Advanced Road Accident Prevention System

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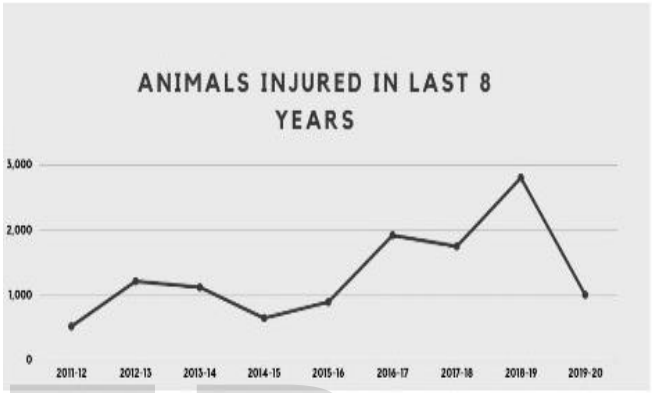
***Abstract*— As we know a lot of accidents happen during night time especially on the highways and that affect the life of people and the animal living in that area. This paper aims for prevention of road accidents. It detects living objects like animals and humans during the night time. In the proposed system, we will be using IR sensors (thermal camera) to detect the living objects on the road at a certain distance, and will display them on the LCD screen. We will also be using laser sensors for detection of living objects and giving an alert with an alarm. This system will ensure the safety of the living beings on the road also the ones who are using the automobile**.

Keywords*— *IR sensors, LASER sensors, Thermal camera Accident, Accident prevention.

I. INTRODUCTION

Wild species living close to us and nowadays struggling for survival due to mass destruction of species in road side accidents. Right now the rates of wildlife road mortality are neither sustainable for biodiversity nor a healthy reflection of our connection with the environment and the animals who try to cordially exist with us. Human activity, modernization and insensitivity towards the lives of other animals make a lot of challenges to nature. The Report made of Road Safety, given to us by WHO (World Health Organisation) identified the prime causes of accidents as rash driving/over the speed limit, driving while they have consumed alcohol/drugs, any many reasons.

The following graph shows us the data over the years of number of animals that were killed during road accidents.



Dog	9971
Cat	1009
Cattle	723
Goat	34
Donkey	27
Monkey	37
Bird, swine, mongoose	63
TOTAL	11,915

Figure [1.[] GRAPHICAL REPRESENTATION FOR DATA GIVEN BY TOI

II. LITERATURE SURVEY

The author in [[8]], proposes a system that combines a smart automobile and a smart traffic signalling to avoid the rash accidents. The smart cars consists of RF receiver, a microcontroller and a sonar sensor with a fixed display in a car, also the smart traffic signalling system contains a RF signalling transistor based microcontroller that is placed in every traffic post. The sonar on the savvy car will offer assistance by measuring the separate of encompassing vehicles.

In [[1]], proposes that Traffic Hazards is the major problem facing globally. The prime causes of traffic hazards is increase in vehicles and dense population. Reducing traffic hazards is one the major challenges as the majority of the deaths across the world are due to road accidents. Hence it is necessary to provide better transportation facilities that can reduce the ratio of road accidents and save life's of people.

One of the solutions that is proposed in this paper is using Arduino Uno technology and IR sensors. The system has two phases-Accident Detection and Accident Prevention. The detection phase is done using IR sensors that could alert the people by detecting and by sending SMS using GSM module which has predefined numbers and accident location using GPS. In Second Phase, the accident prevention is carried out using IR sensors by warning the driver about the neighbouring vehicles when the distance is beyond the threshold value.

Also in [[2]], proposes that an accident prevention and identification system is being introduced with recognition for vehicles that will give higher chances to reduce the number of road mishaps increasing every day and if disaster happens, the proposed technique will track it down and will directly notify the people who will take instantaneous actions. GPS and GSM are used to develop Arduino based system. An accelerometer will be utilized which is able to degree the velocity and the vehicle's tilting if it strikes over something. When the speed of the car will be more than the characterized greatest speed for the street or it tilts, a caution will be given consequently. At whatever point any mishap will take put, GPS will find the geological facilitates for that specific put and will send an SMS utilizing GSM module

III. PROPOSED SYSTEM

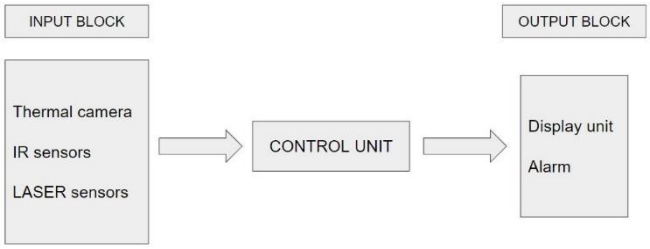


Figure [2.] BLOCK DAIGRAM

The proposed system is an effort towards preventing these fatalities from happening. We will be using various sensors and alerting systems to give out an alert beforehand. This will help us in getting a hold of the situation and taking a step towards avoiding these accidents. The technologies we used in the proposed system are the LASER sensor, alarm system, IR (thermal camera) LCD display. The software used for this system is the Arduino.

IV. SOFTWARE AND HARDWARE

SOFTWARE: The software used for this system is the Arduino. It is one the most popular and easy platforms with people beginning with electronics Arduino consists of a programmable circuit board also called as microcontroller and bit of software/IDE (Integrated Development Environment) which works on our PC, utilized to type in and physically transfer the coding system to the Arduino board.

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HARDWARE: The hardware of the system consist of a laser sensor, IR sensor and thermal camera. The laser sensor is used for detecting the distance of the living object and alarm the driver beforehand. It is a proximity type laser sensor, usually called the photoelectric sensor. Alarming the driver a little beforehand can help the driver to process the situation and act accordingly, saving several lives. The IR sensor and the Thermal camera help the process of identification by giving us the image of the living object, helping the driver to take further actions as soon as possible in case of any accident.

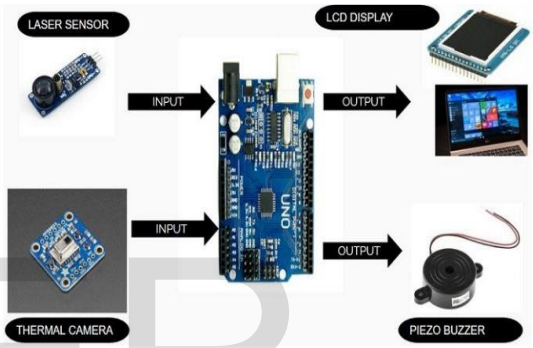

Figure [3.] DETAILED BLOCK DAIGRAM

A. *ARDUINO*

Arduino Uno R3 is ATmega328P based microcontroller. It incorporates the entire device necessary to foothold the microcontroller; with assistance just attach it to the PC with the help of USB, and provide utilizing an AC-DC connector/battery to induce begun. The term Uno implies "one" in Italian dialect and was chosen for stamping the discharge of Arduino's IDE 1.0 computer program. The 3rd Arduino Uno is R3 as well as the most recent modification. It comprises 14-digit I/O pins. This board incorporates 14 computerized input/output pins, Analog inputs-6, a USB association, quartz crystal-16 MHz, a control jack, a USB association, resonator-16Mhz, a control jack, an ICSP header and an RST button.

Power Supply: The outside supply (6 to 20 volts) basically incorporates a battery or an AC to DC connector. The battery terminals can be associated within the pins of Vin as well as GND.

Memory: The memory of a microcontroller includes 32 KB and 0.5 KB memory is for the Boot loader, and also it includes SRAM-2 KB and EEPROM-1KB.

Input and Output: Uno R3 incorporates 14 of the digital pins which can be utilized as i/o pins, by utilizing the

capacities like pin Mode(), digital Read() & Write(). The pins can work with 5V, and every digital pin can transmit or receive 20mA, including a pull up resistor of 2ok to 50k.

Serial Pins: The TX(1) and RX(0) are serial pins of an Arduino board and can be used to send the TTL serial data.

B. LASER Sensor

The laser proximity sensor recognizing objects, by passing the laser light on the object and identifying the reflected laser. This proximity sensor (obstacle/object detector) will detect very small size objects too within the detection range. This happens because the laser light is very focused in the particular direction that its projected and almost has no divergence. The digital output signal is provided by the Laser proximity sensor, which is attached to the digital IO pin of Arduino board. Software will read the digital IO pin value and output will be given in the form of Piezo buzzer. The Sensor incorporates laser source (transmitter), laser detector (receiver) and signal amplification (conditioning circuit).

The receiving tube can only receive the reflected light in the same frequency and effectively prevent the noticeable light, since the laser sensor adopts modulation processing technology. Effective sensor distance of calculation is 0.8m-1.5m.

C. Thermal Camera

Panasonic's thermal IR sensor i.e. the AMG8833 is the newest generation 8X8 thermal IR sensors, that provide better performance than its previous version AMG8831. The sensor contains a configurable interrupt pin that can fire when any particular pixel goes more or less than the threshold that you set and only supports 12C. When it is connected to the raspberry Pi or microcontroller it will give an output array of 64 different infrared temperature ratings over I2C. It's compact and simple enough thermal camera for easy integration. It has an accuracy of +- 2.5°C, this part will measure temperatures ranging from 0°C to 80°C. It can sense a living being from 7 m. It's perfect for creating your own small thermal camera or human detector , having a maximum frame rate of 10Hz.

D. LCD Screen

TFT LCD Screens (Thin-film-transistor liquid crystal display) are excellent graphical displays to show the information, with 1.8 Inch Touch Display modules. They are a form of a LCD which use Thin Film Transistor technology to enhance quality of the image, like contrast and addressability. It can be utilized with all kind of microcontroller, since the display has its own pixel-addressable frame buffer and uses 4-wire SPI to communicate. For the convenience of this project we will be using our laptop screen as a LCD

E. Active Buzzer Module

The sound produced by active buzzer module is based on reverse of the piezoelectric effect. The Buzzer we are using is 3.3V-5V DC Electronic Part Active Buzzer Module. It is durable in use, using top quality material.

The active buzzer will keep ringing as long as we electrify it. It is a bit expensive but easier to control, compared with a passive buzzer. Buzzers are typically used as alarm devices, timers, and confirmation of user input. It is a 3 pin buzzer module with VCC, I/O and GND terminals.

V. WORKING PRINCIPLE

The proposed system works on the principle of interference. If the LASER is interrupted, the buzzer will give an alarm. We can stop the buzzer only by pushing the Reset button. The laser puts out a straight beam of light of unicolour and is a concentrated light source. The LDR is light sensitive and when the light hits it, puts out a voltage. When the beam of the laser can't reach LDR due to interruption, its output voltage changes, which leads to the alarm rings.

What we can do is, instead of LDR, we can use Light Sensor. So what the light sensor does is, when the laser is projected on the Light Sensor it will register a particular value which will be of a higher range and will also be constant. When the laser light is cut but any object, it will reduce the value of light sensed by the Light Sensor and so, the buzzer will go on until we Rest using the Reset button. Following is the table and graph to explain the readings of the laser sensor used.

Time (in sec)	Readings of the Light Sensor
1	650
2	650
3	650
4	500
5	550
6	650
7	650
8	25
9	500
10	650

Figure [4] READINGS OF LIGHT SENSOR

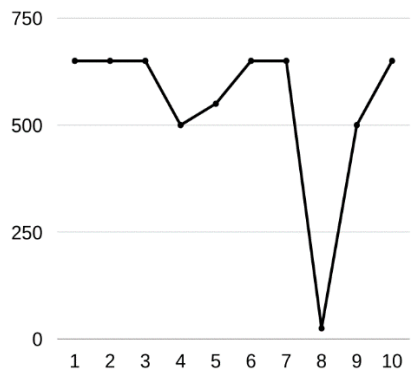

Figure [5.] GRAPH FOR THE READINDS OF LIGHT SENSOR

Simultaneously, when the laser sensor gets activated, our thermal camera senses the living object nearby and gives us the display on the screen. It senses the heat/temperature of the nearby living thing and gives the display like, if the heat is sensed in a particular area, it shows a combination of red, orange and yellow colour, whereas the cold areas are shown as blue or green.

Output of the laser sensor system is given below:

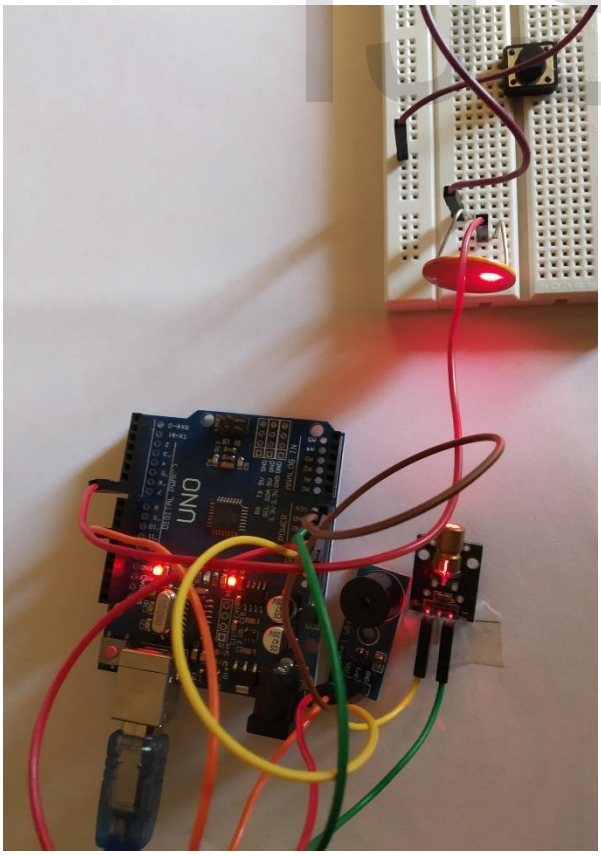

Figure [6.] LASER SENSOR OUTPUT

VI. Conclusions

As the automobiles and technologies are enhancing, the need to protect our environment and the wildlife is equally important. Our system aims at protecting the wild life that get harmed due to lack of sensing system.
In this paper, it aims for prevention of road accidents. It detects living objects like animals and humans during the night time. It is observed that the system detects living objects and alerts the driver about it.

Future scope of our proposed system is that, we can use the adaptive cruise control system, so that if any living object is detected, the speed of the automobile will automatically be reduced.

VII. References

[1] Al Wadhahi, Naji Taaib Said, et al. "Accidents Detection and Prevention System to reduce Traffic Hazards using IR Sensors." *2018 7th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)*. IEEE, 2018.

[2] Mahammad, Md Sadad, Maliha Mansur, and Md Saniat Rahman Zishan. "An Arduino based accident prevention and identification system for vehicles." *2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)*. IEEE, 2017.

[3] Nagarjuna R., et al. "Smart road accident detection and communication system." *2018 International Conference on Current Trends towards Converging Technologies (ICCTCT)*. IEEE, 2018.

[4] Rajemi, Siti Zubaidah Binti, et al. "Pedestrian detection for automotive night vision using thermal cameras." *2012 7th International Conference on Computing and Convergence Technology (ICCCT)*. IEEE, 2012.

[5] Badamasi, Yusuf Abdullahi. "The working principle of an Arduino." *2014 11th international conference on electronics, computer and computation (ICECCO)*. IEEE, 2014.

[6] Design of Animal Detector Based on Thermal Imaging Sensor.

[7] Pagadala, Vidya, Sheetal Rani, and B. K. Priya. "Design and Implementation of the Prevention and Analysis of the Accident for Automobiles." *2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI)*. IEEE, 2018.

[8] Taher, Taieba ct al, “accident prevention smart zone sensing system” (2017)