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Development of an Artificial Intelligence Based Safer Transport System in Mountains

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Abstract: ***Safety in transport systems is the foremeost requirement. For which Cognizance is sought in right design initiatives such as thru' artificial intelligence (AI). In this work, using a sensor system and signal processors a tool was used to avoid road accident in hilly area. Sensors used to monitor each vehicle from designed standoff distance and buzzer to alert driver crossing from other side was the forte of development. Design and fabrication of trouble free driving using arduino road tracking was the prime objective of experimental set up. Ultrasonic sensors used to detect up to a distance to an object by at a specific frequency to the target by measuring the time between the emission and reception.***

Keywords: Artificial Intelligence, Intrusion Detection Systems, Neural Networks (Computer), UTMC.

I. INTRODUCTIO0N

Safety in transport systems is dependent upon the warning distance. In mountaneous terrains the sharp curves give no time [1]. The solutions are available in Design, development and Deployment [2]. Artificial intelligence is the intelligence exhibited by machines or software(1)In present road accident is major problem face all over the world. In Indian accident rate is quit higher as compared to other country. Road accident mostly happen due to bad weather, ruff driving and at sharp turn. Advance intelligence safety system effective to minimize road accident. Transport Systems (ITS) are progressive claims which, without exemplifying intelligence as such, aim to afford road accident with high efficiency. Intelligence transportation system helps to achieve better control on transport and traffic handling safer even at complex transport networks. During the year 2010 EU directive deployment of ITS system was created to control traffic. In this system various advance technique was used to developed intelligence transportation system for improve better transport with low cost and high safety. ITS have been used for various application namely ash tolling, road pricing, public transportation travel information and tracing system, vehicle safety and driver information and guidance. In these fields ITS was developed with high efficiency for pilot study which should be implemented in real field. In developed country like USA, Japan and UK the ITS was adopted. The UTMC program is evolving an open structure project description for traffic management applications in urban area. The new requirement will permit better flexibility for attaining and growth of new applications. In this article aim was to develop trouble shooting intelligence system for minimize road accident in corner and U turn. In this system a trouble shooting system was design to provide information to vehicle coming on other size which are not able to see the vehicle come from opposite size. It is claimed that artificial intelligence is playing an increasing role in the research of management science and operational research areas. Intelligence is commonly considered as the ability to collect knowledge and reason about knowledge to solve complex problems[3]. Such competencies will go a long way in developing and directing the future of cars tomorrow [4,5].The various techniques applied in artificial intelligence are Neural Network, Fuzzy Logic, Evolutionary Computing, and Hybrid Artificial Intelligence[3]

The use of technology, and its development, and the need to develop the alignment has been amply reinforced by Thareja [6], who additionally calls for an implicit need of education [7], because the causes of accidents could be avertable if drivers are more conscious of safety and conscientious of their responsibilities [8]. is imperative

II. DESIGN & DEVELOPEMENT

In design of trouble shooting intelligence transportation system shooting U-turn mountain area has following steps and selection of components. Set of sensors signalling system, piezoelectric buzzer, battery and LED was used for it. Road traffic accidents (RTA) are responsible for 1.2 million deaths worldwide each year [9]. Ultrasound is defined by the American National Standards Institute as "sound at frequencies greater than 20 kHz." In air at atmospheric pressure ultrasonic waves have wavelengths of 1.9 cm or less. Ultrasound is sound waves with frequencies higher than the upper audible limit of human hearing. Ultrasound is no different from 'normal' (audible) sound in its physical properties, except in that humans cannot hear it. This limit varies from person to person and is approximately 20 kilohertz (20,000 hertz) in healthy, young adults. Ultrasound devices operate with frequencies from 20 kHz up to several gigahertz. A major part of what it means to understand a story is to know how the different events and states described inthe text relate to one another temporally.

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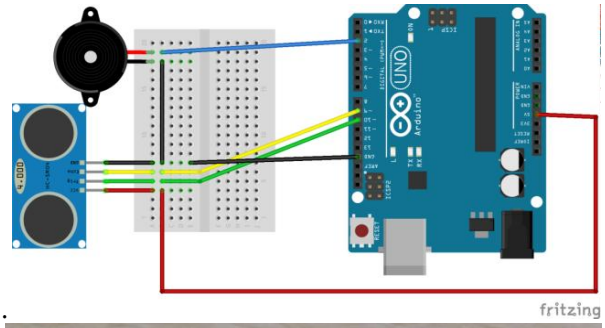

Fig. 1. Ultra Sonic Sensor Setup Used for ITS

Ultrasound is used in many different fields. Ultrasonic devices are used to detect objects and measure distances. Ultrasound imaging is often used in medicine. In the nondestructive testing of products and structures, ultrasound is used to detect invisible flaws. Industrially, ultrasound is used for cleaning, mixing, and to accelerate chemical processes. Animals such as bats and porpoises use ultrasound for locating prey and obstacles.[1] Scientist are also studying ultrasound using grapheme diaphragms as a method of communication. A signal as referred to in communication systems, signal processing, and electrical engineering is a function that "conveys information about the behaviour or attributes of some phenomenon". In the physical world, any quantity exhibiting variation in time or variation in space (such as an image) is potentially a signal that might provide information on the status of a physical system, or convey a message between observers, among other possibilities. The IEEE Transactions on Signal Processing states that the term "signal" includes audio, video, speech, image, communication, geophysical, sonar, radar, medical and musical signals.

In nature, signals can take the form of any action by one organism able to be perceived by other organisms, ranging from the release of chemicals by plants to alert nearby plants of the same type of a predator, to sounds or motions made by animals to alert other animals of the presence of danger or of food. Signalling occurs in organisms all the way down to the cellular level, with cell signalling. Signalling, in evolutionary biology, proposes that a substantial driver for evolution is the ability for animals to communicate with each other by developing ways of signalling. In human engineering, signals are typically provided by a sensor, and often the original form of a signal is converted to another form of energy using a transducer. For example, a microphone converts an acoustic signal to a voltage waveform, and a speaker does the reverse.

The formal study of the information content of signals is the field of information theory. The information in a signal is usually accompanied by noise. The term noise usually means an undesirable random disturbance, but is often extended to include unwanted signals conflicting with the desired signal (such as crosstalk). The prevention of noise is covered in part under the heading of signal integrity. The separation of desired signals from a background is the field of signal recovery, one branch of which is estimation theory, a probabilistic approach to suppressing random disturbances.

Engineering disciplines such as electrical engineering have led the way in the design, study, and implementation of systems involving transmission, storage, and manipulation of information. In the latter half of the 20th century, electrical engineering itself separated into several disciplines, specialising in the design and analysis of systems that manipulate physical signals; electronic engineering and computer engineering as examples; while design engineering developed to deal with functional design of man–machine interfaces.

After sensing the signal by the ultra sonic sensors. It gives the signal to the signal pole and then a red signal is displayed on the signal pole with a buzzer sound to alert the vehicle driver to stop. After the vehicle coming from the opposite direction, when it passes the signal pole it gives the green signal to pass the vehicle freely. This signal system we used in this project .Then it is easy to recognize and there is a chance to control the vehicle. A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. A piezoelectric buzzer/beeper also depends on acoustic cavity resonance or Helmholtz resonance to produce an audible beep

These are the buzzer we used in this project Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development

environment (IDE) based on the Processing language project. The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

III. ROAD TRACK & ARTIFICIAL HILL

- In this aspects we made a wooden sheet for the main base part.
- A thermacol sheet is placed upto certain height.
- For this a artificial hill is placed in the middle of the wooden sheet which is arranged according to the thermacol sheet.
- Road track is made a round the artificial hill.
- Each corner of the artificial hill a signalling pole is placed with red and green signal that appears to the coming vehicles to certain distance.
- Buzzering system is done with a buzzer sound when the vehicle passes the sensors line at the given distance to the signalling system with a sound.

Each battery supply 9 volts we use this battery for power supply to the signals and buzzers. A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that 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. LEDs are typically small (less than 1 mm^2) and integrated optical components may be used to shape the radiation pattern.

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in remote-control circuits, such as those in remote controls for a wide variety of consumer electronics. The first visible-light LEDs were also of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven-segment displays and were commonly seen in digital clocks. Recent developments have produced LEDs suitable for environmental and task lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light-emitting diodes are used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, and lighted wallpaper. They are also significantly more energy efficient and, arguably, have fewer environmental concerns linked to their disposal.

Unlike a laser, the colour of light emitted from an LED is neither coherent nor monochromatic, but the spectrum is narrow with respect to human vision, and for most purposes the light from a simple diode element can be regarded as functionally monochromatic.

IV. SENSORS CODING SYSTEM

Code Explanation:

First and foremost we have to define the pins for ultrasonic and buzzer in order to retrieve the information from the sensor and to send it to the buzzer.

Void setup() is the inbuilt function in arduino where we layout the initial conditions for the program so that the Arduino knows what kind of work it's going to be doing. pin Mode tells us whether the pin is input or an output.

```
void setup()
{
        pinMode (trigPin, OUTPUT);
        pinMode(echoPin, INPUT);
        pinMode(buzzPin, OUTPUT);
}
```

defined the loop function to run over and over when the obstacle is ahead in order to reduce the complexity in coding. Digital Write() gives value to the trigpin to trigger the sensor for every 1ms by generating a pulse. Initialize the variable duration which will be the input pulse width and variable distance will be the distance to the obstacle in centimeters.

```
void loop()
{
        int duration, distance;
        digitalWrite(trigPin, HIGH);
        delay(1);
        digitalWrite(trigPin, LOW);
```

Defining the variables duration to measure the pulse

input in echo pin and distance is half the duration divided by 29.1(from datasheet).

```
duration = pulseIn(echoPin, HIGH);
distance = (duration/2) / 29.1;
```

Defining if and else condition to make the buzzer ring only when the obstacle is between 0 and 0.5m with a delay of 60ms.

```
if (distance <= 50 && distance >= 0) {
// Buzz
digitalWrite(buzzPin, HIGH);
 } else {// Don't buzz
digitalWrite(buzzPin, LOW) }
        delay(60);}
```

After sensing the signal by the ultrasonic sensors. It gives the signal to the signal pole and then a red signal is displayed on the signal pole with a buzzer sound to alert the vehicle driver to stop.When the vehicle passes through the arranged sensor then the sensor detects the vehicle moment and gives the information to the control unit .The control unit within fraction of seconds gives the signal to signal pole .It gives the signal whether to stop or go if the vehicle either coming to the opposite direction or no. If the red signal is given it is the indication that there is a vehicle coming from the opposite direction so he has to stop the vehicle. If the green signal is displayed it is the indication the way is free to remove from other side Hence it is the indication that is emerged in this process

V. CONCLUSION

Now a days we see many incidents occur due to huge road curves in many parts of India. So in-order to prevent these incidents we are setting a signalling system which gives a signal with a buzzer sound to alert the opposite vehicle driver to slow down his vehicle by these we can reduce such type of accidents. Following are the conclusions drawn on based of present work.

- Road accident can be minimized by using intelligence transportation system.
- Intelligence transportation system also helps to control traffic at complex road network.
- It is effective system which can be used in any weather condition and at any location.
- ITS have low cost and required small space and easily modified signal distance according to available space with fraction of time.

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