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DESIGN AND DEVELOPMENT OF SMART BRAKING SYSTEM

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ABSTRACT

Now a days safety is becoming important aspects of automobile industries. And automation is the key which keeps the safety at our fingers. In other words, an unskilled or less examples can handle the automobile vehicle with greater with safety. Presently, cars have the alarm system where when the car gets too close to an object an alarm is triggered which warns the driver about an object close by. But this feature has produced a lot of problems and is prone to human error. We have enhanced the facility by using the same system, but we have altered it so that the car brakes automatically when an obstacle is close by. A Sensor Operated Pneumatic Brake consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic braking system. The IR sensor is utilized to detect the obstacle. There are an any obstacle in the path, the IR sensor senses the obstacle and giving the control signal to the breaking system. The pneumatic braking system is used to break the system. So basically here the car brakes on its own by determining the distance from the object.

Keywords: Automobile, Pneumatic braking system, control Unit.

1.0 INTRODUCION

The number of vehicles is increasing day by day and proportionally the numbers of accidents are also increasing. These accidents are mostly caused by the delay of the drive to hit the brake. To prevent the accidents caused by this delay, "SMART BRAKING SYSTEM" is used in automobiles

The main target of the smart braking system is that, the vehicle should automatically break when the sensors sense the obstacle. This is a technology for automobiles to sense an imminent forward collision with another vehicle or an obstacle, and to brake the vehicle accordingly, which is done by the braking circuit. This system includes two ultrasonic sensors viz. Ultrasonic wave emitter and ultrasonic wave receiver. The ultrasonic wave emitter provided in the front portion of an automatic braking vehicle, producing and emitting ultrasonic waves in a predetermined distance in front of the car. The Ultrasonic wave receiver is also provided on the front portion of the vehicle, receiving the reflected ultrasonic wave signal from the obstacle. The reflected wave (detection pulse) is measured to get the distance between the vehicle and

the obstacle. Then the PIC microcontroller is used to control the motor based on detection pulse information and the motor in turn automatically controls the braking of the vehicle. Thus, this new system is designed to solve the problem where drivers may not be able to brake manually exactly at the required time, but the vehicle can still stop automatically by sensing the obstacles to avoid an accident. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system, although with the changing demands on physical input as the degree of mechanization is increased.

Rupali J. Pande (1) studied The speed control and automatic braking system will involve the electronic circuits such as sensor, relay, control system, microcontroller, signal transmitter and signal receiver. They used the software Proteus to design the circuit and used ultrasonic sensor for detection the hurdle and IR sensor for the automatic braking system purpose.

Dhanya K. R (2) Investigated the properties of both capacitive and ultrasonic sensors for detecting the obstacles and also for calculating the distance between the vehicle and the obstacle. The brain of the embedded system part can be developed in 32bit microcontrollers with ARM processor (LPC2138). The system also provides features Such as Automatic Speed reducing and Automatic Horn disabling in a restricted area.

S.P. Bhumkar (3) Studied the advanced technologies in cars for making it more intelligent and interactive for avoiding accidents on the road by using ARM7 this system becomes more efficient, reliable & effective. They described a real-time online safety prototype that controls the vehicle speed under driver fatigue.

Francesco Bella (4) analyzed the driver's behavior in order to define effective driver assistance systems which can be readily accepted by the driver. A study was performed with an interactive fixed-base driving simulator. The data recorded during the tests were analyzed to assess the safety distances required by the driver during a car following situation.

Martin Schneider (5) studied The status of the frequency regulation for short and long range radar is summarized because of its importance for car manufacturers and their sensor suppliers. Front end concepts and antenna techniques of 24 GHz and 77 GHz sensors are briefly described.

Hideo araki (6)The studied the Rear end collision avoidance system(RCAS) of functions like issue distance headway warnings and perform automatic breaking in case of emergency . These papers contain an outline of the RCAS and describes its experimental results.

Jian Chu and Yan Feng (7) Investigated the automatic control process of solenoid valve production line with PL Control and touch screen user interface. The system control structure, hardware components, software design, as well as the process of automatic control are articulated in this

article. The production line runs with consistent stability, the man-machine interface is user friendly, and all the processes have a high level of automation.

Dhivya P. (8) Designed an automatic car braking system using Fuzzy Logic. The system could avoid accidents caused by the delays in driver reaction times at critical situations. A simulative study was did using MATLAB and Lab VIEW software. The results obtained by the simulation model are compared with the existing system and the proposed model conveys a satisfactory result which has high consumer acceptance.

Heinrich-Bernhard Rat, (9) Studied the apparatus for controlling a brake system in a heavy vehicle provide for continued measuring parameters which are characteristics of the state of the vehicle, such as the velocity of the vehicle, the inclination of the roadway, the axle load, and the transverse acceleration. For any given state of the vehicle and brakes it is determined whether or not the stopping distance to be expected will be longer than a predetermined rated stopping distance.

Dean C. Karnopp (10) Studied the A desired yaw rate or lateral acceleration rate is computed from the vehicle velocity and the steering wheel angle If the yaw rate or the lateral acceleration is excessive, indicating instability,and the brakes are being operated, then both steering References Cited and braking are controlled to reduce the yaw rate or the lateral acceleration rate. In all other cases, steering control alone is performed. The yaw rate or lateral acceleration rate is reduced under Steering control by adjusting wheel positions in a direction opposite the direction of yaw or lateral acceleration.

Kenneth Schofeld (11) Investigated the Light levels sensed in individual regions of the field of view are evaluated in order to identify light sources of interest. Such as oncoming headlights and leading taillights. The vehicle's headlights are controlled in response to identifying such particular light sources or absence of such light sources. Spectral signatures of light sources may be examined in order to determine if the spectral signature matches that If particular light sources such as the spectral signatures of headlights or taillights.

Vijay Anand (12) studied an ultrasonic modified abating instrument for forward accident avoidance with stimulating specialist pedal detachment segment. This structure involves ultrasonic sensors specifically ultrasonic wave emitter and ultrasonic wave gatherer. This paper displays the possible usage of a stimulating specialist pedal withdrawal segment in this structure, by which the animating operator pedal is therefore pulled back once the braking starts.

kalpana.S (13) focused on building a user-friendly device that specializes in detecting intrusions besides doing close range obstacle detection. Automobile safety can be improved by anticipating a crash before it occurs and thereby providing additional time to deploy safety technologies. Warnings can be like buzzer if the driver is approaching a pothole or any obstruction, driver may be

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warned in advanced regarding what the road entails.

2. Design of Frame

2.1 MATERIAL:- M.S. CHANNEL

S.NO	DESCRIPTION OF OPERATION	MACHINE USED	CUTTING	MEASUREMENT	TIME
1	Cutting the channel in to length of 1000 mm long	Gas cutting machine	Gas cutter	Steel rule	15 min.
2	Cutting the channel in to length of 480 mm long	Gas cutting machine	Gas cutter	Steel rule	15 min.
3	Filling operation can be performed on cutting side and bring it in perpendicular c.s.	Bench vice	File	Try square	15 min.
4	Weld the channels to the required size as per the drawing	Electric arc welding machine	.....	Try square	20 min
5	Drilling the frame at required points as per the drawing	Radial drill machine	Twist drill	Vernier calliper	10 min

Frame is made to comfortable to the moving of a vehicle in our prototype. To that frame in front part small wheels are attached and in middle batteries are fitted and in back two wheels are attached and to that wheel solenoid values are fitted. Frame is welded at four sides and it is painted with green color.

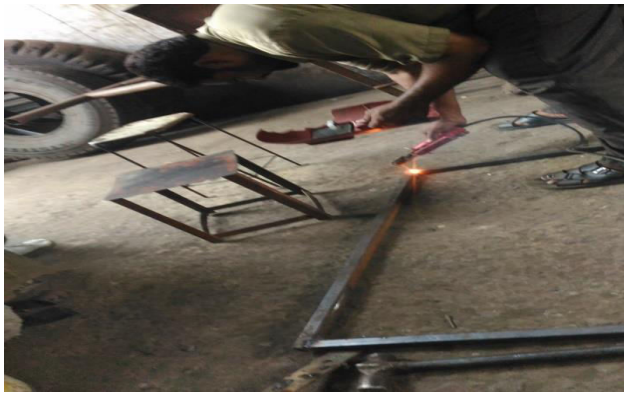

Fig1: Frame welding

3. Working:

Up to know we learned about the components, we are used in this process and know we know about the working process of smart braking system.

We deigned the vehicle that move on only on power by using rechargeable batteries. First we have to on the switches of the main power supply and control unit power suppl. Now the vehicle move in forward direction. The vehicle move in 60kmph. when the sensors detect the obstacle in fraction of second the vehicle is stooped.

Ultrasonic sensors will emit sound waves and detects the eco when the obstacle is found in medium of waves, and the feedback system gives input exgute the as for the algorithm.

When vehicle gets too close to an obstacle, the ultrasonic waves reflect back which was then receive by the ultrasonic receiver. After receiving the reflected signal, it gives the impulse to the control unit. This control unit make ON the solenoid valve. These complete processes are electronic based which required electric supply.

When signal from control unit receives by solenoid valve, Then the plunger takes forward motion and consequently brake applied to the wheel. This stops the vehicle and accident is avoided.

Generally, ultrasonic sensors are fitted at front of the vehicle and solenoid valve is located at the back wheel.

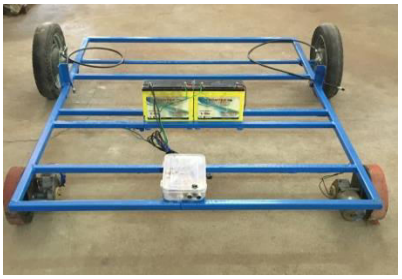

Fig 2: Final image of smart braking system.

4. Conclusion

This paper is the implementation of an Ultrasonic Automatic Braking System for Forward Collision Avoidance with electromagnetic mechanism, intended to use in vehicles where the drivers may not brake manually, but the speed of the vehicle can be reduced automatically due to the sensing of the obstacles. The ultrasonic sensors are cheaper and the system comprises of a less demanding hardware. The relative speed of the vehicle with respect to the obstacle is estimated using consecutive samples of the distance calculated. It is used by the control system to calculate the action on the brakes, to adjust the speed in order to maintain a safe distance to prevent accidents. This factor, coupled with the fact of lower cost and power consumption of ultrasonic sensors, could facilitate the application and mounting of the system in many low-end vehicles, thus helping to improve safety and offer a hassle free driving experience at a reduced cost. With this future study and research, we hope to develop the system into an even more advanced speed control system for automobile safety, while realizing that this certainly requires tons of work and learning, like the programming and operation of microcontrollers and the automobile structure. We believe that the incorporation of the electromagnetic mechanism will maximize safety and also give such system a bigger market space and a competitive edge in the market.

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