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International
Journal
Of Modern Engineering Research (IJMER)

Advanced Brake Assistance System

Pankaj Jat[1], Pritesh Koshti[2], Prof.Vipin.V.Gawande[3]
[1,2]*Mechanical Department, Dr. D. Y. Patil Institute of Engineering and Technology, Pune, Maharashtra, India*
[3]*Assistant Professor, Dr. D. Y. Patil Institute of Engineering and Technology, Pune, Maharashtra, India*

ABSTRACT: *In recent years the numbers of cars has been increasing. Due to which day by day accidents are increasing more & more simultaneously. Unfortunately, many accidents caused by driving on the opposite side of the road, inappropriate speed and insufficient distance from other vehicles and it might have been prevented, if vehicle had been able to brake faster in emergency situation. The goal or idea of the project is to develop the system to support the driver is emphasized in critical braking situation. A probability based framework was developed and tested in emergency situation. As the components were added to the algorithm, greater benefits were realized. The result indicates that time taken to apply brake is less in emergency situation than the normal situation. Also taking the driver reaction time in account we can assist the driver and avoid accident and hence improve the safety parameters regarding to brakes. Thus the system reduces the number of car accidents mostly caused by human errors .Also make brake assist available for commercial cars at lowest range.*

Keywords: *Advance brake assistance, Driver response, Emergency situation, Safety, Time.*

I. INTRODUCTION

In automobile system, the brake played a subordinate role because the friction generated in between the brake pads and brake disk which helps the vehicles to slow down or stop at particular distance. Increase in speed and power constantly increasing the modifications in braking system. Brakes are used to inhibit the motion in order to prevent the vehicles from collisions. Suddenly when a driver sees an abject in front of the vehicle, he is momentary in shock and applies brakes suddenly. In this condition they get panicked and fail to apply brake completely. Consequently, for the normal drivers the reaction time to press the pedal is high but the force applied is not sufficient, so they may fail to use the full braking efficiency of the car which leads in accident and also valuable braking distance is lost. This happens because many drivers do not apply the brakes sufficiently in emergency situations due lack of experience. This means that the greatest possibility of braking effort is not sufficient for braking because the drivers did not press the brake pedal with sufficient amount force to apply brakes.

Advance brake assistance system will help in emergency situations by increasing braking force. Based on the speed and force with which the pedal is pressed, the advance brake assistance system detects the emergency situations. Drivers press the brake pedal quickly during emergency situations. This is done by analyzing the speed, with which the pedal is pressed active the advance brake assistance system will detect the emergency condition and applies full braking force even though driver did not press the brake fully. This advance brake assistance system has to be used with ABS and ESP equipped cars in order to increase the control of the car while emergency braking. It will also increase the brake pressure until the ABS regulation intervenes to prevent the wheels from locking. In this way greatest possible braking effect can be achieved and the brake path is significantly short.

II. LITERATURE REVIEW

Generally the studies of various roads safety surveys have been made. This stated that normal drivers fail to apply brakes completely in emergency situations. Mainly the reason is that the stopping distance depends on the deceleration when we apply brakes, due to incomplete baking force is applied the stopping distance is more and this leads the vehicle to crash or collide with the obstacle. The main concept of work began with the method to detect the problem by consider various factors such as driver behavior, reaction time, driver response in emergency situation, trails are made to consider the time taken for the brake pedal to move some amount of distance and then fix some threshold time to detect the emergency.

III. PROPOSED METHODOLOGY

This system is been designed with the algorithm required in order to detect and differentiate in emergency and normal situation. Advanced brake assistance system interprets a quick push of brake pedal in emergency condition. The main components in the advanced braking assistance system are optical sensor or

proximity sensor, brake pedal, micro controller (unit processor), master cylinder, secondary cylinder, pulley, rod, wheel, motor and disk brake.

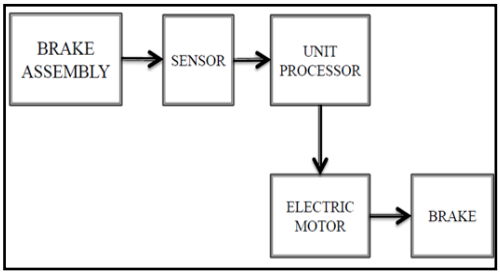

Fig. 1. Block diagram of Advance Brake Assistance system.

When the brake pedal is pressed it gives an analog output voltage or signal. This voltage or the signal value is given to unit processor (micro controller). Proximity sensor is used to detect the speed with which the brake pedal is pressed. Proximity sensor is placed at 65% of brake pedal path. Proximity sensor gives analog value for analyzing. Proximity sensor values are given as input to unit processor.

Unit processor or micro controller will take two inputs, one from brake pedal and another from optical sensor. The brake pedal is pressed or not will be determined on the basis output from brake pedal. Whenever the brake pedal is pressed across the proximity sensor, it will output voltage or signal. A timer is set on whenever the brake pedal is pressed. And when the brake pedal is released then the timer is switched off. The timer gives the value between the brake pedal pressed and the brake pedal crossing the proximity sensor. The threshold value is compared with the timer value. When the timer value is less than the threshold value, the system will declares it as emergency situation and motor is actuated to increase the braking force to stop the vehicle.

We can increase the braking force by pushing the piston by motor in emergency conditions, or by energizing the motor to pull the hand brake. Usually hand brake is used to keep the vehicle motionless in incline places or at parking. In emergency condition we need high braking force so, the motor pulls the hand brake cable for few seconds this helps to stop the vehicle and also create high braking power.

Day by day increase in number of vehicles. Most of vehicles have hydraulic braking system, which is most efficient system than all the mechanical braking systems. Hydraulic braking system consists of brake pedal, master cylinder and vacuum servo. Vacuum servo will assist the driver by increasing the braking force thus reducing the braking effort. When the brake is applied by the driver and then the vacuum servo multiples the brake force. Vacuum servo consists of rubber diaphragm in Centre dividing it into chambers. One of from other chambers is low pressure chamber and it is connected to engine into manifold. Other chamber is connected with atmospheric air and when the pedal is pressed which has high pressure vacuum. Due to the pressure difference diaphragm will move forward and create force on brake fluid. In this way when brake is pressed will fully the diaphragm will move fully in forward direction thus multiplying braking effort.

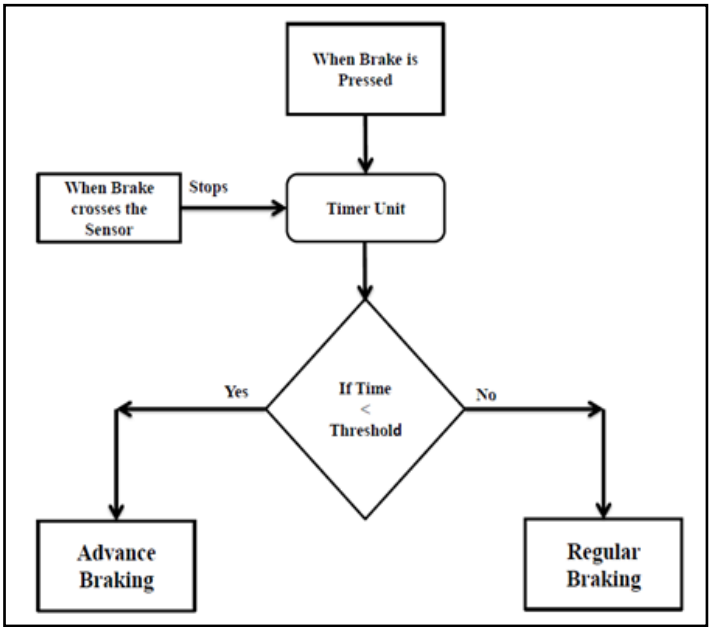

Fig.2. Advance Brake Assistance System Flow Chart.

Advance Brake Assistance System when the brake is applied too slowly, then it will not get triggered. But when the brake is pressed certain distance and certain velocity, then the Advance Brake Assistance System will get intervenes in triggering. When the pedal pressed, it travels to certain distance and velocity which is less than fixed value which is sense by proximity sensor. The proximity sensor sends the signal to the micro controller. Micro controller then compares with the other value of the timer and if it is less then, the micro controller gives the signal to the motor which is attached to the main cylinder. When the motor starts then the oil in the main cylinder will move to the secondary cylinder. In secondary cylinder were the force develop is 10 times greater than the main cylinder. This 10 times greater force will help in creating greater force for braking in crucial situation or emergency situation. This method is more efficient than the hand brake principle and it increases in braking force in critical situation or emergency condition.

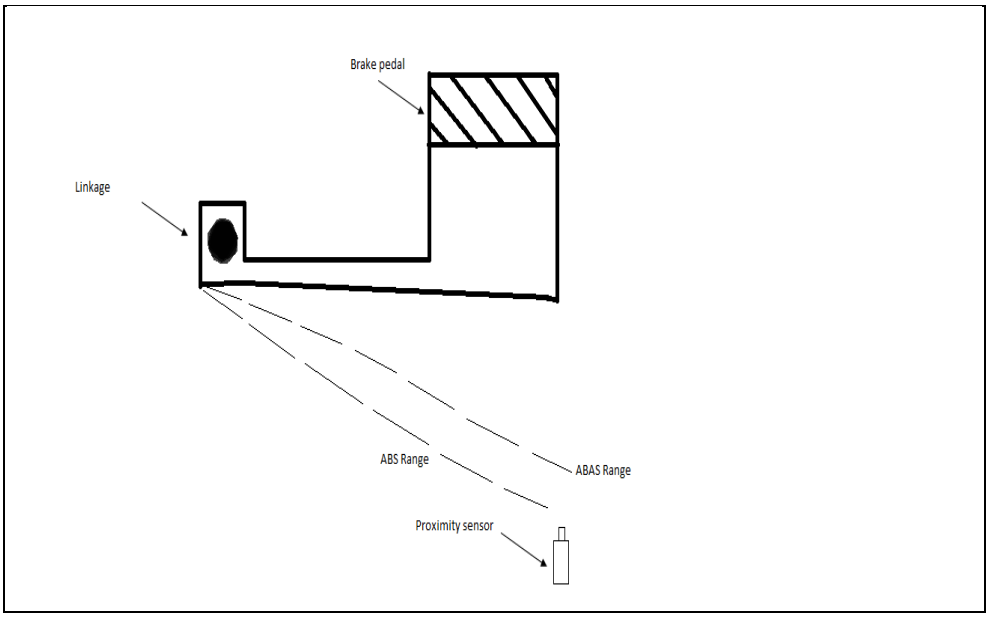

Fig.4. Schematic sketch of prototype brake pedal

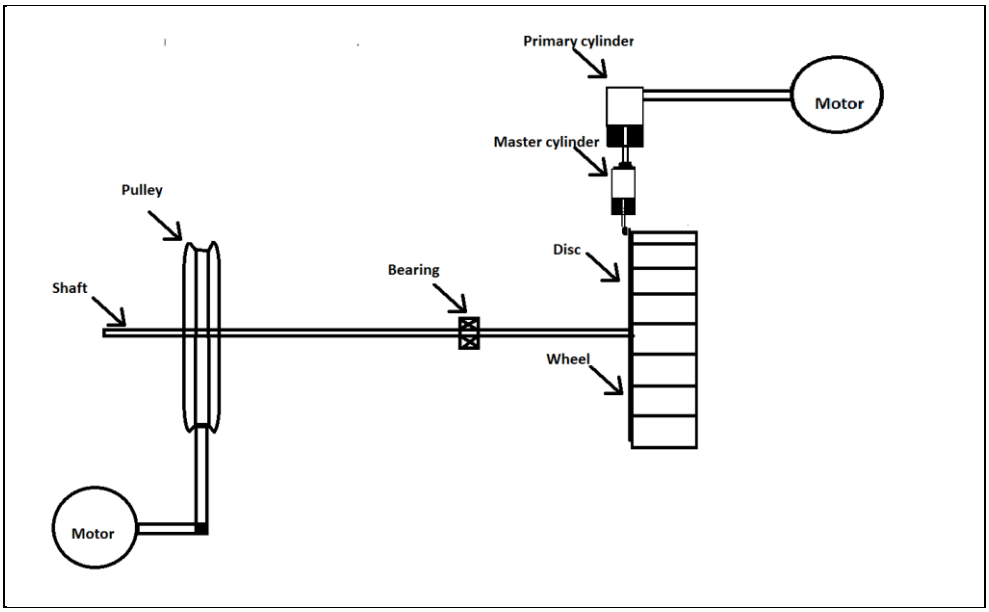

Fig.4. Schematic sketch of prototype

IV. RESULT

From the graph, it has been clearly differentiate the normal braking Vs. Advance braking situations. As shown in the graph, we can clearly observe the time taken by brake pedal to reach the 65% of its position is much less in emergency situation than the normal situation.

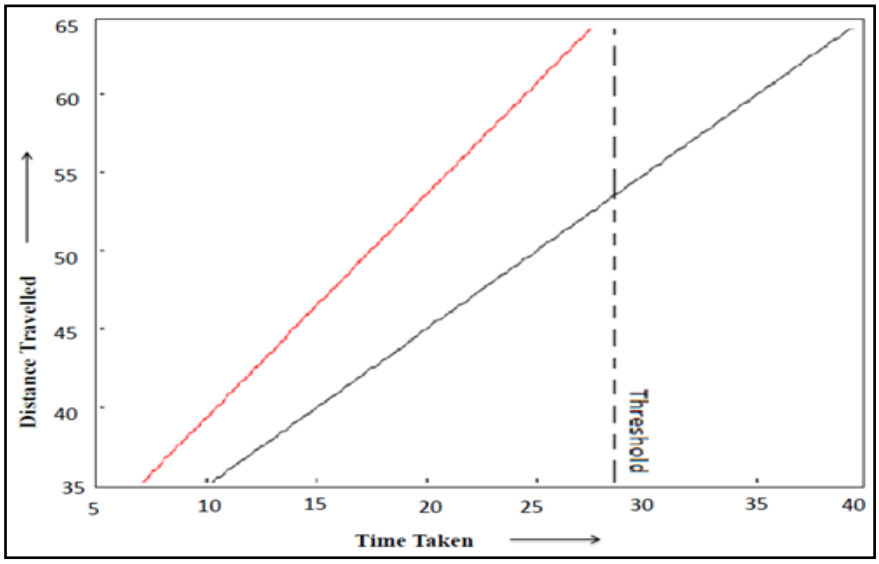

Fig.4.Normal Braking Vs. Advance Braking

V. CONCLUSION

In this way, finally we conclude that anyone can reduce the stopping distance by implementing the Advance Brake Assistance System and hence accident is decreased (reduced). The result also shows that the Advance Brake Assistance System is more efficient than the Normal Braking System.

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