

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

Volume 2, Issue 5, May 2022

Design and Development of Advanced Intelligent Reverse Braking System

Bhushan A Dangare¹, Mohammed Mustakim F Khan², Tejas H Chavan³ Nihal J Mohite⁴, Prof. Vishwajeet Borate⁵

> Professor, Department of Automobile Engineering⁵ Students, Department of Automobile Engineering^{1,2,3,4} Dhole Patil College of Engineering Pune, Maharashtra, India

Abstract: Vehicle is very important source for human beings in current world, the brakes in vehicle is critical area which can save and take life. So we developed the intelligent reverse braking system which consist of arduino and IR sensors and control unit. This IR sensor detects objects and brakes automatically so this avoids accidents and saves car also life present in it. Our aim is to avoid accidents in back of the car also there are system used in front for automatically brake but in case of ditch presence while reversing is problem for driver safety, so we came to implement intelligent braking system to sense obstacles and objects then apply brakes automatically.

Keywords: IR sensor, Arduino, Control unit, Automatic Braking

I. INTRODUCTION

The braking system of vehicles are very important area, there are main research and innovations are came in collision avoiding front braking systems, and they also used cameras and made system complicated, we concentrated this area and came with the concept of the reverse ditch and obstacle sensing using the IR sensor so by this the IR sensor detects the obstacles, plot holes and unconditional imbalance of roads it's automatically apply brakes then save car as well as life present in it. It also important to add a safety device in back side of car also, this system can be opted for all automobile vehicles. This may reduce no of accidents and collisions taking place during reversing the vehicle. The operation of our prototype is controlled by Arduino.

Types of Braking:

- Mechanical Brakes
- Hydraulic Brakes
- Ultrasonic Brakes
- Electric Brakes
- Vaccum and Servo Brakes

II. LITERATURE REVIEW

Advance reverse braking system means a braking system that provides a safety for vehicle during the parking of vehicle in parking area. Many times driver is unable to see the obstacles at back side of vehicle during reversing the vehicle. So in order to overcome this problem we introduced intelligent reverse braking system without damaging vehicle or any human being during the parking process. Damaging of vehicle during parking is a major problem but until there is no solution on this problem. This system will open new opportunities for engineer in order of safety, basic human being is unable to measure the safe distance during parking or reversing the vehicle.

III. EXPERIMENTAL DETAILS

Hardware Requirements:

- 1. Arduino Control Unit
- 2. Wheel arrangement

Copyright to IJARSCT www.ijarsct.co.in

DOI: 10.48175/IJARSCT-4124

IJARSCT



International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

Volume 2, Issue 5, May 2022

- **3.** Pneumatic cylinder (double acting)
- 4. 5/2 Solenoid valve
- 5. Polyurethane tube
- 6. Frame Stand and Compressor

IV. WORKING PRINCIPLE

This system operates only when whole system operates in reverse direction. So when we shift the gear to reverse gear, power supply is given to the sensor unit, In the sensor unit, IR TRANSMITTER circuit will transmit the Infra Red rays. If any obstacle is there in a path, the Infra – Red rays reflected. This reflected Infra – Red rays are received by the received by receiver circuit is called IR receiver. If there is no obstacle in path, the receiver circuit will not receive any signal and the whole system remains as it is. The IR receiver circuit receives the reflected IR rays and giving the control signal to control circuit. The control circuit is used to activate the solenoid valve. The operating principle of solenoid valve is activated, the compressed air passes to the double acting cylinder. The compressed air activates the pneumatic cylinder and moves the piston rod. If the piston moves forward, then the braking arrangement is activated. The braking arrangement is used to brake the wheel gradually or suddenly dur to the piston movement. The compressed air is drawn from the compressor in our project. The air flow from compressor to inlet of solenoid valve is through polyutherane tube.

V. OBJECTIVE AND METHODOLOGY

Objective:

The aim is to develop a control system based on an electronically controlled automatic braking system called 'Intelligent Reverse Braking System'

The objective of this project are

- Design a control unit that senses am obstacles behind the vehicle
- The vehicle can automatically brake, when vehicle senses an obstacle while reversing.
- Reduce injuries happening to person in vehicle and damages to the vehicle hereby reducing the cost of maintenance of vehicle.

Methodology:





International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

Volume 2, Issue 5, May 2022

IJARSCT

VI. EXPERIMENTAL SETUP





The above system is block diagram of Advance Reverse Braking System. In this system we use IR sensor for obstacle detection and activating the solenoid valve simultaneously. Sensors are placed back side f car to sense the parameter, the control unit monitors input from sensor and activates the output according to it.

The sensor is fitted at back of the vehicle. This sensor gets switched on once the vehicle is started and sensor gives output continuously depending on the position of obstacle. When the obstacle is present back side of car the IR sense the distance and apply brakes. The Arduino microcontroller is a power device which monitors the input from sensors and actuates the braking circuit.

VII. ADVANTAGES

- A. Cost effective
- B. Less power consumption
- C. Skilled operators not required
- D. Operation is very simple
- E. Installation is very simple
- F. Less time more profit

VIII. DISADVANTAGES

- A. External compressor is required.
- B. Continuous power supply is required of operation.
- C. Circuit system should be away from moisture to avoid corrosion.
- D. Wear and tear happens at brake surfaces.

IX. CONCLUSION

This project has provided us an excellent opportunities and experience to our limited knowledge. We gained lot of practical knowledge regarding planning, purchasing, assembling and machining while doing this project work. We believe this project is best solution to bridge the gap between the institutions and industries. The project is working satisfactory conditions and we are able to understand the difficulties in maintaining the tolerances and quality. This project which we have developed helps to achieve low cost automation. This system can be modified as per required applications.

REFERENCES

[1]. Donald. L. Anglin, Automobile Engineering.

[2]. Evans, Leonard and Peter H. Gerrish, "Antilock brakes and risk of front and rear impact in the vehicle crashes," Accident Analysis and Prevention, vol. 28, no. 3 (1996), pp. 315-323.

[3]. Stroll & Bernaud, Pneumatic Control System, Tata Mc Graw Hill Publications.

Copyright to IJARSCT www.ijarsct.co.in DOI: 10.48175/IJARSCT-4124

IJARSCT



International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

Volume 2, Issue 5, May 2022

[4]. Radlinski, R.W., Braking Performance of Heavy U.S. Vehicles, SAE 870492; 1987.

[5].Hatipoglu,C.; Ozguner, U.; Sommerville, M.: Longitudinal Headway Control of Autonomous Vehicles, Proceedings of

the 1996 IEEE International Conference on Control Applications, New York, NY; 1996; p.721-6

[6].S.R.Majumdhar, Pneumatic Systems, New Age India International (P) Ltd

[7].Heller, Carl T., Automotive Braking Systems (Reston Publishing Company Inc., 1985).

[8].Radlinski, R.W., Williams, S.F., and Machey, J.M., The Importance of Maintaining Air Brake Adjustment, SAE 821263, 1982.

[9]. Hoseinnezhad R, Saric S, Bab-Hadiashar A. Estimation of clamp force in brake by-wire systems: a step-by-step identification approach. SAE transactions journal of passenger

[10] International Journal for Research in Applied Science & Engineering Technology. Hitesh Kumar S P1, Jayanth H21, 2Dept, of Mechanical Engineering, Dr. Ambedkar Institute of Technology, Bangalore.