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ENGINEERING

INTELLIGENT BRAKING SYSTEM

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ABSTRACT

Road accidents have become common these days. Accidents mostly occurs because of failure of braking system. Therefore, the vehicles are equipped with many safety devices. Currently most popular of them include anti-lock braking system(ABS) traction control and stability control. The most common causes of accidents are- unconsciousness of driver, failure of braking system, road condition, uncontrollable speed of vehicle. Thus, there is need to automatically control the vehicle using electronic devices. Therefore, a system known as intelligent braking system came into existence. The name intelligent is given because it can take decisions automatically depending upon the input from ultrasonic sensors. The system upon detecting an obstacle can initiate an action to avoid collision. The system includes ultrasonic wave emitter provided on the front portion of a car which produces and emit ultrasonic wave in forward direction. An ultrasonic receiver is also provided which receive a reflected ultrasonic wave signal. A microcontroller is used to control the speed of the vehicle and to apply brakes.

KEYWORDS :

1. INTRODUCTION: -

The automobile industry is producing vehicles at a very high rate. The reason for this is that everyone wants own a four/two-wheeler. Not only that industrial growth has lead to increase in heavy utility vehicles. As a result, number vehicles have increased at an alarming rate. This has led to increase in traffic congestion on roads. As a result, number of accidents have increased. This is because the driver reacted late or made a judgmental error. Nearly 1.3 million people die in road crashes each year, on average 3,287 deaths a day. An additional 20-50 million are injured or disabled. More than half of all road traffic deaths occur among young adults ages 15-44. Many of these accidents could have been avoided or they would have been less severe, has the driver applied the brakes at the right time. Also, there may be failure of brakes.Unfortunately, the time required by driver to understand the potential accident situation, compounded with driver's delayed reaction time in applying brakes, usually causes a lag between the identification of a potential accident situation and execution of the corrective actions that will prevent the accident. Hence, in such emergency situation an efficient control mechanism has to be employed to avoid accident. Generally, a car brake is operated manually as the driver pushes the brake pedal. A lot of accidents can be prevented by automating the task assessing the situation and deciding the amount brake pressure to be applied. In that case, the driver will have a companion to help him along the road. There are two issues related with design of intelligent braking system. Collision avoidance is hard and demanding process for driving autonomous vehicle. The challenge in designing a collision avoidance system is in balancing the effectiveness of avoiding collisions versus raising false alarms. False alarms are extremely critical, because they may lead to serious consequences. Antilock braking is another issue in designing an efficient braking system in automobiles. Conventionally, in automobiles equipped with ABS, it is a part of engine control unit and prevent locking up of wheels. Hence, applying fuzzy logic to intelligent controls seems to be an appropriate way to achieve this human behaviour, driver's experience could be transformed easily into rules and any kind of nonlinearities can be easily tackled.

2. ANTI LOCK BRAKING SYSTEM

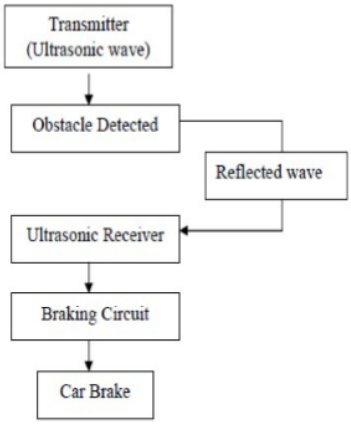
An anti-lock braking system or anti-skid braking system (ABS) is automobile safety system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. It is an automated system that uses the principles of threshold braking and cadence which were practiced by skillful drivers with previous generation braking systems. It does this at a much faster rate and with better control than many drivers could manage.

ABS generally offer improved vehicle control and decreases stopping distances on dry and slippery surfaces; however, on loose gravel or snow-covered surfaces, ABS can significantly increase braking distance, although still improving vehicle steering control. Since initial widespread use in production cars, anti-lock braking systems have been improved considerably. Recent versions not only prevent wheel lock under braking, but also electronically control the front-to-rear brake bias. This function, depending on its specific capabilities and implementation, is known as electronic brake force distribution(EBD), traction control system, emergency brake assist, or electronic stability control(ESC).

Typically, ABS include a central electronic control unit(ECU), four-wheel speed sensors, and at least two hydraulic valves within the brake hydraulics. The ECU constantly monitors the rotational speed of each wheel; if it detects the wheel rotating significantly slower than the speed of the vehicle, a condition indicative of impending wheel lock, it actuates the valves to reduce hydraulic pressure to the brake at the affected wheel, thus reducing the braking force on that

wheel; the wheel then turns faster. Conversely, if the ECU detects a wheel turning significantly faster than the others, brake hydraulic pressure to the wheel is increased so the braking force is reapplied, slowing down the wheel. This process is repeated continuously and can be detected by the driver via brake pedal pulsation. Some anti-lock systems can apply or release braking pressure 15 times per second. Because of this, the wheels of cars equipped with ABS are practically impossible to lock even during panic braking in extreme conditions.

3. METHODOLOGY



4. WORKING

At present fuzzy logic is used to apply brakes when the obstacle is near to vehicle or the speed of the vehicle is very high. Ultrasonic sensors are placed at front of the vehicle to calculate the distance between the obstacle and the vehicle. This does not consider the obstacles which are side of the vehicle or the obstacles which are out of collision range. The brakes will be applied when the driver fails to act in time. This system will come into play when critical situation arises. The system uses two ultrasonic sensors to find the distance of the obstacle from the vehicle.

The ultrasonic sensor at the front of vehicle produces and emit ultrasonic waves frontward at a predetermined distance. A ultrasonic receiver is also placed at front of the vehicle operatively receiving a reflective ultrasonic wave signal. The reflected wave(detected pulse) give the distance between obstacle and the vehicle. Then a micro controller is used to control the speed of the vehicle based on the detection pulse information to push the brake pedal and apply to the car stupendously for safety purpose.

5. CONCLUSION

It is a system which has got various applications in today's world especially in countries which has high number of vehicles plying on roads. During foggy days when visibility is near zero, intelligent braking system can be used for saving of life and money.

The system when combined with regenerative braking system, float sensors, traction control etc. will result in smart vehicle maneuver. In present scenario where accidents are common in every type of industry, this system can be used to prevent loss of life

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