

Review on Speed Breaker Detection System

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Abstract : Roads are designed such that vehicles can speed up and people can travel with comfort, from one place to another within the required time period. But at certain locations, like zebra crossings, schools, hospitals, sharp turns, residential streets and other crowded places there is a need for certain speed controlling devices for the safety of human beings, animals. This is achievable by installation of various different safety measures such road signs, speed cameras, road markings, illumination devices and speed breakers. In few situations, speed breakers are essential, but their use on roads is not a well thought-out engineering practice. There are many unmarked speed breakers on the roads which when are un-noticed cause severe accidents, suspension damage and tyre bursts. In this report the method of detecting humps and potholes and provide timely alerts to drivers to shun accidents or vehicle damages are put forward. An image processing system is used to become aware of the speed breaker. This output will be utilized for alerting the driver. Further, we plan to devise an automatic speed reducing mechanism, which will reduce the speed of the vehicle in case it is travelling at a speed higher than a threshold value.

IndexTerms - speed breakers, unmarked, detection, alerting.

I. INTRODUCTION

Anyone who has driven on Indian roads will know how terribly designed are the speed breakers. Usually unmarked, these often lead to accidents and suspension damage. In 2015, according to government data, 11,084 deaths occurred because of speed breakers. In 2014, the fatality count was only marginally lower at 11,008[1][2].

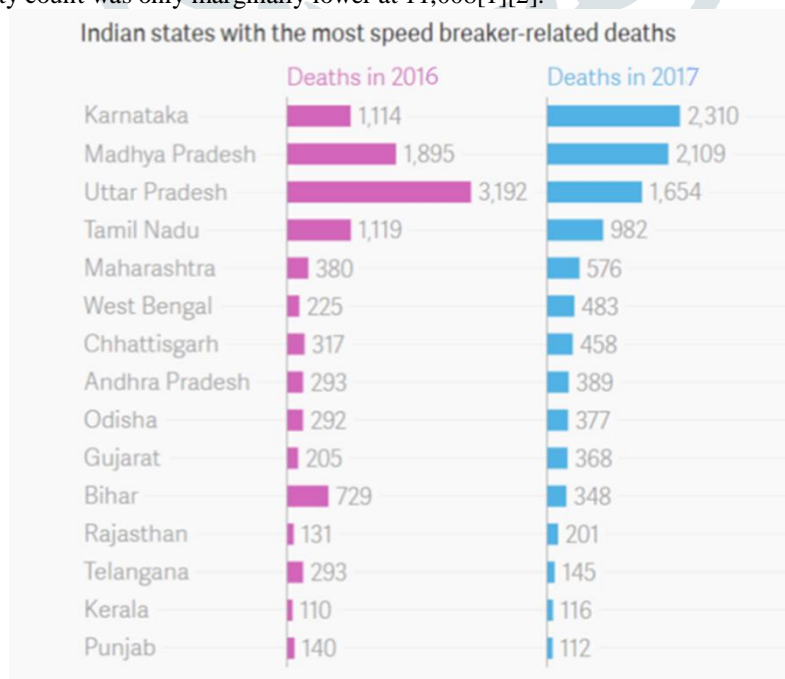


Figure 1. Accidents caused due to speed breakers in various states

II. IMPORTANCE OF THE PROJECT

The state of Indian roads is terrible, as known by everyone. The speed breakers are improperly designed and left unmarked. This leads to inability to identify their presence, when driving a vehicle on the road. Damage to the suspension system is unavoidable under such circumstances. This further leads to accidents, leading to death of people. Only if the driver is able to identify the presence of such speed breakers, any further accidents and suspension damages can be easily avoided.

III. OBJECTIVES & SCOPE

3.1.Objectives:-

- 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.

3.2.Scope:-

- The driver will be aware of the speed breakers beforehand, thus providing him sufficient time to control the vehicle.
- Decline in casualties caused by improper speed breakers.

If successfully implemented, system can be developed further to:

- Automatically control the vehicle speed in case the driver fails to do so.
- Detect potholes on the roads.

IV. LITERATURE SURVEY

4.1.Introduction

Now-a-days transportation has become an inseparable part of all human beings. The present transportation system has minimized the travelling times but on the other hand amplified the life risk. Annually, road crashes cause loss of numerous lives and serious injuries.

According to Indian Road Congress the provision of speed humps for control of vehicular speeds on roads specifies that a road hump should confine certain dimensions and should be painted in white strips. But in fact speed breakers are not well maintained and are not constructed according to guidelines. For someone who is unfamiliar with the roads, sudden finding of a hump in the middle of the road could be very dangerous. These speed breakers are unevenly distributed with irrational heights. Also, heavy rains and movement of heavy vehicles are the main reasons for the formation of potholes. This also leads to major harrowing accidents and loss of human lives. To avoid this, an effective and prompt delivery of information well in advance to drivers can definitely decrease the number of traffic accidents. So a detection and identification system becomes an essential module of the driver warning and assistance system. [3]

4.2.Related work

A method for detecting vehicle braking and road humps was proposed in [5]. They used machine learning techniques to detect road irregularities and braking events from accelerometer and magnetometer data. The method will not always work because magnetometer is not present in all phones, usually is vulnerable to magnetic interference and always increases battery consumption. As well, the performance of this algorithm was not tested for various different types of speed-breakers, vehicles and drivers. A method for detecting speed bumps and braking events was also proposed in [6]. This work did not differentiate between potholes and speed-breakers, and labeled them both as speed humps. Like [5] requires magnetometer for reorientation, [6] requires GPS for reorientation, increasing the overall complexity and battery utilization. Lately, cell phone crowd-sourcing based pothole detection has also gained considerable attention [7]. In this work [7], the cell phone had to be placed in a certain way on the dashboard to avoid reorientation difficulty. Authors of [9] attempted to solve the pothole detection problem without considering accelerometer reorientation. Authors of [8] proposed a fixed threshold based pothole detection algorithm that may probably not work with different types of phones or cars because of the difference in overall sensitivity to variations along the vehicle's z-axis [4].

4.3.Terminologies used

4.3.1. Speed bump

Speed bump is an artificial elevation set crosswise into the surface of a street to make the operators of vehicles drive at a slow speed. Speed hump is a common name for a family of traffic easing devices that use vertical deflection to slow down motor-vehicle traffic in order to improve safety conditions. Even though speed bumps are efficient in keeping vehicle speeds down, their use is

sometimes debatable—as they can increase traffic, may damage vehicles if traveled upon at too high speed, and slow down emergency vehicles. Improperly designed speed bumps that are too tall can be disruptive for drivers; and, may be difficult to navigate for vehicles having lower ground clearance, even at very low speeds. Speed bumps can also pose serious hazards to two-wheelers if they are not clearly visible.[10]

4.3.2. Camera

A camera is an optical instrument that is used for recording or capturing images, which may be stored locally or transmitted to another location. The images may be still photographs or constituting videos or movies. The camera is a distant sensing device as it senses subjects without any contact. The operation of the camera is very analogous to the working of the human eye.[11]

4.3.3. MATLAB

MATLAB (matrix laboratory) is a numerical computing environment and exclusive programming language developed by MathWorks. MATLAB allows matrix calculations, plotting of functions and data, execution of algorithms, formation of user interfaces, and interfacing with programs written in other languages, including C, C++, C#, Java, Fortran and Python. MATLAB is intended primarily for numerical computing; an optional toolbox uses the MuPAD symbolic engine, allowing way in to symbolic computing ability. MATLAB users come from various backgrounds of engineering, science, and economics.[12]

4.3.4. Arduino

Arduino is an open source computer hardware and software company that designs and manufactures single-board microcontrollers that are used for building digital devices and interactive objects that can sense and control several objects in the physical and digital world. Arduino boards are usually available commercially in preassembled form, or as kits. These board designs generally use an assortment of microprocessors and controllers. They are pre fitted with digital and analog input/output pins that may be interfaced to various expansion boards or Breadboards and other circuits. The microcontrollers are typically programmed using features from the programming languages C and C++. Common examples of such devices intended for beginners include simple robots, thermostats, and motion detectors.[13]

4.3.5. LED

A light-emitting diode is a 2-lead semiconductor light source. It is a p–n junction diode that emits light rays when activated. When an appropriate current is applied to the leads, electrons recombine with electron holes within the device, and release energy in the form of photons. This effect is known as electroluminescence. Recent developments have produced LEDs appropriate for environmental lighting. LEDs are much better than incandescent light sources, including lesser energy consumption, improved robustness, long service life, and smaller size. Light-emitting diodes are generally used in applications such as aviation lighting, automotive headlamps, general lighting, traffic signals, camera flashes, etc. They are also much more energy efficient and, have fewer environmental concerns regarding their disposal.[14]

4.3.6. Buzzer

A buzzer is an acoustic signaling device, which can be mechanical, electromechanical, or piezoelectric. Buzzers are usually used in alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.[15]

V. PROPOSED WORK

Based on the disadvantages of the previously studied articles, it has been decided to focus on overcoming the same, by thinking of a different approach.

We have decided to use a camera that would mount at the front of the vehicle which will be recording the road ahead. The captured images will be analyzed by MATLAB software. In case any Speed breaker is detected, an output will be generated.

This output will be utilized for alerting the driver. Further, we plan to devise an automatic speed reducing mechanism, which will reduce the speed of the vehicle in case it is travelling at a speed higher than a threshold value.

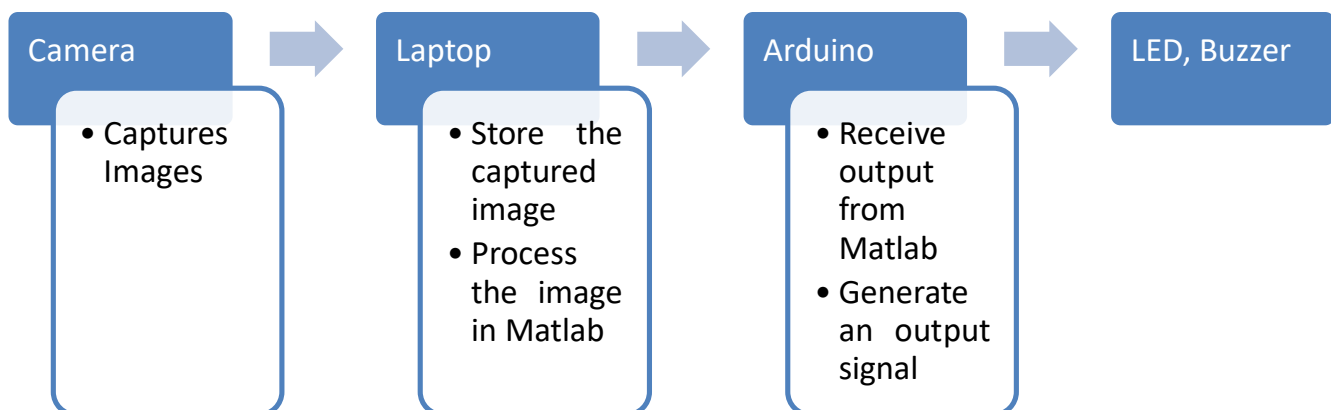


Figure 2. Proposed work

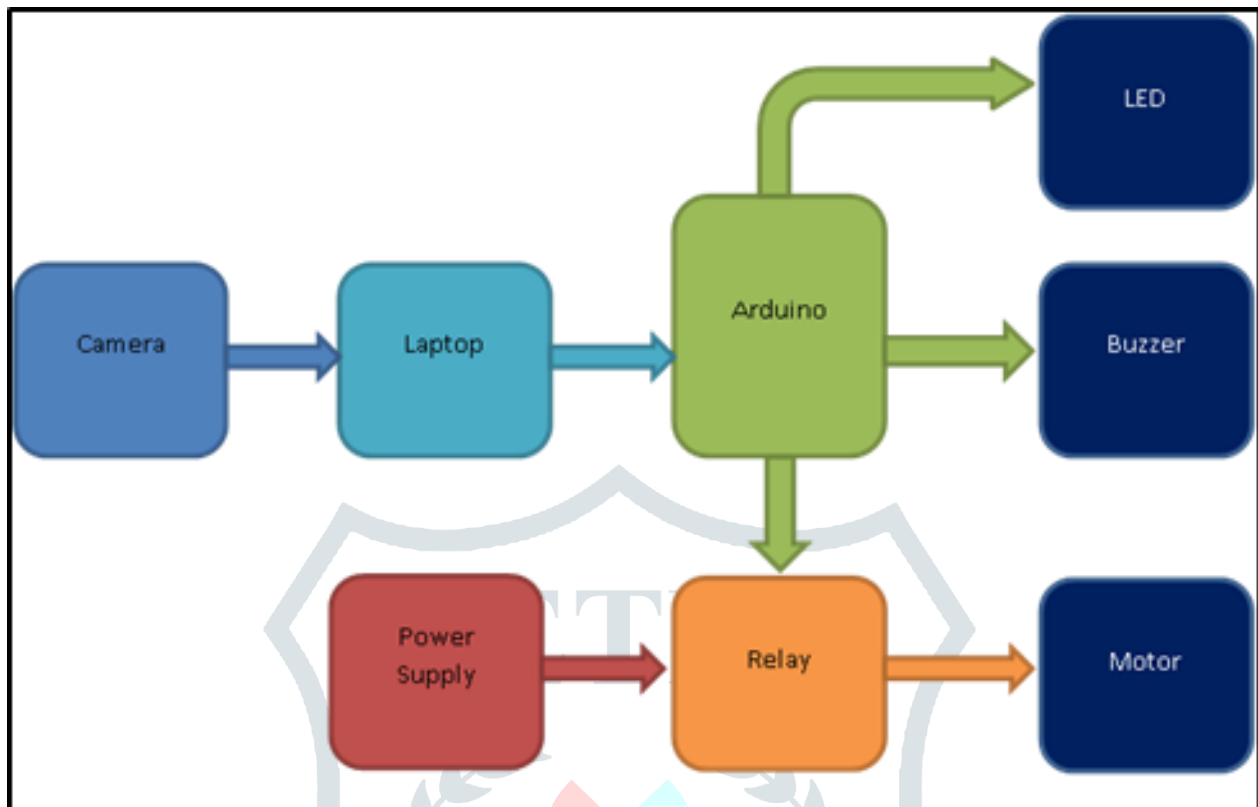
VI. DESIGN

Figure 3. Proposed design

VII. EXPECTED OUTCOMES AND FUTURE SCOPE

7.1.Expected outcomes

- The driver will be aware of the speed breakers beforehand, thus providing him sufficient time to control the vehicle.
- Reduction in accidents caused due to speed breakers.

7.2.Future scope

If successfully implemented, system can be developed further to:

- Automatically control the vehicle speed in case the driver fails to do so.
- Detect potholes on the roads, and alert the driver about the same.

VIII. ACKNOWLEDGMENT

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