AUTOMATIC BRAKING SYSTEM USING IoT

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ABSTRACT: Accidents are happening more frequently, and safety has become a top focus. One of the causes of accidents is improper brake usage. The goal of the initiative is to raise the bar for braking safety. The driver becomes anxious when they suddenly recognize an object in front of them. Many drivers don't use their brakes properly, and accidents result. By assisting the driver and accounting for their reaction time, we can prevent accidents and thereby raise safety. Distance is measured by an ultrasonic sensor, and when the distance between objects decreases without the driver's involvement, automatic brakes are then applied. Most likely, this function can apply either manual brakes or automatic brakes.

1. INTRODUCTION

The number of people who utilize automobiles is rising daily. At the same time, traffic congestion has expanded into a global issue. The main cause of this issue is human driving, which has reaction time lags and judgment lapses that can disrupt traffic flow and result in accidents. The most unwelcome event for a road user is a road collision. Brakes are used to halt the motion and prevent collisions.

Typically, when drivers unexpectedly detect an object in front of them during an emergency, they become terrified and don't fully engage the brakes. Increasing braking force will benefit an active safety braking system in an emergency. In regular driving conditions, the motorist applies the brake pedal more quickly than in an emergency. In an emergency, drivers swiftly depress the brake pedal. Examining the speed at which the foot is pressing the brake pedal, the active safety system will detect the emergency condition and applies full braking force even though the driver isn't applying the brake fully.

To prevent such kinds of accidents and save the driver's as well as others' life Automatic braking system will be helpful and can significantly impact safety and driving

experience. So, we developed a system that can be developed further to improve efficiency, our system includes an ultrasonic sensor that gives the location of a particular thing in front of the vehicle. The system is controlled by the Microcontroller which in turn controls the linear actuator to move the brake.

In order to improve vehicle stability during emergency braking, this intelligent braking system needs to be used with automobiles that have ABS. The main goal is to construct a system that requires less human attention while driving and to produce a safe emergency braking system employing an ultrasonic sensor.

2. LITERATURE REVIEW

Prasad Kisan Rajendra [1] in May 2021, proposed a paper on "Autonomous Braking System A System That Can Be Used For All Vehicles With Little Modification", which depicts that the control system is an important part of any automobile. This system is an Arduino-based system, where Ultrasonic and Camera sensors collect the data and transmits it to the micro-controller to perform necessary actions, also consists of an Ultrasonic wave emitter and receiver. Thus with emitter emits ultrasonic waves and with receiver receives a reflective Ultrasonic wave signal, giving the distance between the obstacle and the vehicle. Then the microcontroller is responsible for taking decisions about whether to brake or keep going or slow down to prevent a collision. As Linear Actuator is more precise and easier to use in the system, is controlled by Arduino to brake accurately.

Hemalatha[2] in May 2016, proposed a paper on "Automatic Braking System for Automobiles using IR Sensor", which depicts that braking system is an essential part of reducing accidents. This abs consists of an IR sensor and different brakes. The design consists of a spherical disc connected to a motor and a solenoid. The disc, mounted on the vehicle's wheel, will experience a moment that is opposed by the magnetic field produced. The system can identify an object's position and detect its presence. The IR emitter is supposed to produce infrared light. The signal will be reflected back to the receiver if an item is nearby. The integrated IR detector will then pick up the reflected light, then the brakes are applied.

3. PROPOSED METHODOLOGY

An automatic braking system consists of a linear actuator and an ultrasonic sensor through which it detects the distance of an obstacle and sends it to the model, with the help of a linear actuator the model performs pull and push operations to apply the brake

successfully. The brake wire is connected to the linear actuator. Whenever an obstacle is detected, this linear actuator will perform a pull operation so that brakes can be applied and the bike will come to a halt.

3.1 WORKING

The working of the Automatic braking system is totally based on the Arduino UNO. It is the processor on which the whole ABS working is dependent. The speed from the speedometer and the distance between the objects is detected by the ultrasonic. This speed and the distance are sent to the Arduino UNO as input. Based on the conditions the linear actuator applies the push and pull operation on the brake.
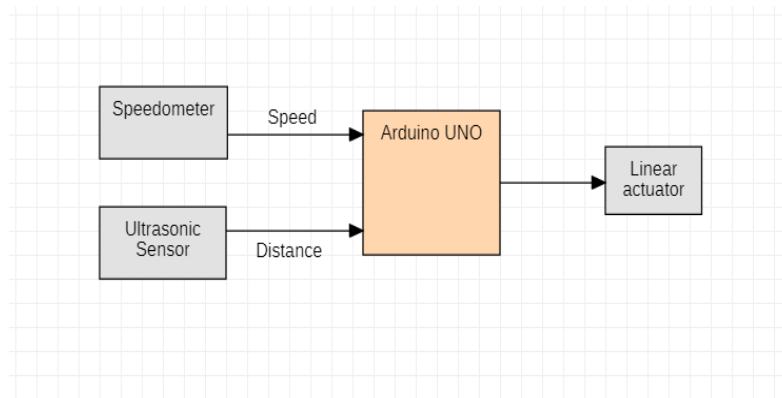
Fig: Working of abs.

3.2 IMPLEMENTATION

This paper depicts the implementation of Automatic Braking System simulation using Tinkercad software. This system works in applying both manual and automatic braking of a vehicle. Arduino UNO is the microcontroller, that holds the control of the sensors and the actuators processing. An ultrasonic distance sensor is used to measure the distance between two vehicles and two potentiometers are used one represents the working of a linear actuator in applying automatic breaks. The other represents the speed of the vehicle. LED on signifies automatic braking has been successfully applied and vice-versa.

Conditions where Automatic Braking System(abs) is been applied:
- If min_speed = 30 then abs will not apply.
- If the speed is between 50 to 60 and the distance is less than or equal to 200, then abs is applied.

- If the speed is between 60 to 80 and the distance is less than or equal to 240, then abs is applied.
- If the speed is between 80 to 90 and the distance is less than or equal to 275, then abs is applied.
- If the speed is above 90 and the distance is less than or equal to 300, then abs is applied.

Fig: Automatic Braking System Implementation.

4. CONCLUSION AND FUTURE SCOPE

By the end of the project, we will be able to develop new features in the motorcycle in which the braking system is automated to avoid accidents.

It can also be utilized for huge, heavy vehicles like tractors, buses, trucks, cranes, etc. We can certainly learn more about detecting obstacles based on the state of the vehicle and sensory zone.

It is definitely helpful to users and the public sector. Additionally, it prevents accidents from occurring in big cities. Therefore, we believe that automatic vehicle braking at a reasonable cost is a preferable idea.

REFERENCES

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