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Alert System for High Speed Vehicles to Avoid Wildlife Accidents

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ABSTRACT
"Alert System for High Speed Vehicles to Avoid Wildlife Accidents" is an alert system used to safeguard our wildlife. We often hear of various accidents of wild animals like elephant, nilgai etc., who are trying to cross the railway track. So, an intelligent electronics system is necessary which can be affixed to avoid the possibilities of accidents. Regarding this, in our project we are using a Passive Infrared Sensor (PIR sensor) which is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view and switches ON any electrical/electronic device to which it is connected to. The key component of the sensor module is the pyro-electric element. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it is radiated at infrared wavelengths, but it is detected by this PIR sensor. This sensor does not radiate any energy for detection purposes and thus, it has no harmful effects on living beings. In our project the PIR sensor is used as a part of a burglar alarm and the electronic in the PIR typically control a small relay. This relay completes the circuit across a pair of electrical contacts connected to a detection input zone of the burglar alarm control panel. The system is usually designed such that if no living creature is being detected, the relay contact is closed- a 'normally closed' (NC) relay. If energy emitted from any nearby creature is detected, the relay opens, triggering the alarm, a signal will be directly sent to the driver's chamber and it will create a message in the LED screen of his chamber also an alarm will be heard which we have implemented using an ultrasonic sensor hc-sr04.

Keywords **-** Arduino UNO, Buzzer, GSM SIM 300, PIR Sensor, SMS, Ultrasonic Ranging Sensor

I. INTRODUCTION

At a time when Environment is the concern of most countries, safeguarding animals from any kind of hazard is of utmost importance for us humans in order to maintain an ecological balance. Over the last few years, we learn that animals tread into railway tracks and lose their lives by virtue of being hit by these trains. The population of animals has been diminishing rapidly with habitat loss and human encroachment; the endangerments of animals are further burdened by these railway accidents. PETA had also filed a Right to Information request with the Ministry of Railways to find out about the actions being taken to address the issue. But what makes this tragedy even more ironic is that an Animal, the elephant, is the mascot of the Indian Railways. Adhering to this problem we thought of making a device which would allow us to reduce these accidents by sounding an alarm and informing the driver as well as the office from where the signal is operated. The alert system consists of two sensors- PIR and an ultrasonic ranging sensor along with a buzzer and a Fresnel lens in order to increase the range of radiations the system can receive. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose such as a PIR sensor. On detection of any living being on the railway track when the train is approaching the sensor circuits will then transfer the signal to the Microcontroller chip (ARDUINO UNO). Subsequently, the Microcontroller signals the GSM SIM 300 module to communicate with the user via SMS. The GSM module first contacts the base station which in turn contacts the train driver's android device using satellite connectivity. Thus communicating to the driver where there is danger to the living being by providing the pir number near which the living being has been detected. In addition to alerting the driver of the train, a buzzer would be sounded in order to alert the living being. Also in a realistic scenario the hc-sr04 ultrasonic ranging sensor shall be placed at an optimal height such that it shall be in sync with the rate at which the train is approaching towards the living being. The block diagram for the entire process is given below (fig 1). The ARDUINO UNO is the brain and control unit for the entire design. The microcontroller has written program stored into its Programmable Read Only Memory(PROM).

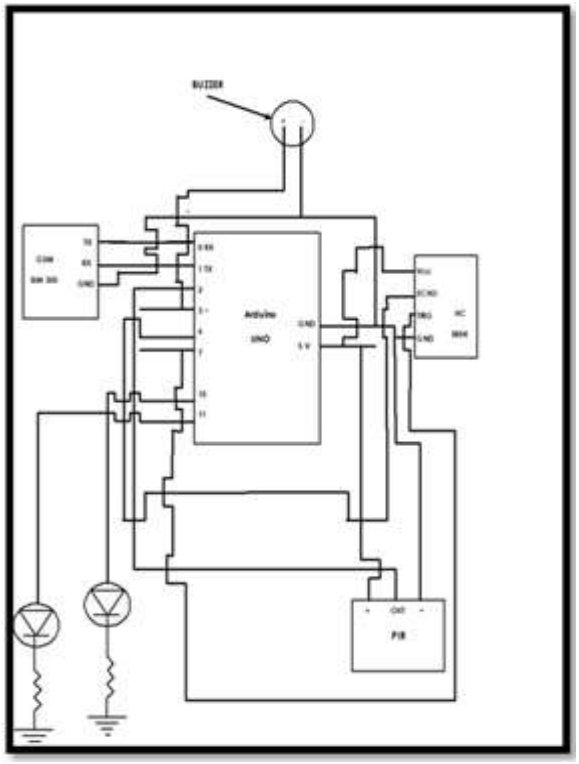
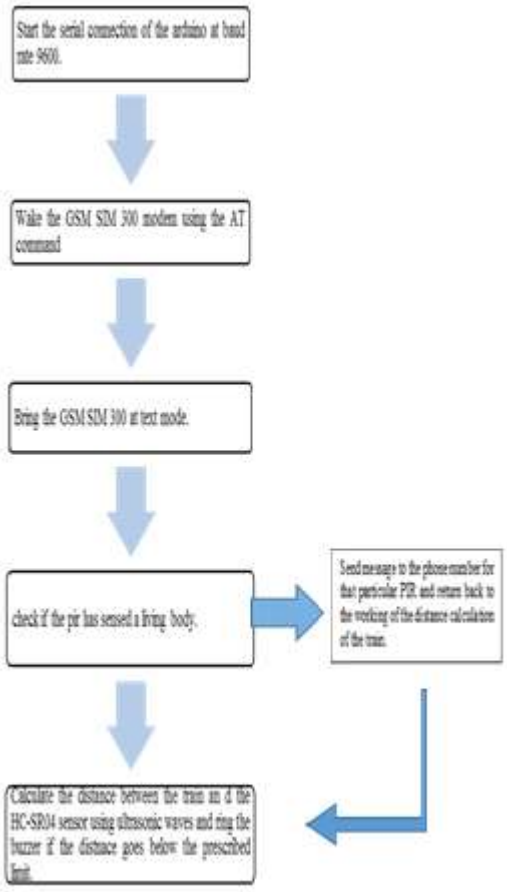


Fig: -1 (Circuit Diagram of the System)

II. GENERAL WORKING OF THE ALGORITHM



III. ALGORITHM AND IMPLEMENTATION

In this section we discuss the various implementation details.

Step 1: Declare trigpin, buzpin, echopin, pir, led as macros and initialize them to 0.
Step 2: Define the setup () method.
Step 3: Begin serial connection at baud rate 9600.
Step 4: Set trigpin, led, buzpin in output mode and echopin, pir in input mode
Step 5: Transmit the message "AT" from the Arduino to the GSM SIM 300 //used to wake up the GSM SIM
Step 6: Provide a 200 milliseconds delay //time required by the GSM SIM to answer back
Step 7: Serial print "AT+CMGF=1" //used to place the GSM SIM in text mode
Step 8: Delay 200 milliseconds
Step 9: Define the loop () method
Step 10: if pir = HIGH then led = HIGH
Step 11: Serial print "AT+CMGS+\phone_ number" //used to place the phone number of the driver's android device, note that the phone number must be provided with proper country code.
Step 12: Wait till the GSM SIM answers back with a ">" symbol.
Step 13: Serial print "desired message"
Step 14: Delay 500 milliseconds
Step 15: Serial print 0X1A
Step 16: Serial print 0X0D
Step 17: Serial print 0X0A
Step 18: Set trigpin = HIGH
Step 19: if echopin = HIGH record time using millis () method
Step 20: Let velocity of sound in air = 330 m/s, calculate distance of the obstacle from HC-SR 04 and store it in variable dist.
Step 21: if dist < permitted limit the buzpin=HIGH. //used to alert the animals about the arrival of the train using the buzzer.
Step 22: goto Step -10
Step 23: End.

IV. CONCLUSION AND FUTURE SCOPE

The vital feature of the project is its simplicity, flexibility and expandability since number of sensor circuits can be integrated on a single Arduino kit and it can be implemented in different environments. This project has been designed keeping in mind the local conditions. Also we wish to implement this project in reality so that we are successful in safeguarding our wildlife.

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