JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DESIGN AND DEVELOPMENT OF AUTOMATIC SPEED BREAKER DETECTION SYSTEM

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ABSTRACT

The project focuses on enhancing the safety and comfort of electric vehicles (EVs) by developing a speed breaker detection system. The system utilizes a distance sensor to detect speed breakers on the road. Upon detection, the system triggers a mechanism to stop the vehicle's motor temporarily, allowing for a smoother traversal over the speed breaker. The project aims to address the growing need for intelligent road-adaptive systems in EVs, ensuring a safer and more comfortable driving experience

INTRODUCTION

1.1. Introduction

the increasing popularity of electric vehicles (EVs), there is a growing need to improve their safety features. One common challenge faced by drivers is navigating speed breakers, which can be uncomfortable and potentially damaging to the vehicle if not approached correctly. To address this issue, our project focuses on developing a speed breaker detection system that can detect speed breakers ahead of time and adjust the vehicle's speed accordingly.

Speed breakers are generally laid for the safety of the pedestrians in residential zones and school zones to control the speed limit of the vehicle, thereby avoiding accidents. But these days, many numbers of unauthorized speed breakers are laid unnecessarily, which do not follow the standard size proposed by National Highway Authorities. Speed breakers are common in developing countries like India, China, Pakistan, etc. because sign boards like “stop”, “yield” and “speed limit” etc. will not work due to lack of traffic enforcement resources. Though there is evidence that speed breakers reduce speed related accidents, there are also situations causing accidents and severe injuries. Driver negligence, the speed of the vehicle, low visibility at nights will result in crossing the speed breaker in greater velocity. There are few incidents reported, where motorcycles, scooters, and cars are vulnerable because unnoticed speed breakers may throw

them off balance causing severe accidents and damages. According to the Road Accident Report (2014) published by the Road Transport & Highways ministry, while 4,726 lives were lost in crashes due to humps, 6,672 people died in accidents caused due to potholes & speed breakers, this figure is not small and the numbers of deaths due to speed breakers are increasing every year. The statistics of the road accidents collected from the report are shown as a bar chart in Figure 1. As part of this work, a general survey was conducted to opinions from different people. Many of them have complained that their vehicles are thrown off balance, especially when they are traveling in new. As part of this work, a general survey was conducted to opinions from different people. Many of them have complained that their vehicles are thrown off balance, especially when they are traveling in new. routes and in the nights. For example, many have complained that Bangalore is one such city where night traveling is very tedious and dangerous as most of the speed breakers are very huge and there are no proper sign boards installed. Also, the current version of the Google maps will provide data about ongoing repairs on a road but, it will not provide any data about speed breakers and bad road conditions. This provides us an opportunity and motivation to develop a solution that will alert the user about the speed breakers, particularly when he is traveling on new routes.

1.2. Problem Statement

"To develop a cost-effective and reliable system for detecting speed breakers on roads in real-time to improve road safety and vehicle suspension longevity. The system should be able to accurately detect speed breakers of varying shapes and sizes, provide timely warnings to drivers, and integrate seamlessly with existing vehicle systems. The goal is to enhance driver awareness and reduce vehicle wear and tear caused by sudden speed breaker encounters."

1.3. Objectives

The primary objective of the project is to design and implement a speed breaker detection system for EVs that can enhance safety and comfort for drivers. The system will use a distance sensor to detect speed breakers on the road and will automatically stop the vehicle's motor when a speed breaker is detected. This will allow for a smoother and safer traversal over the speed breaker, reducing discomfort for the driver and potential damage to the vehicle.

• To make the driver aware of the speed breaker well before time.

• To avoid any possible accidents, damages to the suspension, tyres, etc.

• Develop the system further, to detect potholes.

2. LITERATURE REVIEW

Apeksha S. Chavan, et al[1] Sleep related accidents discussed are more severe, possibly due to being taller Speed is involved, and because the driver is unable to take any Avoiding action, or braking before a collision. when The driver fails to change the lighting mode Sleep-related accidents happen when cars come To be more intense, probably because of the higher speed involved and because the driver was unable to take any Avoiding Where typical sleep-related accidents are described The driver runs off the road or collides

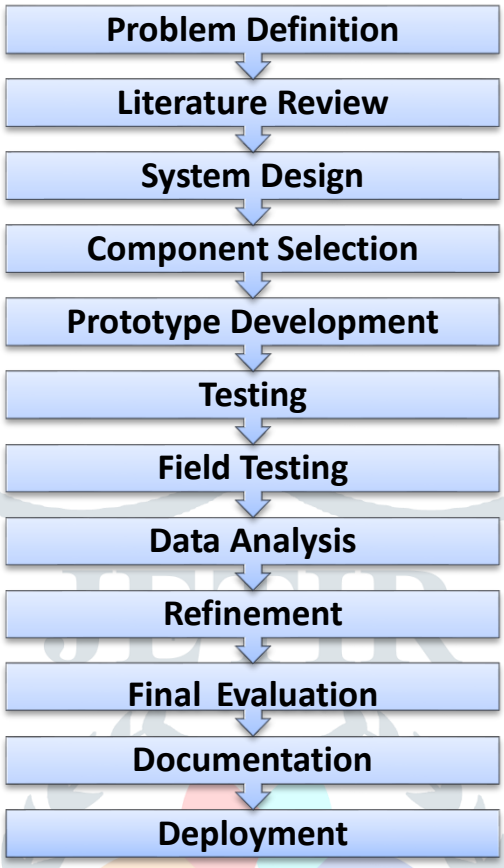
with another vehicle or vehicle object, without any indication of hard braking before impact.

B. Praveenkumar, [2] Described the accident due to Drowsiness as being prevented and controlled when the vehicle is out of control. Additionally, adding alcohol detectors to cars Also helps to avoid drunk driving. The word used here for Reconstituting that the driver is sluggish is by using the eye Driver's blink. Currently, one of the main factors contributing to traffic accidents is fatigue. These events were Because the driver was lethargic and not competent to drive the car when he or she woke up. There is lethargy Using one is identified by the frequency of eye blinks on and off An infrared sensor is attached to the driver's eyeglass frame. The vehicle will not allow the driver to start the vehicle if the buzzer Indicates that the driver is drunk.

Takahiro Wada [3] described how to lower the back car crash, it is important to assess the necessity help slow down as soon as possible and start help naturally. Based on the developed braking profile model and brake activation model of expert drivers, an there will be an automatic braking system to avoid a collision designed in this study to achieve a smooth and safe brake help naturally.

Erik Coelingh [4] Discussed how governments, the public, and the auto industry are all becoming more and more interested in automotive safety. Statistics on traffic Accidents indicate that 1.2 million people die on roads every year. Due to these factors, safety is still the top Priority for Volvo cars. Some of thmost recent Advances in active safety in Volvo cars were discussed In this study. Driver distraction, which results in failure to Respond in time, is a prevalent factor in incidents Including rear-end crashes

3. METHODOLOGY



4. DESIGN

4.1. Layout of system

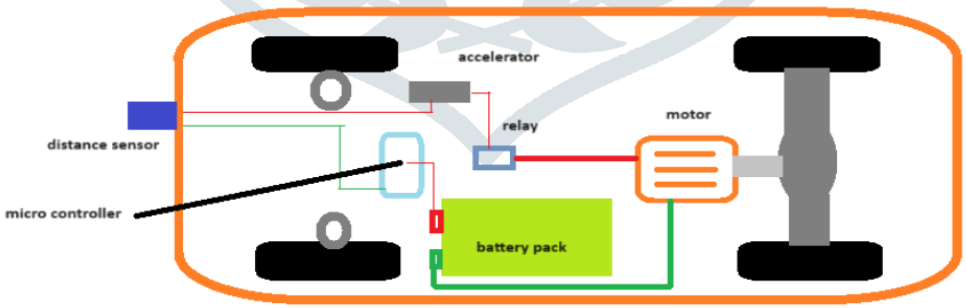


Fig.4.1. Layout of System

4.2. Components Used in System

Distance Sensor

Fig.4.2. Distance Sensor

A distance sensor is a device that is used to measure the distance between the sensor and an object. These sensors are commonly used in various applications such as robotics, automation, and object detection. There are several types of distance sensors available, including ultrasonic sensors, infrared sensors, laser sensors, and capacitive sensors. Each type of sensor uses different principles to measure distance:

Arduino

Fig.4.3. Nano-Microcontroller

The Arduino Nano is a small, versatile, and easy-to-use microcontroller board based on the ATmega328P microcontroller. It is part of the Arduino family of boards and is designed for projects that require a compact and low-cost solution. Here are some key features and specifications of the Arduino Nano:

Key Features:

Microcontroller: ATmega328P

Operating Voltage: 5V

Input Voltage (recommended): 7-12V

Input Voltage (limits): 6-20V

Digital I/O Pins: 14 (of which 6 provide PWM output)

Analog Input Pins: 8

DC Current per I/O Pin: 40 mA

Flash Memory: 32 KB (of which 2 KB used by bootloader)

SRAM: 2 KB

EEPROM: 1 KB

Clock Speed: 16 MHz

USB Interface: Mini USB

LCD Display

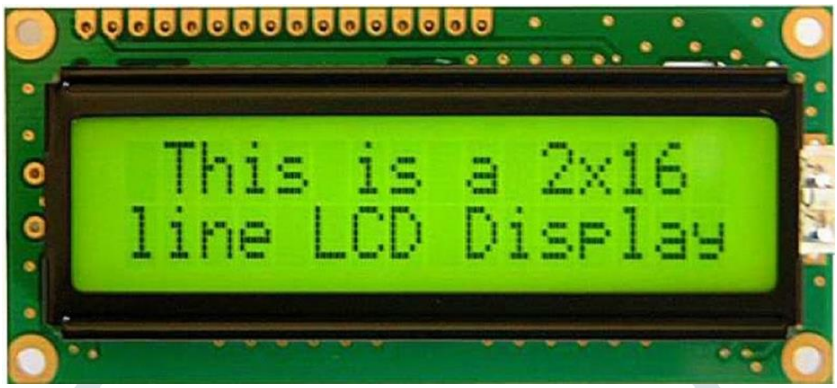


Fig.4.4. LCD Display

A 2x16 line LCD display is a type of liquid crystal display (LCD) module that can display 2 lines of text, with each line capable of displaying up to 16 characters. These displays are commonly used in embedded systems, such as microcontroller-based projects, to provide visual feedback and information to the user. Here are some key features and specifications of a 2x16 line LCD display:

Key Features:

Display Type: Liquid Crystal Display (LCD)

Number of Lines: 2

Number of Characters per Line: 16

Backlight: Most 2x16 LCD displays come with a built-in LED backlight for improved visibility in low-light conditions.

Interface: Typically, these displays use a parallel interface to communicate with a microcontroller or other host device.

Relay Module

Fig.3.8.Rlay Module

A 12V relay module is an electronic component used to control high-power circuits with low-power signals. It consists of a relay and a driver circuit that operates the relay coil when a 12V signal is applied. The relay is a switch that can be electronically controlled to open or close a circuit.

5. ADVATAGES

Improved Road Safety

Reduced Vehicle Wear and Tear

Enhanced Comfort.

Increased Awareness

Cost-Effectiveness

Integration with Existing Systems.

Adaptability

6. LIMITATIONS

Detection Accuracy

False Positives.

Limited RangeCost.

Dependency on External Factors.

Integration Challenges

Maintenance Requirements

Limited Effectiveness at High Speeds

7. APPLICATIONS

Vehicle Safety

Driver Assistance

Fleet Management

Smart Cities

Public Transport

Infrastructure Planning

Research and Development

8. CONCLUSION

In conclusion, the design and development of a speed breaker detection system for electric vehicles (EVs) is a challenging yet rewarding endeavor. Through thorough research, careful planning, and innovative design, a reliable and effective system can be created to enhance the safety and efficiency of EVs on the road.

The key components of a successful speed breaker detection system include accurate detection technology, such as radar or vision-based systems, robust data processing algorithms, and seamless integration with the vehicle's existing systems. By combining these elements, the system can effectively detect speed breakers in real-time and provide timely warnings to the driver, improving overall road safety.

REFERENCES

Title: "Design and development of a speed breaker detection system for automotive suspension enhancement" **Authors:** K. D. Jadhav, P. R. Patil, S. S. Bhandare **Published in:** International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) **Year:** 2016 **Link:** ResearchGate

Title: "Development of speed breaker detection and tracking system for autonomous vehicle" **Authors:** N. Gupta, A. Mishra, S. K. Bhatia **Published in:** Proceedings of the 2018 International Conference on Computing, Power and Communication Technologies (GUCON) **Year:** 2018 **Link:** IEEE Xplore

Title: "An Intelligent Speed Breaker Detection System for Autonomous Vehicles Using Deep Learning" **Authors:** R. Singh, S. K. Sahoo, A. Kumar **Published in:** International Journal of Recent Technology and Engineering (IJRTE) **Year:** 2017 **Link:** ResearchGate

Title: "Design and implementation of a speed breaker detection system using image processing" **Authors:** S. Sharma, R. Singh, A. Verma **Published in:** Proceedings of the 2019 International Conference on Computing, Communication and Intelligent Systems (ICCCIS) **Year:** 2019 **Link:** IEEE Xplore

Title: "Automatic detection of speed breakers using GPS and GSM for vehicle safety" **Authors:** A. Kumar, R. Kumar, A. Kumar **Published in:** International Journal of Scientific & Engineering Research (IJSER) **Year:** 2018 **Link:** IJSER

Title: "Development of a smart speed breaker detection system using Arduino and ultrasonic sensor" **Authors:** S. Gupta, P. Verma, S. Sharma **Published in:** Proceedings of the 2017 International Conference on Computing, Communication and Automation (ICCCA) **Year:** 2017 **Link:** IEEE Xplore

Title: "Speed breaker detection system using image processing and raspberry pi" **Authors:** S. Singh, A. Mishra, A. Verma **Published in:** International Journal of Engineering and Advanced Technology (IJEAT) **Year:** 2016 **Link:** IJEAT

Title: "Design and implementation of an automated speed breaker detection system for vehicles" **Authors:** R. Sharma, S. Kumar, A. Gupta **Published in:** Proceedings of the 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI) **Year:** 2018 **Link:** IEEE Xplore

Title: "Development of a speed breaker detection system using GPS and GSM technology" **Authors:** N. Kumar, S. Kumar, A. Kumar **Published in:** International Journal of Scientific & Engineering Research (IJSER) **Year:** 2017 **Link:** IJSER

Title: "A review on intelligent speed breaker system for vehicles" **Authors:** S. Verma, R. Sharma, A. Kumar **Published in:** International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE) **Year:** 2016 **Link:** ResearchGate