

INTELLIGENT VICINITY ADAPTER FOR AUTOMOBILES

¹R.S.Krishnaveni, ²R.K.Sumetha, ³S.Suganthi, ⁴V.Viknesh, ⁵M.Gayathiri.
[1234]UG Scholar, [5] Assistant Professor.

Department of ECE

Knowledge Institute of Technology, Kakapalayam, Salem-637504, Tamilnadu,

India. ¹krishnavenirs95@gmail.com, ²sumethaece@gmail.com,

³suganthisongappan@gmail.com, ⁴vikneshsivan@gmail.com, ⁵mgece@kiot.ac.in

ABSTRACT: *In day-to-day life, people are busy. They are in short of time and urge to reach places by any one kind of transportation. So while driving there is some carelessness taking place, which leads to two kinds of collision such as vehicle-to-vehicle collision and vehicle-to-human collision. They also face difficulties in driving through narrow roads where the opponent vehicle may cause scrapes on the side parts. Furthermore, due to unseen speed breakers and potholes, people's health may get affected. They get backbone problems such as disc prolapse, body ache, bone fractures etc. A better solution to this could be the usage of automatic brake system with the integration of auto-clutch and anti-locking brake system. Here the brake pedal is controlled using servo motor that is attached to the microcontroller and ultrasonic sensor. This automation helps to slow down the vehicle at speed breakers and potholes in order to prevent from getting hurt as well as prevents occurrence of accidents so as to save people's life. Moreover, the happenings of side scrape on the vehicle could be prevented using IR beam break detector which also indicates the intrusion of passenger's head and hand through windows or door during motion. Thus, the accidents could be prevented using this automatic brake system and side sensor indicators.*

Keywords: *Automatic brake system, Auto-clutch, Anti-lock brake system, IR beam brake detector, Ultrasonic sensor.*

I.INTRODUCTION

India is the largest country which uses various types of vehicles. As the available resources to run these vehicles like quality of roads, and unavailability of new technologies in vehicles are the causes for accidents. The number of people which are dead during the vehicle accidents is also very large as compared to the other causes of death. Though there are different causes for these accidents but proper technology of braking system and technology to reduce the damage during accident can mainly reduce the accident rates. So today implementation of proper braking system to prevent the accidents and IR beam break detector at the sides to reduce the damage is must for vehicles. To achieve this system modification goal, we design this Automatic Braking system that adapts to the surroundings through recognition of obstacles and indication.

The domain to be used is embedded because it plays a vital role in controlling the hardware with the help of software module. So a car's mechanical parts could be easily controlled using a sensing unit and a controlling unit. This system uses the auto-clutch to reduce the effort of the user and anti-lock brake system for effective response of stopping the car immediately. For automation, ultrasonic sensor is used for sensing obstacles, speed breaker and potholes and sends signals to control the brake system. The controlling unit used here is ATmega328P microcontroller which is of low cost and highly efficient. This system also consists of an IR beam break detector unit that indicates the vehicle about the other vehicle that is about to scrape on the side as well as passenger's intrusion during motion.

II.LITERATURE SURVEY

Katore S.R. et al [2015] have described a system based on "Automatic braking with pneumatic bumper system". This system uses IR sensor as input device that gives feedback to engine through relay. During the working of automatic braking system simultaneously the driver tries to stop the vehicle by pressing the brake pedal. Limit switch is provided below the brake pedal which is used to activate the pneumatic bumper and disc brake simultaneously which reduces the damage of the vehicle. This provides pre-crash safety for the vehicle. As well as the system improves the response time of vehicle braking to keep safe between two vehicles.

Balashanmugam P. et al [2013] have proposed the “Fabrication of high speed indication and automatic pneumatic braking system” which indicates high speed and automatic braking is applied by cutting of the fuel to the engine when it exceeds the determined speed. They have used solenoid valve and operational amplifier circuit LM324IC. Here speed limit is taken into considerations and after a speed limit, the electronic gets closed. This makes the solenoid valve to close, which is placed before the carburetor. This in turn decreases the speed. As soon as the speed decreases, op-amp circuit disables the supply to the solenoid valve, which makes it to open and allows the fuel flow in regular manner to the engine.

Rahul Khade et al have discussed about the “Automatic braking system”. The system avoids the accident while reversing the heavy-loaded vehicles such as buses, truck and vehicles containing pneumatic brake system. So they have developed a model that consists of solenoid valve, pneumatic cylinder, IR sensors, control unit, etc. which serves as the complete mechanism of automated braking system while reversing the vehicle.

PrashantKharat and JayashreeKharat have explained the need of “wireless intrusion detection system using wireless sensor network”. They described that the development of a system which comprises of an Infra-Red transceiver. . Passive IR sensors are used due to their specific properties. Passive IR sensor can operate on both day and night. An intrusion subsequently disturbs the IR beams and generates a signal for indication. It can immediately generate an alert on detection of unwanted intrusion.

Mayankkhare has presented on “Anti-lock brake system”. This system is installed on vehicles to eliminate wheel lock-up and prevent skidding. This helps driver to stop on low traction surfaces and in emergency stopping situations. In addition to the direct benefit of greater directional control, the improved vehicle control offered by ABS reduces the potential for trailer swing-out and jack-knifing of combination vehicles. So, it has improved stoppage distance with steer control.

III.METHODOLOGY

To prevent accidents that frequently occur on highways and to reduce discomforts at the speed breaker and potholes, automatic brake controller system is used. It consists of units such as ultrasonic sensor, ATmega328 micro controller, servo-motor, auto-clutch and anti-lock brake system.

To indicate the passenger who puts any of their body parts outside the vehicle or about the vehicle that gets too closer to this vehicle, side sensor is used. The units considered for this are IR sensor, LM556N Timer IC and Indication LED.

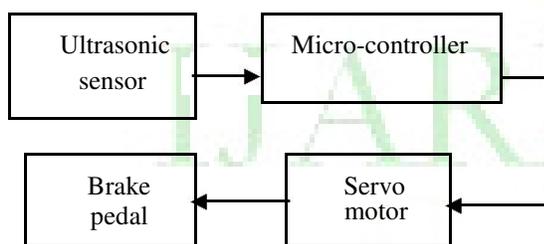


Fig: 1. Block diagram of automatic brake controller

The ultrasonic sensor emits the ultrasonic waves from the transducer. The emitted waves are reflected back by any object present at the front of this vehicle. As soon as the wave is emitted, the sensor changes to receiver mode. So it senses the obstacles such as human or vehicle at a range of 10m and it sends signals to microcontroller. The microcontroller ATmega328P calculates the distance of the obstacle and controls the servo motor. It sends the signals as 0 degree position, 90 degree position or 180 degree position to the servo motor. The motor rotates when sensed and after few seconds it comes back to normal position such that the brake pedal is controlled according to it.

Since the system uses auto-clutch and anti-lock brake system, accidents can be easily prevented by controlling

the brake. Here, the brake system is automated using sensors, micro controller and servo motor connected to the brake pedal. Pulsating notification in pedal is also available in ABS system. So that the user knows that the ABS is active.

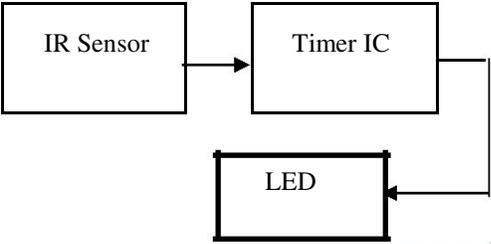


Fig: 2. Block diagram of side sensor

If a vehicle gets too close to this vehicle which is about to cause damage on the sides, then it can be detected using IR sensor. The IR beams from the IR transmitter passes to the IR receiver. When any vehicle gets nearer, the IR beam passing on the sides of the vehicle is interrupted. If any interruption is caused by an external vehicle or object, it could be easily indicated to the driver with the help of LED glow. It also indicates about the passenger’s intrusion at doors and windows when the vehicle is in motion. This may be also useful to prevent life loss or wounds for the passengers who stand on the bus’s stairs.

IV.RESULTS & DISCUSSION

HARDWARE

Thus, automation is possible in anti-lock brake system with the help of auto-clutch and automatic braking controller. The presence of obstacles such as human or object is sensed with ultrasonic sensor, which measures the distance of obstacle up to a range of 10 m and sends the information to the microcontroller. This in turn controls the servo motor that is connected to the brake pedal. The other technique applied here is IR beam brake detector which helps the driver to notice the sides easily in order to prevent scratches or scrapes on the vehicle.



Fig: 3.Hardware implementation

SIMULATION

Obstacle detection is done within the range of 10 m. If the obstacle is in a distance of more than 10 m, the driving mode is normal and manual. The simulation for more than 10m is shown in the fig: no.4 & 5.

The input is collected from the front panel through distance measurement. Thus, the output is displayed in the back panel which is visible to the user. It shows whether the obstacle is within the range or out of range.

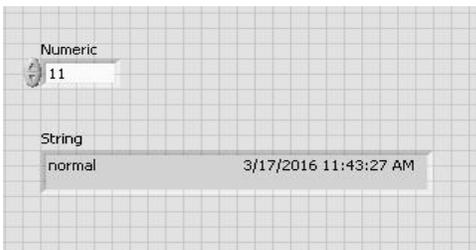


Fig: 4. Input for above 10 m

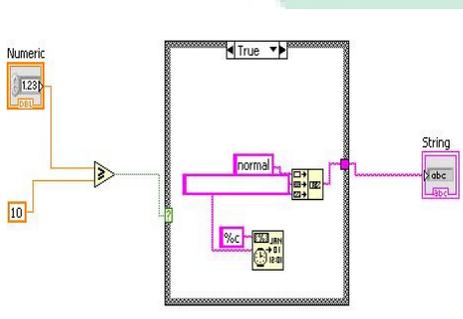


Fig: 5. Output for above 10m

Obstacle detection within 10m is shown in the fig: no.6 & 7. If the obstacle is within the range, then the input is sent to the front panel. It displays the output.

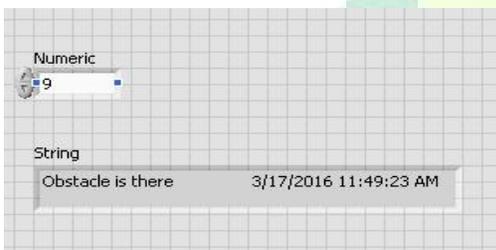


Fig: 6. Input for below 10m

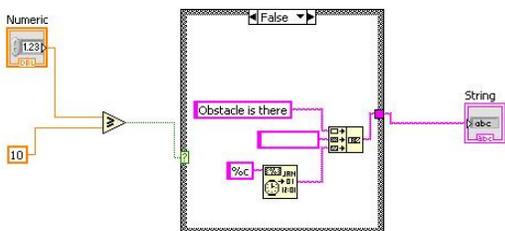


Fig: 7. Output for below 10m

Speed breaker detection is done within the range of 10 m. If the speed breaker is in a distance of more than 2m m, the driving mode is normal and manual. The simulation for more than 2m is shown in the fig: no.8 & 9.

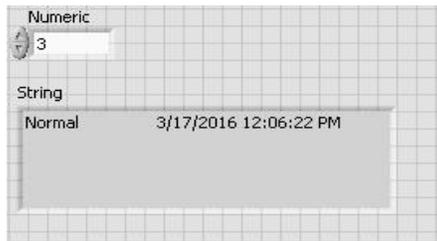


Fig: 8. Input for above 2m

VI.CONCLUSION

Auto-clutch cars are already available in market, where acceleration and braking is enough for driving. The Anti-lock brake system has a feature to prevent the wheel lock up, when a sudden heavy brake is applied. Even though, these systems are available as separate features, they lag in the concept called automatic braking system. This idea would convert the manual safety system into automatic safety system.

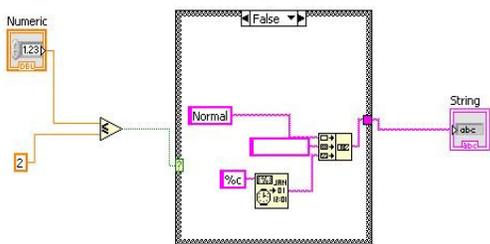


Fig: 9. Output for above 2m

Speed breaker detection within 2m is shown in the fig: no.10 & 11. If the speed breaker is within the range, then the input is sent to the front panel. It displays the output.

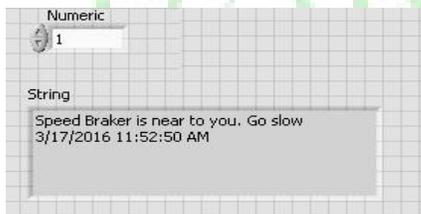


Fig: 10. Input for below 2m

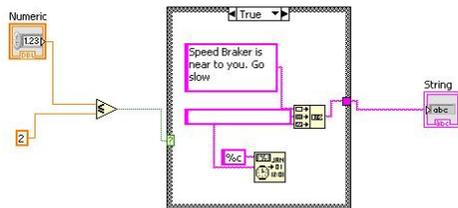
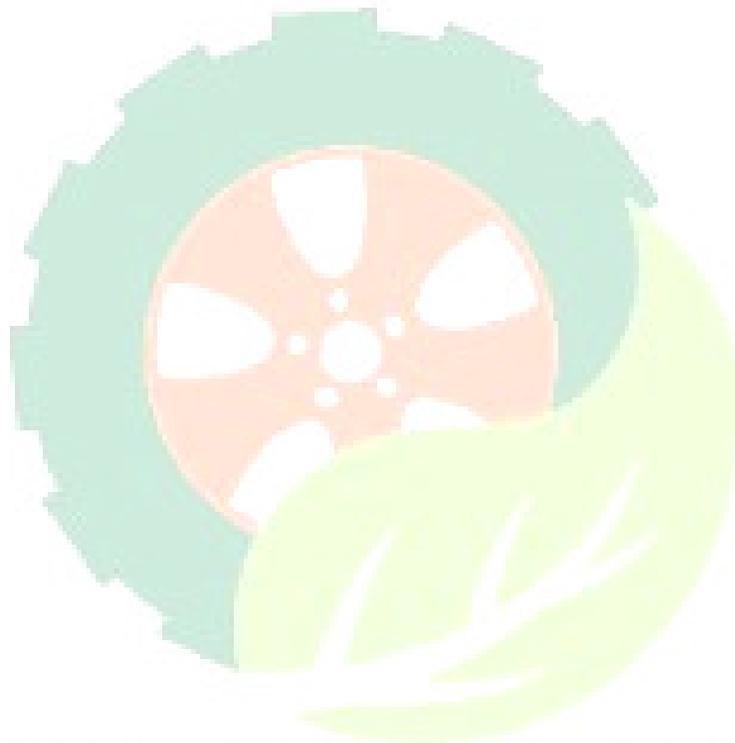


Fig:11. Output for below 2m

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