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Automatic Headlight Dipper

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***Abstract:* -- An automatic system of dipping the headlight in cars and other road vehicles which automatically dims the glare of the opposite car which reflects on the driver's eye which can prevent many accidents happening across the globe. The system includes a Photodiode or LDR to judge the intensity of light, Ultrasonic Sensor for sending and receiving signals, Arduino UNO microcontroller and embedded C programming.**

***Keywords:-* Photodiode, LDR, Arduino UNO, Ultrasonic Sensor, Embedded C.**

I. INTRODUCTION

One must have come across the irritating situation while driving at night when we find the Headlight Lamp focus from an opposite vehicle straight to our eyes, making things difficult to assess, giving rise to a situation of some collision or some kind of possible accident.

Highbeam lights in vehicles Incidentally, the driver of the opposite vehicle might be going through the same situation due to the focus our vehicle. Such situation are normally tackled by using normal dipper or manual dipper switch mechanism, where the driver is prompted to "dip" the focus of his headlight, thus giving the opposite vehicle a chance to adjust his vehicle and also an indication that he too needs to "dip" his vehicle lamp. However, doing the operation manually every now and then can become horribly laborious and troublesome, therefore if an automatic system is incorporated, it can save this headache of the driver in stressful conditions and on dangerous roads and highways.

Fatal road accidents happening at night

The following describes an effective auto head lamp dimmer or dipper.

II. SYSTEM ARCHITECTURE

The system architecture is very simple as well as logical. Here are some of the basic componenets the each car should have:

1. Arduino uno microcontroller
2. Ultrasonic sensors
3. Photodiode
4. Notification system

Arduino uno microcontroller:

Connection of Ultrasonic Sensor with Arduino UNO Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It

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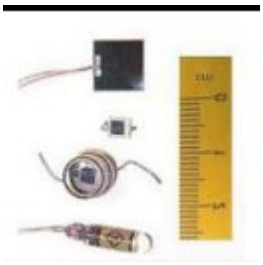
contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter evry to get started.

Photodiode



It is used to detect the intensity of light falling on it. its output is connected to the input of microcontroller. A **photodiode** is a semiconductor device that converts light into current. The current is generated when photons are absorbed in the **photodiode** . A small amount of current is also produced when no light is present. **Photodiodes** may contain optical filters, built-in lenses, and may have large or small surface areas .It is placed behind the rear view mirror.

Ultrasonic sensors

Ultrasonic sensors are sensing devices they work in 2 modes ,namely:

- ♣ Active mode
- ♣ Passive mode.

When it is transmitting signal ,it works in active mode and when it receives a signal, it works in passive mode. It is placed in the front part of the car. It will generate signal in the form of high frequency sound wave having frequency anything above 20,000Hz which is greater than human audible range. It travels at a speed of 330m/s which is higher the speed of any vehicle and hence can tranmitt and receive signals very fastly,within a fraction of mincroseconds. The HC-SR04 **Ultrasonic** Module has 4 pins, Ground, VCC, Trig and Echo. The Ground and the VCC pins of the module needs to be **connected to** the Ground and the 5 volts pins on the **Arduino** Board respectively and the trig and echo pins to any Digital I/O pin on the **Arduino** Board.For programming purpose, we need to download SR04 library and install to Arduino IDE.

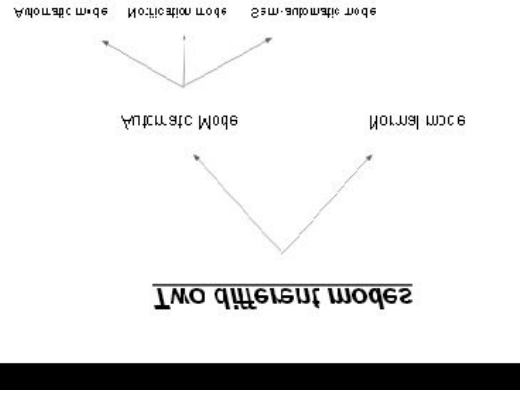
Notification system:

In this context,it is used to inform to the driver to switch the vehicle's headlights to low mode.It can be in the form of beep sound or any other form.

III. DIFFERENT MODES

The proposed system works in three different Automatic modes which are:

1. Auto-Dimming Mode
2. Notification Mode
3. Semi- Automatic Mode



The automatic mode can be switched by the driver from normal mode using a switch provided in the dashboard. The auto dimming mode is an automatic mode in which driver need not to worry about dimming the headlight. The proposed system will automatically dim the high intensity sensed by the LDR or the photodiode. The second mode is the Notification mode in which the driver will be given a notification to dim his vehicle's headlight using a beep sound or a pre-installed voice message. The third mode is the Semi automatic mode in which initially the system will be in notification

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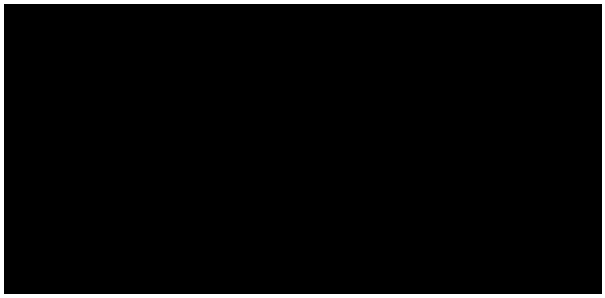
mode which will changes to automatic mode after a fixed programmed time. This mode can be useful for deaf people.

IV.WORKING PROCEDURE



Here are a few steps that will explain the working of this system This requesting signal is received by the sensor of the other car..

1.When two cars are approaching each other in opposite direction and the other car has its headlight in high beam mode.

2. This high beam light will fall on the photodiode of the other car.
3. This information is sent to microcontroller to which it is connected.
4. When the intensity of this light crosses a certain predefined value,the microcontroller will direct ultrasonic sensors to transmit a requesting signal to the car having high beam opposite to it.
5. This sensor is connected to the microcontroller of the car,which then will respond as follows:

- If the system is in automatic mode,the car headlights will automatically switch to dim mode,without intervention of the driver.
- If the system is in notification mode, notification (in the form of beep sound) will occur repeatedly until the driver switches to low beam.
- If the driver do not do so,the headlights will automatically switch to low beam after a predefined time interval.
- If the system is in normal mode, notification (in the form of beep sound) will occur and the driver will switch the car headlights to low beam.

6. All this will take place within a fraction of second, since we are using ultrasonic sensors.
7. If the car is already in low beam the nothing will happen.
8. After the vehicles pass by each other the headlights will again switch to its previous mode.

V. CONCLUSION

In this paper the system is proposed with three modes to control the vehicle's headlight beam and avoid accidents as much as possible. A user friendly interface is available in the vehicle's system. It is also friendly for disabled people(deaf people). The implementation of this idea will be a major step towards elimination of road accidents, as its very cause is being eliminated here.

Acknowledgement

A similar idea was proposed by Edwin Land in the year 1948. This was discussed by him in summer camp Land when he attended that at the age of 14. His idea consisted of a polaroid which was to be fixed on the car's front glass. This idea was rejected due to high installation cost of polaroid including it's wear and tear.

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