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Research Paper

AUTOMATED REVERSE BRAKING

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In this world, automation of various systems has been developed just to reduce the time and human error. Presently the vehicle has alarm system for maintaining the safe distance between moving vehicles. But this feature has many problems and is prone to human error. We have developed a concept by using the Microcontroller which restricts the backward motion of the vehicle. For this purpose we have developed a model which consists of Sensors, Microcontroller and sensing circuit. The system is probably the most reliable means of detecting human beings and objects and, therefore valuable in the prevention of injury or fatal accidents. Our aim is to design the “Automatic Reverse Braking System”. The vehicle detects an obstacle in its reverse path which can avoid the accident in reversing the heavy loaded vehicles like trucks, buses and all the vehicles consisting of braking system. If there is object in reverse path, the sensor senses the object and the brake is applied automatically. In this, Microcontroller is used as a control unit to which the devices and sensors are interfaced. This system is suitable for commercial vehicles such as car, emergency services vehicles, trucks and buses.

Keywords: Sensors, Microcontrollers, Automation

INTRODUCTION

Stopping safely is one of the most important functions a motor vehicle can perform. Failure of the brake system will almost invariably result in property damage, personal injury, or even death. Consequently, a great deal of consideration has been given to improving the brake system in trucks and passenger cars over the last nine decades. Automation of the driving control of vehicles is one of the most vital needs of the hour. Various system or methods have been developed and the

improvement is still continuous for the safety of Driver, Passengers as well as vehicle.

CONCEPT

The system is probably the most reliable means of detecting human beings and objects and, therefore, invaluable in the prevention of injury or fatal accidents. Our aim is to design the “Automatic Reverse Braking System”. The vehicle detects an obstacle in its reverse path using various sensors and microcontroller which can

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avoid the accident in reversing the heavy loaded vehicles like trucks, buses and all the vehicles consisting of braking system. If there is object in reverse path, the sensor senses the object and the break is applied automatically. In this, ATMEGA16 microcontroller is used as a control unit to which the devices and sensors are interfaced. This system is suitable for commercial vehicles such as car, emergency services vehicles, trucks and buses.

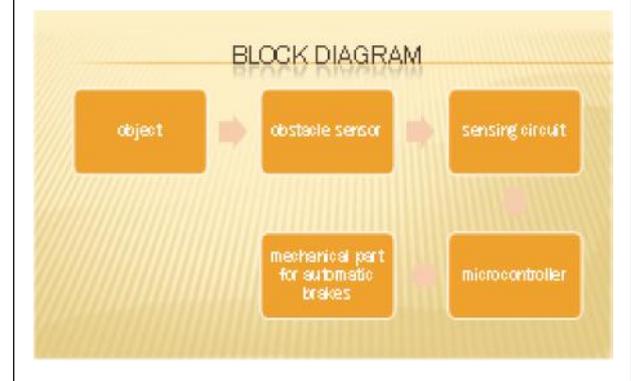
PROPOSED WORK

The proposed auto-braking system consists of obstacle sensors embedded in the vehicle which will detect the obstacles in the reverse path and send signal to controller. The output of obstacle sensor is in analog form, but controller requires data in digital form and hence we require a circuit called as Sensing circuit. Sensing circuit will convert the analog data into digital form, that is, the analog output of sensor is converted to digital and is given to controller. ADC is used as a sensing circuit. Controller will apply the brakes whenever required.

The output is provided by Switching circuits such as tail lights or LEDs. Practically, the final output is connected to mechanical system which is actually connected to breaking system of vehicle, which is responsible for brakes thus leading to the concept of automatic breaking. The Ultrasonic sensors are used as obstacle sensors in our system which are operated all the time while reversing the vehicle. The Ultrasonic sensors consists of Transmitter and Receiver.

The object can be anything which has certain shape and size, the LED transmits the Ultrasonic signal on to the object and the signal is reflected back from the surface of the object. The reflected signal is received by an receiver. In our system,

Figure 1: Block Diagram



Sensing circuit consists of 555IC which is used as astable multi vibrator. The frequency of the 555 is tuned using the potentiometer. The output of 555 is given to the transmitter. TSOP detects a frequency of 38 KHz. The output of TSOP goes low when it receives this frequency. Hence the output pin is normally high because, though their LED is continuously transmitting, due to no obstacle, nothing is reflected back to the TSOP. The indication LED is off. When an obstacle is encountered, the output of TSOP goes low, as the required frequency is reflected from the obstacle surface.

The processing part in our system is ATMEGA16 microcontroller as a controller to which the sensors are interfaced. Micro controller accepts the signal from sensors and process the signals and generates the instructions and transfers the generated instruction to control unit of transmission and brakes of vehicle. Micro controller can be used to implement any logical functions that an ASIC could perform and has an advantage to update the functionality after shipping reconfiguration of design and low non-recurring engineering cost relative to ASIC design. The behavior of controller is defined by the program in it. The final output is connected to mechanical part of braking

system thus leading to the concept of automatic braking.

The TSOP module is then interfaced with controller board. That will then process the data received from TSOP module and decide the logic. The simulation results of system shows the outputs of sensor1 and sensor2. The outputs of both the sensors are processed by controller and corresponding outputs (logic) are indicated by tail lights. When an obstacle sensor1 detects an object both the tail lights that is tail light1 and tail light2 glows on and if the obstacle is not present both the tail lights are off. During actual implementation, the sensors will be embedded in the vehicles and will operate while reversing the vehicle. The tail lights in our prototype module glows on when an obstacle is detected which in practical implementation will initiate the braking system of vehicle leading to the concept of automatic braking.

RESULTS

In our system, TSOP module is fitted to the back side of vehicles which works when vehicle moves in reverse direction. The TSOP is a general purpose proximity sensor used for collision detection. The module consists of a Ultrasonic emitter and TSOP receiver pair. The module consists of 555 IC, working in a stable multi vibrator configuration. The output of TSOP is high whenever it receives a fixed frequency and low

otherwise. The on-board LED indicator helps user to check status of the sensor without using any additional hardware. The power consumption of this module is low.

CONCLUSION

The whole system works only while reversing the vehicle. When the sensor senses any obstacle behind the vehicle, it sends signal to the control unit. Controller will sense the object according to the digital input and action will be taken accordingly. For a future development of this project the Logic Controller designed can be enhanced by applying more rules. By then, it can produce better response. The response should be better and can be applied to a real hardware model to observe the real response and yet can improve the system.

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