Side-Sweep Accident Detection System using Ultrasonic sensor

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Abstract. Accidents are one of the major reasons for loss of life. Many numbers of deaths occur due to road accidents. Passenger safety acts as the most important parameter. Carelessness is the first and foremost reason for the major accidents. This paper makes us to understand the cause of accidents, especially the side sweep accidents which occur in multi-lane highways. Side-sweep accidents act as the major reason for death which occur due to accidents. This is when the driver wants to change the lane at the same time the other driver or vehicle obstructs the road within the same lane. Our objective is to know and simulate the different kind factors that have an effect on the chance of side sweep accidents. As an example, we all know that blind spots, components of the road that don't seem to be visible to the driving force directly or through the rear-view mirrors. Similarly, the frequency produced with that a driver gives a glance to his rear-view mirrors before deciding to change the lane affects the chance of the accident. Even there is an intuition that may cause side-sweep accidents are additional possible if there's a big distinction within the velocities of the vehicle and also the targeted lanes. There are a lot of factors that may cut back the chance of the accident: as an example, the sign of the lane change by the driving force will alert the near vehicles concerning the lane change, and that they will change their behaviors as if no accidents or commotion can happen.

Keywords: Side-Sweep Accident, Ultrasonic sensor, Arduino board, Microcontroller

1. Introduction

As side-sweep accidents occur in large number, to reduce that we have proposed a system to overcome that kind of accidents [1]. When the driver wants to change the lane in multilane highways, there are more chances for the driver to be careless. In that case this proposed system comes into action. It detects the chances of accidents in the road and says to the driver about the chances of accidents [2]. It not only does that; it also gradually slows down the vehicle if the driver does not listen to the alert message. If the car or any vehicle which has this system is in a very danger zone, then the vehicle stops abruptly. This proposed system is designed only for a single vehicle for time being [3]. This should be done in a manner where there is a vehicle-to-vehicle communication. So that if one vehicle stops or slows down the other vehicles near to that system also slows down or stops accordingly. This will only decrease the chances of accidents occurring in the road. This system can be enhanced with many other features incorporated with this system. This system is done with the ultrasonic sensor which is the main component of the system [4].
2. How side-sweep accidents occur?

Side-sweep accidents occur in multi-lane highways, when a driver of a vehicle wants to initiate a lane change. Side-sweep injuries bring about an element collision, however the resulting lack of control will produce any collisions. This type of accidents acts as the major cause in road accidents [5]. The instant purpose at the back of the side-sweep twist of fate is that the wrong name created via way of means of the reason pressure of the lane ever-converting car, and consequently the purpose at the back of this wrong name is loss of information: the reason pressure does not recognize approximately the obstruction car [6]. To reduce this kind of accidents, the driver must be very careful when he changes the lane. To add an extra protection this proposed system can be fitted into the vehicle so that it makes the driver to make decisions [7]. Rationalization is that the reason pressure didn't look or test the mirrors. NHTSA says that the driver always fails to check the rear-view mirrors in the vehicle which leads to accidents. What is more, three hundred and sixty-five days of drivers failed to test their proper mirrors, proper windows, and middle mirrors at some stage in the closing 8 s earlier than starting up a proper-lane extrude [8]. Even for drivers United Nations enterprise do test the mirrors, a foremost variety do not create a sturdy attempt to expose their head and create a seen scrutiny. There will be lots of blind spots depending on the vehicle the driver drives. It is based on the arithmetic calculation done according to the size of the vehicle [9]. A quick car might probably input into the obstruction sector at the same time as now no longer the reason pressure being aware of it. the electricity to as it should be determined whether or not or now no longer the lane is unfastened on the on the spontaneous change of lane [10]. This can be weakened withinside the situations of negative visibility and somnolence. Visibility is regularly wedged via way of means of the elements like atmospheric situations and consequently the blind spots. Enhancing motive force interest and minimizing the dimensions of a blind spots of motors will facilitate conquer loss of visibility problems [11]. In a one-of-a-kind manner to examine somnolence is deliberate via way of means of integration shrewd control structures into automobiles to include the human motive force control loop [12].

3. Proposed System

![Flow Chart](image-url)

Figure 1. Work-flow Diagram

During this system, side-sweeping accident detection and alerting is done through the device like IR device
and ultrasonic sensor. To cut back the accidents, the distance between the vehicle and signals of breakdown are measured. It is done in a way that the rpm conditions are neutral. In that case there will be more chances of breakdown. That knowledge is transmitted through the ad-hoc technology [13]. Throughout this technique, Arduino board processes the data. Communication has been created between the vehicles wirelessly by Ad-hoc technology Figure1.

The operating of the planned technique is illustrated as follows
1) Firstly, we measure the distance between two vehicles in the same lane and also the third vehicle.
2) IR device detects the vehicle’s speed and neutral’s on & off condition are adjusted manually.
3) The directions and poles of the vehicles are found using compass acceleration.
4) All the elements or components which are to be used are attached with Arduino board.
5) By mechanical process the data are processed and sent.
6) The processed data is sent to the vehicle by RF transceiver and checks if any other vehicle or obstacle is present behind it, if so then the driver is said to adjust his driving accordingly [14].

Components:

I. Ultrasonic sensor:
The sensor plays a vital role among the event of the various applications. This sensor senses the obstacles which a special sound waves called as ultra-sonic waves. 2cm-4m is the range in which the sensor can detect the distance. Throughout the system, the ultrasonic sensor is utilized to grasp the precise state of automobile motor vehicle. They're usually utilized for measurement of the item distance. [15]

II. Micro controller:
The Arduino uno may be a microcontroller board (based on atmega328). [16] It has a fourteen-digital input and output pins system of the half-dozen area unit typically used as PWM (Pulse Width Modulation) outputs, six analog inputs, a sixteen mc oscillator, a USB association, associate influence jack, associate ICSP header, and a button. Kit contains everything needed to support the microcontroller board. This micro controller is very different when compared. It is because it doesn’t use the FTDI USB-to-serial driver chip.

III. Power supply:
An AC voltage, generally 220v rms, is been connected to an electrical device, that steps that AC voltage right down to the volume of the specified DC output. A full-wave corrected voltage is then provided by a diode rectifier, which is then filtered to provide a DC voltage by an easy condenser filter. There may be any ripple or AC voltage change in the resulting DC voltage. The ripples or the load attached to the output DC voltage adjustments are removed by a regulator circuit. This voltage control can be achieved by using one of the popular transformer IC devices.[17]

4. Future Enhancement:
Several new options will be added to the side-sweep accident warning system to make the product more effective. The vehicle's horn will be operated by controller intervention, and the microcontroller will be configured to disable the horn and stop running until it reaches a set of bound places or positions, in order
to avoid unnecessary noise production around hospitals and faculty areas. Also, this proposed system can be expanded to be used in every vehicle, so that there will be very less accidents occurring. The sensor used can also be replaced with some powerful sensors which is much faster, accurate and efficient when compared.

5. Conclusion:

In this paper, we tend to conferred a model for side-sweep accident detection system. These dynamic simulations are built into any vehicle system in order to minimize the risk of significant incidents. These findings indicate that future studies could go in a range of ways, including designing many complex models that take all of these variables into account.

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