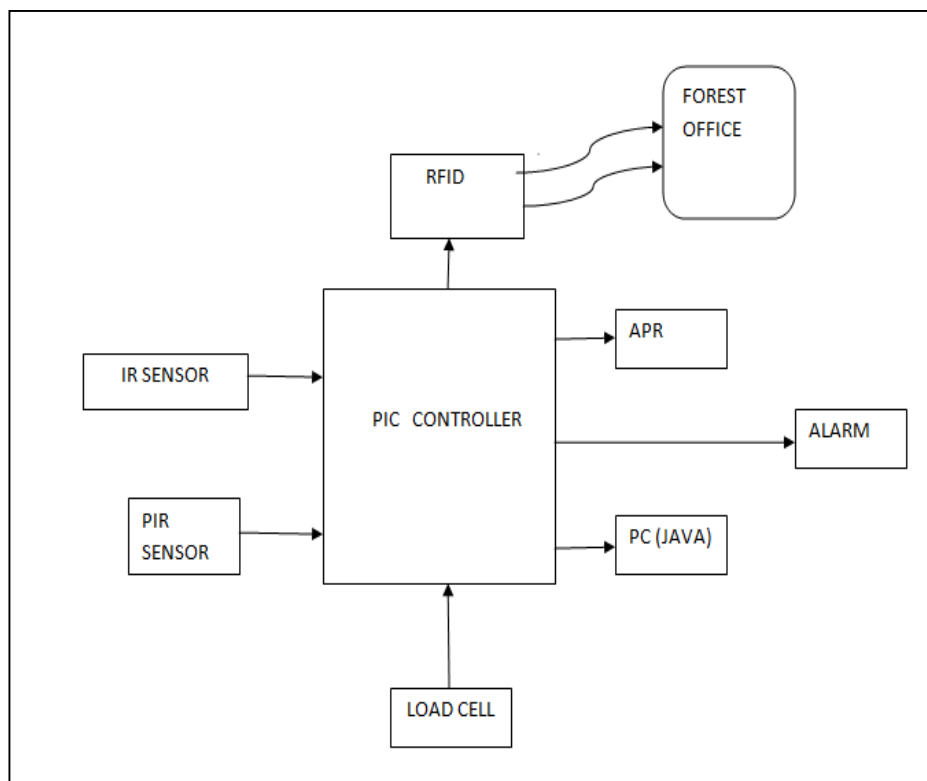


Fig 1. Block Diagram

There are several common shapes, here double ended load cell (a straight block of material fixed at both ends) are used. Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR

transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. If any object is detected, LED light will be on to indicate it. But IR alone is not enough to detect the presence of animal since it is only capable of detecting the obstacles. PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in out of the sensors range. They are small, inexpensive low-power, easy to use and don't wear out. For many basic projects or products that need to detect when a person has left or entered the area, or has approached, PIR sensors are great. They are low power and low cost, pretty rugged, have a wide lens range, and are easy to interface.

4. METHODOLOGY

4.1 IR SENSOR

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly, IR Receiver is used to receive the IR rays transmitted by the IR transmitter. The RE 200B is a passive infrared sensor designed to pick up heat radiation of wave lengths in a band around 10 microns. It contains two active elements configured as balanced differential series opposed type. This results in good compensation of environmental temperature and excellent sensitivity for small changes of a spatial temperature pattern.

Thermal signals far below one microwatt are sufficient to trigger a sufficient output voltage change. Load cell is a sensor that performs functionality of converting force into an electric output which can be measured. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

Infrared radiation was first discovered by the astronomer William Herschel. He conducted an experiment in which he used a prism to refract light from the sun. Herschel was able to detect the presence of infrared radiation beyond the red part of the visible spectrum using a thermometer to measure an increase in temperature. In 1800 Herschel published his findings to the Royal Society of London.

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. Infrared is light that has a wavelength longer than visible red light. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same

wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

All objects emit light according to their temperature--this is called "black body radiation." The hotter the object, the shorter wavelength of light it emits. The Earth emits infrared light at a peak of about nine to 10 micrometers--and so do warm-blooded animals like humans. This light can be used to detect motion or warmth.

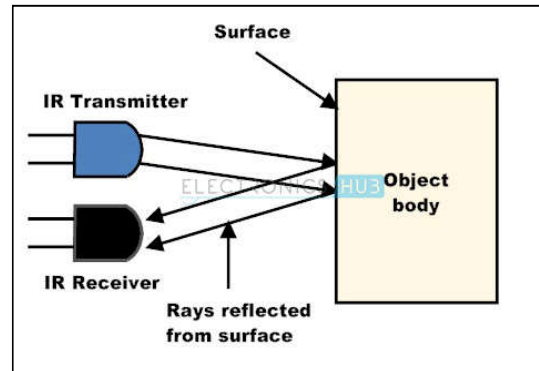


Fig 2. IR Transmitter and Receiver

4.2 PIR SENSOR

PIR sensors allow us to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors. PIRs are basically made of a pyroelectric sensor (which you can see above as the round metal can with a rectangular crystal in the center), which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves are wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the output will swing high or low.

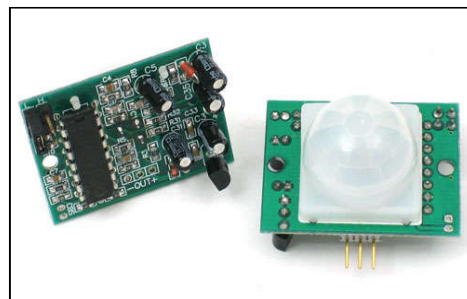


Fig 3. PIR Sensor

4.3 LOAD CELL

Features

- Ready to Interface with Microcontrollers
- 8 Bit Data o/p Reference to Load
- UART o/p
- Varies from 0- 255

Applications

- Load checking
- weight
- Strain Guage

Working:

- Load cell is Interfaced with SPI Based ADC chip
- Using 8051 Microcontroller Conversion of SPI to UART o/p and 8 bit O/p
- Easy to Interface with 8 bit Microcontrollers

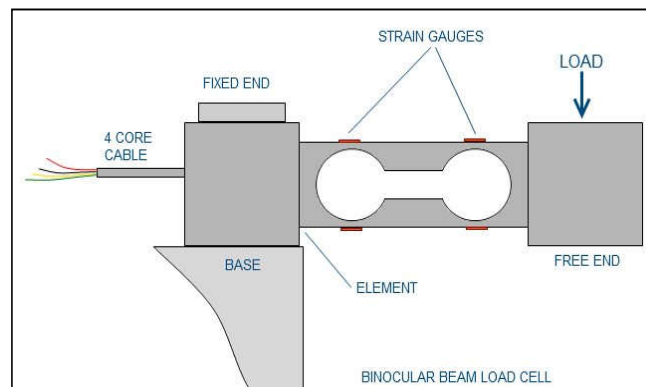


Fig 4. Load Cell

5. CONCLUSION

It is absolutely heart-breaking knowing that wild animals are being maimed by trains in the railway tracks. The collaborative effort of wireless sensors will detect the presence of animals near the railway track around the forest/village area. The implementation of an automatic drum alarm system will threatens the animal and thereby preventing it from crossing the railway track. The detected information is also transmitted to the forest office via RF transmitter and receiver. Though it is very difficult to prevent animal casualties on railways, this system will help them to safely return to their shelter without the risk of being hit by an oncoming train.

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