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A Review on Automatic Dimming of Headlights and Braking System in a Vehicle

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ABSTRACT

Automobiles help us to travel very long distance in less time with more comfort. Nowadays road accidents are major cause of death and disability. The major cause of accidents takes place due to driver inattention. The drivers of most vehicles use high bright beam while driving at night. This causes inconvenience for the person travelling in the opposite direction. The drivers from the blinding glare of the opposite side having high beam headlights, and the drowsiness of driver causes a serious accident. Ultrasonic sensor is placed to maintain the distance between the vehicles to avoid collision it applies the brakes automatically. Even though automatic braking system was there it leads to the engine failure. This present literature aims that the clutch, brake, accelerator, and the gear system all will come to neutral position while apply the automatic brake and dimming and dipping of head light will be done automatically. Through this work we can able to prevent the major accidents which were occurring due to the night time driving of the vehicles on a road in loop lines and in highways.

Keywords: Accidents, headlights, Ultrasonic sensor, distance, collision, accelerator, brake, clutch, gear.

1. INTRODUCTION

Nowadays, with the improvement of enterprise production technology and the requirement of automation technology, intelligent vehicle and the products on the basis of intelligent vehicle have become the key equipment of automated logistics transportation and flexible production organization system. The design of intelligent vehicles is a topic of current research in many nations worldwide. Intelligent vehicles aim to be able to automatically avoid obstacles and do range finding. Electronic equipment is capable of taking the place of humans in many continuous tasks. In an effort to increase comfort and safety, the usage of electronic components in vehicles is expected to grow. 50 MCUs, for instance, are among the 250 electronic components that go into an automobile. Consequently, automakers in Japan and Europe are developing for safety including collision safety and preventive safety as well as new car technology for intelligent cars like intelligent transport system (ITS), rear view camera system, road-to-vehicle and inter-vehicle communication systems, auto-parking system, hybrid car, electric car, and hydrogen-fuelled car [21, 22]. Electronic devices are typically preferred over people since they can function more quickly and reliably and because they don't get tired [4].

There are many sensors to detect the vehicle. But the efficient one is the ultrasonic sensor due its high range of detecting and available in the low cost. Ultrasonic sensors have been widely employed for several tasks, including figuring out an object's surface structure, detecting its location, and estimating its speed [1, 2]. Ultrasonic sensors operate on the fundamental tenets of sound propagation and material reflection in the ultrasonic frequency range. So it works in the irrespective of the lighting in the environment. It may work in the light intensity of low or dark. The benefits of ultrasonic sensors over cameras are their smaller size, comparably lower cost, ease of implementation, and lower power requirements [1, 4].

1.1 Automatic Dimming of Headlights in a vehicle:

The amount of traffic on our road is increasing daily. This development compelled practically all automakers to consider adding extra safety features and electronic controls to their cars in order to provide consumers with a level of protection that is derived from all traffic circumstances. The requirement of headlight is very common during night travel. The same bulb that helps the motorist see more clearly when driving at night also contributes to numerous accidents. The headlights can be altered from high beam (bright) to low beam (dim) under the control of the driver. The driver must adjust the headlamp to provide the appropriate amount of light [12, 13].

1.2 Automatic Braking System:

The vehicle at the immediate front was named the preceding vehicle. The host vehicle was equipped with necessary hardware along with actuating devices. For avoiding collision, it was necessary to develop an automatic system in which the braking, whether immediate or gradual, would be dependent

on the input from the sensors and output generated by the actuators. Two ultra-sonic sensors were mounted at the side front to measure distance between the host and the preceding vehicle, called following distance. This distance should always be more than the braking distance required by the host vehicle at the current speed. The current speed was fed to the control system as feedback signal for computing correction required in the speed of the host vehicle.

1.3 Bluetooth controlled vehicle:

Bluetooth operated bot vehicles are robotic vehicles that can be controlled wirelessly using a Bluetooth connection from a smart phone, tablet, or other Bluetooth-enabled device. These vehicles are often designed for hobbyists or educational purposes, and can range from simple vehicles that can move forwards and backwards to more complex robots that have sensors and can navigate obstacles.

2. LITERATURE SURVEY

N. Anju Latha etal [1] studies the object's distance is determined using an ultrasonic distance sensor, and the sensor's output is linked to a signal conditioner before being processed by an Arduino microcontroller. Liquid crystal displays are used to show the measured findings. The outcomes are downloaded to a computer. In order to discover the polar distance around the sensor up to 1800 revolutions, the sensor is connected to a servo motor. The LCD display shows the measured distance. It may be utilised in manufacturing lines, automation and robotics, automotive reversing systems, snow depth detection, and tank water level detection.

Arun Francis G et al [2] studies the dispersion of ultrasonic waves in the air causes the waves to rapidly return when they come into contact with any item in their path. The Arduino is linked to an ultrasonic sensor, allowing the sensor to send a signal to the Arduino whenever it detects an item. As the speed of sound in air, the ultrasonic sensor emits high frequency sound waves at regular intervals. After hitting the item, the waves are reflected back to the receiver. The ultrasounds are converted into electrical signals by the receiver, while the electrical signals are converted back into ultrasounds by the transmitter that is built within the sensor.

P. Manikandan et al [3] studies the design of automatic head light dim and dip system. When a car coming from the opposite direction the automated vehicle headlight dim and dip system adjusts the intensity beam. It makes use of a Light Dependent Resistor (LDR) sensor that was created to automatically reduce automobile headlights in order to protect pedestrian's eyes. The driver no longer needs to do manual switching, which was not always done. Additionally, this system's high beam lighting reduces the number of accidents that occur at night.

Roni Stiawan et al [4] Finding increasing and decreasing values of the distance obtained by ultrasonic sensors is used to calculate the number of cars. There should be one rising point and one lowering point per vehicle. The total number of vehicles may be determined using straightforward mathematics by counting the total number of rising and falling values. Finding the largest value between the rising and falling points in the height data series is all that is necessary to compute the kind of each vehicle that has been identified.

Yusuf Abdullahi Badamasi et al [5] studies the hardware and software of an Arduino Uno, as well as the components on the hardware, are both essential to understanding how to write code in the software Integrated Development Environment (IDE) and how to combine both to create your own projects.

Sridhar, N. K et al [6] proposed a work that uses IR sensor that keeps transmitting signal to a range, so it detects the upfront vehicle and using a relay switch and Arduino board to switch the high beam to low beam. If the driver wants to change the low beam to high beam immediately it will work 10 seconds after detects the upfront vehicle.

Aliyu A et al [7] proposed a model that uses ultrasonic sensor and at Mega microcontroller 328 to detect the vehicle or obstacle in front of our vehicle. If the obstacle is within the 4m the sensor gives us warning and decelerates the vehicle if the distance is equal to 3m then the system were applied automatic brakes.

Arpita K et al [8] proposed a work that uses photo transistor and arm controller, Zigbee. The photo transistor receives the high beam of head light from upfront of vehicle will be in analogue form then it will be converted in digital form. The arm controller checks the intensity level of light if it is high; it passes the information to opposite vehicle through Zigbee. And a dimmer circuit placed to reduce the intensity of lights.

Mustapha B et al [9] proposed a model that is based on the multiple sensors are connected parallel to the microcontroller. The microcontroller receives data and sends data to smart transceivers and these are connected to warning devices.

Brindha G M et al [10] proposed a model using ultrasonic sensor and infrared sensor if any one of the sensors or both the sensors detects the obstacle in the 4m and greater than the 3m it turns the buzzer and vibration motor on, if the obstacle is less than the 3m then automatically brakes were applied.

Vithalkar Akshay Ganesh et al [11] proposed a Automatic Headlight Beam Control System for a motor vehicle includes two phototransistors as a normal light sensors, one has a field of view forward of the vehicle, while other has a field of view normal to the road surface and it facilitates not only auto-switching of the headlight but also, beam modulation.

Okrah. S.K Williams et al [12] proposed automatic headlight dimmer which uses a Light Dependent Resistor sensor has been designed to dim the headlight of on-coming vehicles to avoid human eye effects. This avoided the need for the driver to manually convert from high beam to low beam, which was not always done, and reduced the glare impact by sensing the light intensity value of an approaching vehicle.

Victor Nutt et al [13] proposed the most prominent factors for night-time travel is temporary blindness due to elevated headlight intensity. In order to eliminate accidents due to temporary driver blindness, a wireless sensor network (WSN) based controller is devised to quickly transmit sensor data between cars. Low latency allows quicker headlight intensity adjustment to minimize temporary blindness.

Kumar, A et al [14] proposed a system using ultrasonic and vision sensor to detect and identify the obstacle type and gives appropriate warning to the users. The main disadvantages when using ultrasonic sensors in obstacles avoidance system (OAS) are the fact that these sensors cause mutual interference and might not operate properly in rooms with wall to wall carpeting and thick drapery.

Aye, A. N. et al [15] used IR sensor in Wheeled Mobile Robot (WMR) to detect an obstacles along its path and to measure out the distance .They attached infrared sensor coupled with laser range finder in their design of mobile robot navigation to ensure free collision whilst moving around.

Eung Soo Kim et al [16] describes auto-braking system was designed by VHDL and fabricated to keep a distance between two cars. It provides pre-crash safety system for intelligent car. This module can detect the distance between front vehicle and driver's vehicle to keep a constant distance using a sensor and operate the brake system forcibly if the driver does not decrease the speed of car. The system displays the distance between the two vehicles and the speed of your vehicle. The performance of the system was good.

Erik Coelingh et al [17] describes one of the latest AEB systems called Collision Warning with Full Auto Brake and Pedestrian Detection (CWAB-PD). It helps the driver with avoiding both rear-end and pedestrian accidents by providing a warning and, if necessary, automatic braking using full braking power. A limited set of accident scenarios is selected to illustrate the theoretical and practical performance of this system. It is shown that the CWAB-PD system can avoid accidents up to 35 km/h and can mitigate accidents achieving an impact speed reduction of 35 km/h. To the best of the authors knowledge CWAB-PD is the only system on the market that automatically can avoid accidents with pedestrians.

Jiweon Ko et al [18] describes a brake system for an AT-based HEV has been developed, and a regenerative braking cooperative control algorithm has been proposed, with consideration of the characteristics of the brake system. The proposed brake system does not require a pedal simulator or a fail-safe device, because a hydraulic brake is equipped on the rear wheels, and a EWB is equipped on the front wheels. To evaluate the performance of the brake system and the regenerative braking cooperative control algorithm proposed in this study, dynamic models of the EWB, the rear-wheel hydraulic brake, and the HEV power train of the subject vehicle were constructed, and a regenerative braking performance simulator was developed, using the co stimulation of the MATLAB/Simulink-powertrain and brake system model and the Car sim vehicle model. A simulation and a vehicle test were performed to evaluate the performance of the proposed brake system and the regenerative braking cooperative control algorithm.

E. F. Bassey et al [19] investigated on design an obstacle detection model using ultrasonic sensors, model an antilock braking system, develop fuzzy logic rules for both detection and antilock braking system, and simulate the developed model using Simulink in MATLAB software to achieve high braking torque, optimal slip ratio and shorter stopping distance and time. The results show 22% improvement in braking torque thereby giving a shorter stopping time and distance when compared to the normal PID control.

Sachin Hirulkar et al [20] investigated on a Fuzzy Logic Controller (FLC) for an automated car braking system. The response of the system is simulated by using Fuzzy Logic Toolbox in MATLAB and PID controller. The purpose of this controller is to brake a car when the car approaches for an obstacle at a specific range. For this, the Fuzzy Logic Controller is designed using the Fuzzy Logic Toolbox in MATLAB. Based on the simulation done the response of FLC and PID has been compared. The PID controller has been used to constitute a reference for the performance of FLC.

P. Manikandan et al [21] investigated on automated light dim and dip system, under the current system, vehicles are dimmed and dipped manually. It is essential for night time travel. Designing, developing, and producing this autonomous light are all part of our plan, System of dim and dip. When driving at night, the majority of drivers utilise raised, bright beams. This causes discomfort for the person moving in the other direction and, in the majority of cases, accidents.

B. Kalaimathia et al [22] describes an automatic headlight dimmer prototype is what this paper's major goal is to create. When driving at night, the headlight of the approaching car hits the driver's eyes from the opposite end. There are situations when the opposite vehicle's strong light glares the drivers and causes an accident. The troxler Effect is what is known as the sudden glare the motorist encountered. According to several investigations, the troxler Effect is the primary reason for night time traffic accidents.

Akhil Mediboyina et al [23] describes about the driving at night is quite dangerous because of car beam lights. When driving at night, most drivers of automobiles utilise a high, bright beam. The individual who is travelling in the opposite direction finds this uncomfortable.

Shortly after experiencing an abrupt glare, the person goes blind. The other vehicle's powerful spotlight beam, which is approaching him from the opposite way, is what's to blame for this. Road accidents are frequently caused by the Troxler Effect. The expectation is that we will manually adjust the headlight to reduce the glare.

NarendiranathBabu et al [24] investigated on despite a 60% reduction in traffic, almost 40% of accidents occur at night. By lessening night glare, we can decrease accidents that occur at night. When a car is coming at you from the other way, the Arduino Uno may be programmed to automatically dim the headlight. By detecting the light from the opposing vehicle's headlight and processing it using an Arduino UNO, the light dependent resistor (LDR) module can detect the presence of an opposing vehicle. Additionally, an ultrasonic sensor can be used to detect when a vehicle passes by and send the corresponding signal to the Arduino.

RD. Balaji et al [25] investigated on the Internet of Things (IoT) and recent advances in sensor technology are making many gadgets smarter and more capable of acting autonomously or with little to no human involvement. The researchers are finding several existing systems and making an effort to fix the present issues with the functionality or constraints of these existing devices. Researchers are also attempting to identify technologies that are highly expensive and out of the reach of the average person so that it will be feasible to provide a better solution for the ever-expanding human race at a price that are appropriate for affordability.

V. Milanes et al [26] proposed work on an electro hydraulic braking system for autonomous vehicles and it have software for automatic recognition and analysis of the test images of objects use to evaluate image quality. They used AUTOPIA program. In this they compare the manual and automatic braking system by plotting a graph between time and speed. Strongly suggest that an automatic collision avoidance system can be used if an electro-hydraulic braking system is allowed to work at 100% of its strength. This would thus offer a possible solution for the reduction of car accidents on roads as a complement to obstacle detection systems.

Samantha H et al [27] proposed a work on automated emergency braking systems for vehicle–pedestrian crashes in the United States. The main theme is to detect human movements then urgently apply the brakes if the driver fails to respond. They use model of a hypothetical AEB system with pedestrian detection ability and the AEB was developed to determine the system's effect on the crash. Second a pedestrian injury model was developed to the quantity the effect of crash factors on injury and fatality risk for the struck pedestrians. Third one is to pedestrian AEB model and injury risk curve were applied to real world cases to determine the benefit if all cars and light trucks and vans LTVs were equipped with pedestrian AEB.

Sanaz Bozorg et al [28] proposed work on a Dimmed Road Lighting and Car Headlights on Visibility in Varying Road Surface Conditions. Here they having three types of roads they are dry, wet, snow based on the types of roads the light will dim automatically. The light illumination varies automatically done in the various road surfaces. In front of car a camera will be fixed on the screen then the object will be appeared. The results support the Feasibility of reducing road lighting intensity when car headlights are available. The average visibility of the pedestrian was higher than that of the target, even though the target possessed a higher reflection factor. This is due to the size and 3D shape of the pedestrian.

Hongtei Eric Tseng et al [29] proposed a work on Development of Vehicle Stability Control at Ford. Improvement in a vehicle stability control system. They include driver intent recognition, Vehicle status measurement and estimation, control target generation, system actuation efficiency and smoothness, road bank angle detection, system development and evaluation, and fault detection. Active systems have been developed to improve vehicle control and safety. Among them, anti-lock brake systems (ABS's), traction control (TC), and vehicle stability control systems (VSC's) have already found their way into production passenger vehicles. A vehicle stability system provides stability enhancement vehicle stability system developed at Ford which utilizes a relative steering wheel sensor in the attempt to optimize the system performance and value and handling predictability of a vehicle.

R. Ashokkumar et al [30] proposed a work on arduino based electric vehicle emulator. In this they tell about the vehicle will run automatically by the given the code to the Arduino. By using of components like Arduino board, servo motor, limit switch, battery, current sensor, hall sensor, real time clock module. The portrayal and circuit demonstrating are clarified in this segment; the circuit must be displayed dependent on the prerequisites of Brake Test Bench. Additionally, the source voltage (CNN Bus) cannot be applied straightforwardly to the brake test. The module consists of the main components of an actual electric vehicle scaled down to provide an optimal test platform for various speed values to determine voltage and current consumption.

Yoo and Johansson et al [31] proposed to overcome transmission delays and packet losses of networks many approaches have been developed. They applied a machine learning technique to compensate random delays. A hybrid system framework has been stated by Heemels et al. (2010) that incorporate communication constraints, varying transmission intervals and varying delays to guarantee stability based on Lyapunov functions.

Dr. P. Venkata Ratnam et al [32] proposed an intelligent collision avoidance system as a prototype, which avoids vehicle accidents and to provide a greatest security to the user in adverse or bad weather condition. Here, Ultrasonic sensor and IR sensors placed in the car, where IR sensor is used to detect the lane and avoids accident in significant manner.

Amrutha S Raibagil et al [33] suggests Obstacle detection has been the topic of much research in the past and new ways for avoiding various types of obstacles in various surroundings have been experimented upon. ButSurabhi Anand and Swetha focus has been mostly on obstacle avoidance by autonomous agents and that too was mostly limited to extruding obstacles

Shirish Srivastava et al [34] advocate Automobile safety can be improved by anticipating a crash before it occurs and thereby providing additional time to deploy safety technologies. By this project, the goal is to design a collision avoidance system which is reliable for drivers in traffic.

Papadoulis et al [35] investigated the effects of introducing connected and autonomous vehicles on traffic road safety through simulation. Traffic conflicts were identified using TTC and PET SSMs. The results indicated that even with small market penetration AVs can substantially reduce the number of traffic conflicts. In fact, according to Olofsson and Nielsen (2020), even an autonomous control system with lower complexity provides the possibility to avoid 79% of severe and fatal road departure accidents

B. Ranjitha et al [36] intends to design, develop, and create a robot that can plant seeds, mow lawns, and spray pesticides. The robot and its entire system are powered by solar energy. The created robot is powered by a solar panel and is controlled by a Bluetooth or Android app, which transmits signals to the robot to control the necessary mechanics and movement. This lessens the issue with manual planting and improves the efficiency of seeding, pesticide application, and grass cutting.

K. Radhika et al [37] designed a highly safe and reliable application is intended for an Android-based secure smart door accessing system. Applications of this kind are used in banking, homes, and businesses. For increased protection, we integrate this intelligent security system with a Bluetooth and GSM

module in the suggested system. For high data processing, hardware implementation is created using the Raspberry Pi module. In real-time applications, this wireless data access method is extremely quick and secure.

Tao Chi et al [38] designed to do a very detailed quantitative study of the theoretical maximum collision duration and theoretical collision probability of Wi-Fi or Bluetooth networks using RFID interferers. They put forth an interference-avoidance strategy that depends on understanding the theoretically possible maximum collision duration and collision probability between WiFi/Bluetooth packets and RFID signals. This method reduces interference by generating an ideal channel depending on how the neighbouring frequency channels are currently being used. They also suggest two variations on this technique to maintain a strong Wi-Fi or Bluetooth connection in the midst of strong RFID interference: frequency hopping paired with white space exploitation and an intelligent frequency hopping scheme. They implement a hybrid backscatter-based RFID architecture in existence of the Wi-Fi / Bluetooth infrastructure for efficient operations within the 2.4 GHz ISM band.

P. Ajitha et al [39] proposed to connects the NodeMCU microcontroller using Internet of Things (IoT) and Arduino programming. The robot's progress might be controlled, as indicated by commands received via Android. We deduced simple solutions for the given system to construct robots with little effort but high calculating and detecting capabilities provided by the sophisticated cell that is used as a control device. The concept of a small, autonomous car that can be controlled by voice commands from the customer. The customer may be located in a faraway location, but as long as he or she is connected to the internet, the car may follow voice directions. The concept has been approved by NodeMCU ESP866, Adafruit, and IFTTT. Via Google Assistant, the headings are taken care of for the vehicle.

M. Krishna et al [40] develop the mechanism for climbing the staircase and moving in bumpy region is meticulous task. Gyroscope and sensor installation adds to the system's weight and comes at a considerable cost to maintain stability in stepped and sloping terrain. A CaterBOT is a robotic device built with two pairs of ribbed belt drives that is inspired by biological motion and moves similarly to a caterpillar. The translator motion is provided by the main driving mechanism, which serves as the robot's foundation. The enlarged flipper arm of the secondary ribbed belt drive allows the robot to climb the stairs and obstacles. The wireless driving control allows CaterBOT to operate more easily on uneven terrain.

3. CONCLUSION

In this research we have concluded that the development of automatic braking system in a vehicle to prevent accidents caused by driver inattention, particularly at night time was driving. The dimming and dipping of lights will going to done when there is high light intensity hits the host vehicle. And also, we can control the vehicle without using manual interruption that is we can able control our vehicle under certain distance through a remote/ mobile with the help of a Bluetooth module.

Accordingly, the literature was reviewed in order to prevent the accidents happening during the night times. Since most of the articles reveals that many accidents takes place during the driving in night time. There are many applications came into picture that to prevent the crashing of vehicle from any obstacle. In order to that there will be a possibility for the engine damage, for that this research provided that all the things which are accelerator, brake, clutch and gear comes to neutral automatically when the driver will unable to control the vehicle.

This system uses an ultrasonic sensor to detect obstacles and automatically applies the brakes, bringing the vehicle to a stop and putting the clutch, brake, accelerator, and gear system in neutral. The system also includes a feature of automatically dim and dip of the headlights in response to high beam of light intensity which comes from opposite vehicles or any other light source. Also, a Bluetooth controlled vehicle helps to control the vehicle without using any manual interruption it seems to be a driverless car up to some extent of range.

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