

# Analysis and study of use of light reflective stickers on Speed breakers to avoid sudden accidents.

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## Abstract:

Speedbreakers kill far more people than they rescue in India. According to Ministry of Roads and Transport data, these "safety gadgets" on the road cause 30 accidents every day, killing at least nine people. That is the two-year average since the government began tracking speed breakers in 2014. The data for last year have not yet been revealed, but government officials feel they can be compared. In 2015, 3,409 people were killed in traffic accidents in Australia and the United Kingdom combined (2,937 fatalities in 2015). Inadequate design, poor materials, no clear markings, and dangerous to drivers Nitin Gadkari, the federal road transport minister, stated, "This is a national concern." Every road has speed breakers that may shatter bones and damage automobiles." Speed bumps are legally mandated. Many government authorities and even drivers are unaware of these restrictions and design requirements. To avoid this circumstance, a strategy of installing reflectors on all uneven speed breakers so that the motorist sees a clear reflection of the screen and notices before approaching the speed breaker is implemented. This technique may be used by drivers to slow down and take the required steps to prevent accidents. Additionally Vibration sensors and an emergency SMS sending system can also be incorporated to boost the life-saving factor.

## Introduction:

Different types of highways have different design speeds that cars must follow in order for the highway system to work correctly. To ensure correct speed, a unique control system is required. These strategies can boost traffic while also improving safety and convenience.

Speed bumps should only be used on small city streets and in residential neighborhoods. Speed breakers are not advised on motorways and roads outside of major cities. Many locations, as shown locally, utilise unlawful speed breakers (branch breakers made by local people, not the government). There are usually no street lights to highlight the speed breakers. Due to a lack of road lighting and a lack of comprehensive awareness of speed breaker signs, drivers of fast automobiles are oblivious of speed breakers in front of them. As a result, if the motorist approaches at high speed, he senses the front speed breaker at a distance of at least 10 metres and instantly stops. Heavy braking can cause car skidding (typically on two wheels) or vehicle unbalance, which can lead to major accidents. To avoid these occurrences, a simple answer is to specify whether to build some signs or indications... to alert the driver that the speed breaker is coming. Legal speed breakers, as depicted, contain suitable markings and indicators, but unlawful speed breakers do not. Governments are increasingly eliminating unlawful speed restrictions, but it will take time and money to remove all speed breakers. There are 5 authorised speed breakers and 15 illicit speed breakers in one location. As a result, after determining the heights of all unlawful bumps in a certain place, these heights should be marked with reflectors to warn vehicles of imminent speed bumps and limit the frequency of accidents. Bumps Reflectors must be affixed to unneeded speed bumps since it takes 6 to 12 months from the official examination of unlawful speed bumps to the commencement of removal, and numerous tragic incidents are likely to occur during that period owing to superfluous bumps. to provide As a result, the analytical measurements of the automobile speedometer before and after the placement of the reflector label are observed and documented as a conclusion in this study. An information recording system using ultrasonic sensors is used to detect the time interval between two ultrasonic sensors in order to determine the speed of the automobile.

### 1.1 Objective of the Paper:

- 1) To use a Ultrasonic Based Speed measuring device or data logger to measure the speed of incoming vehicles before and after speed breaker.
- 2) Use of Vibration sensor and sms sending Module to increase the life expectancy in case of any accident.

### Literature Review

#### 2.1 Background

##### 1) Past accidents caused by unnecessary speed breakers:

Delhi, New Delhi: Arguably, speed breakers are killing more people than they are saving in India. According to data from the Ministry of Roads and Transport, these road "safety devices" cause 30 accidents every day, killing at least nine people. That's the average for the past two years since the government began collecting statistics on speed breakers in 2014. Last year's figures have not yet been released, but government sources believe they can be compared. In fact, India has more speeding deaths (3,409 in 2015) than all road accidents in Australia and the UK combined (2,937 deaths in 2015). Poor design, poorly made materials, no clear markings and harmful to drivers. "This is a nationwide problem. We have speed breakers on every road that can break your bones and wreck your car."

##### 2) India registers highest no of deaths due to speed-breaker related accidents.

According to data provided by India's Ministry of Road Transport, speeding causes 30 accidents a day in India. Yes, 30 accidents happen every day in India due to speed breakers. And it is not.

These incidents can also lead to death. Every day 9 people die in India due to accidents related to speed breakers. In 2015, 3,409 people died due to speed bumps. This means India has more speed-related deaths than the UK and Australia combined!

Indian roads are the most dangerous roads in the world. In 2015, about 1.47 million people died in road accidents in India. This number for Australia and Great Britain is a total of 2937. Unfortunately, Indian officials believe adding speed breakers is the solution. But according to statistics, this is not the case.

3 Speed breakers in India kill more people than accident do in UK, Australia In 2014, the government began collecting statistics on speeding accidents. The statistics are dire. According to The Times of India, speeding causes 30 accidents and 9 deaths a day. According to the ministry's data, speeding caused 11,008 accidents in 2014 and 11,084 in 2015. In fact, speeding kills more than all road accidents in Australia and the UK combined (2,937 deaths in 2015). Even more worrisome is the possibility that these data are understated. Speeding accidents may be combined with traffic accidents and are not recorded separately. This is due to poor materials, poor design and lack of noticeable display. The Indian Roads Council (IRC) admits in its rules that there is "no specific design" suitable for all vehicles on the road. Based on field surveys and research reports, IRC suggested a design suitable for normal Indian highway traffic. For the recommended passing speed of 25 km/h for normal traffic, the speed breaker should be a round hump with a radius of 17 m, a width of 3.7 m and a height of 0.1 m. In addition, approaching speed breaker warning signs should be installed and the hump itself should be painted black and white so that approaching vehicles can easily recognize it.

4) Petition in Chhattisgarh For unwanted Speed Breakers The petitioner claims that as far as he knows, speed breakers cannot be built on the country's highways, and the Ministry of Road Transport and Highways has ordered all states and necessary bodies to remove speed breakers from national highways. The number of casualties caused by speed breakers. The complainant also cited the Road Transport and Highways Ministry's annual report on road accidents in India in 2016, which attributed 9,583 accidents and 3,396 "accidental deaths" to speed breakers. I'm here. In the case of Chhattisgarh data, the petitioners argue that speed breakers cannot be constructed unless a permit is issued by a commission called 'ZilaSadakSurakshaSamiti'. Research on speed breakers (2017) Department of Civil Engineering, Faculty of Engineering, Ahmedabad. Research has shown that speed breakers are an effective technique not only for limiting speed, but also for minimizing the frequency and severity of crashes. This is despite

the fact that in some areas the regulations are not followed and they are placed randomly, which also causes accidents. Speed charts are provided on public transport routes, such as BRTS lines near stations, where transport vehicles are already slow. Not only will operating costs increase, but it will also cause serious inconvenience to passengers. It is also suggested to monitor its effect on post-admission comfort. In India, there is a significant need for thorough pre- and post-implementation studies of speed breakers to assess their effectiveness.

### **3.Methodology**

#### **3.1 Methods used For this Study is as Follows:**

**The methods used to test the project's functionality are as follows:**

- 1) Applying a reflective sticker to the speed bumps.
- 2) If the speed breaker reflective sticker has not been worked on, it can be placed on the left side in a vertical position.
- 3) Following the application of reflective stickers on speed breakers, the following steps must be taken to ensure the correct operation of this approach.
  - a) From 50 metres ahead, drivers should be able to notice the reflective stickers' light reflection.
  - b) Without stickers, drivers' speeds may be excessive due to the invisibility of speed breakers.
  - c) Due to the visibility of the Reflective plate indicator after installing the Reflective stickers on the Speed Breaker/side at vertical position, the speed of vehicles should be lowered after placing the Reflective stickers on the Speed Breaker/side at vertical position.
  - d) A speed measurement and data logging equipment should be used to measure the speed differential before and after the placement of the reflective sticker.
  - e) Additional Beneficiary method like Emergency sms sending in case of any accident near the Speed Beaker is included.
  - f) A Vibration sensor is used to detect the amount of shock generated by the crossing vehicles near the speed breaker.
  - g) Vibration Level is Readed and an average vibration value for a particular area is noted and used in the system for normal or abnormal vibration or shock values.
  - h) In case of any abnormal or shock values greater than the noted average vibration value is detected ,it will automatically send an emergency sms to any particular programmed cell phone or service number(Mostly police station, ambulance for inspection and providing medical facility as soon as possible to the injured person.

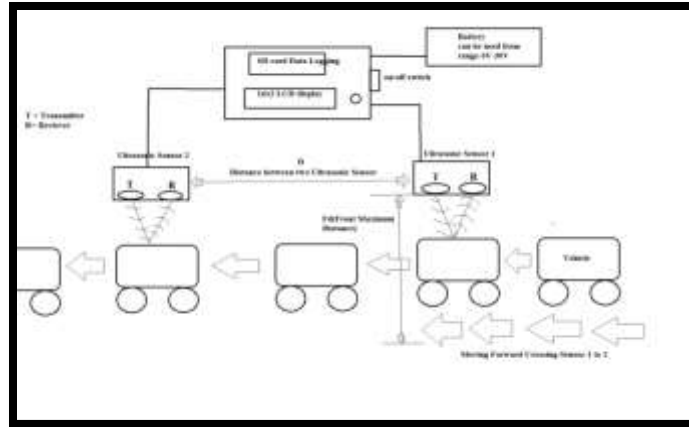


Fig 3.1: Method used to measure the speed of vehicle crossing through two ultrasonic sensor

### 3.2 Data Logger:-

A data logger (data logger or data recorder) is an electronic device that records data over time or in relation to position via built-in or sensors or external devices and sensors. It's not perfect, but it's gradually based on digital processors (or computers) (DDL digital data loggers). Generally small, battery-powered, portable, equipped with a microprocessor, internal memory and sensors for data storage.

#### 3.2.1 Data logger used in this experiment can detect following parameters:-

- 1) No of vehicles crossed from one side.
- 2) Time taken by the vehicle to cross the sensors
- 3) Speed of vehicle in Km/h.
- 4) Time variation in seconds



Fig 3.2:DATA Logger Device used in this Project

### 3.3 Specification of Data logger used in this Project:

- 1) It has an SD card module for storing all data in Excel format.
- 2) The LCD display shows the following parameters:
  - a) Vehicle speed in kilometers per hour.

- b) In microseconds, the time it takes cars to cross two sensors.
- b) Internal Loops are counted.

3) A SET switch to set parameters such as

- a) Maximum vehicle distance in front of ultrasonic sensor in cm.
- b) The separation of two ultrasonic sensors.

### 3.4 Method Process:

1. Locating a location where an undesired speed breaker is being employed without any rules, in a dark area with no street lighting.
2. Applying reflective tape on the speed breaker to alert drivers to the existence of a speed bump.
3. Testing the speed of cars crossing the speed breaker in the absence of reflective tape.
4. As well as evaluating vehicle speeds after installing reflective tape on speed bumps.
5. The estimated speed of cars should have been decreased as a result of their awareness of the speed bump in front of them.
6. The cars' speed will be high if reflective tape is not used.
7. Using a data logger device to read and collect vehicle speed data before and after the application of reflective tape.
8. Comparing graphs created from tabular recorded data between vehicle speed and time of crossing before and after reflective tape deployment.
9. By comparing the graphs and statistics, it is obvious that installing a simple reflective panel can protect the vehicle from a sudden collision caused by speed breakers.

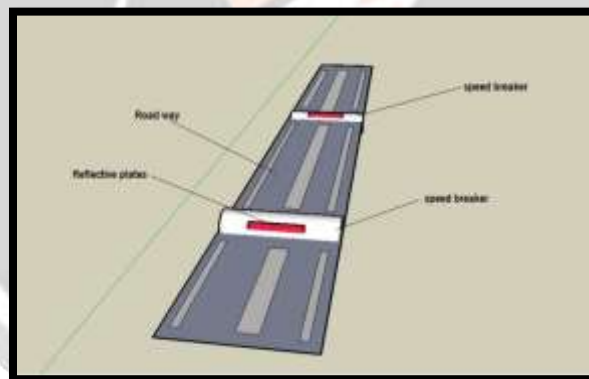


Fig 3.3: use of Reflective Tape on speed Breakers

## 4 Result and Conclusion

### Placement of Data Logger on Two wheeler:

The data logger device is designed to be portable for ease of mobility and reading recording. All of the components are secured inside a plastic enclosure. It is a battery-powered gadget that may be powered by an external battery or the vehicle's internal battery. This gadget is equipped with two ultrasonic sensors. They operate on the ultrasonic proximity concept.





Fig 4.1: DATA Logger with battery powered placed on the two wheeler



Fig 4.2: Speed breaker with no street light and constructed without any guideline

As seen in the above image, the visibility of the speed bump from a distance is nearly non-existent, despite the fact that according to the speed breaker visibility guidelines, it should be seen from at least 50 metres away from the speed breaker.

#### 4.1 Using Reflective tape on speed breakers:

Using non-metallized micro prismatic reflective tape in the desired location for undesired speed breaker. The first step is to mount the data logger on the car and position it along the road before the speed breaker, around 30 metres from the breaker. According to the speed breaker guidelines (see to the methodology section), it should be visible from a distance of at least 50 metres. As a result, if the motorist notices the reflection of the reflective plate, he or she will slow down, else their speed would be excessive.



Fig 4.3: In dark visibility from the distance is very low



Fig 4.4: Placement of Reflective stickers on the Speed Breakers

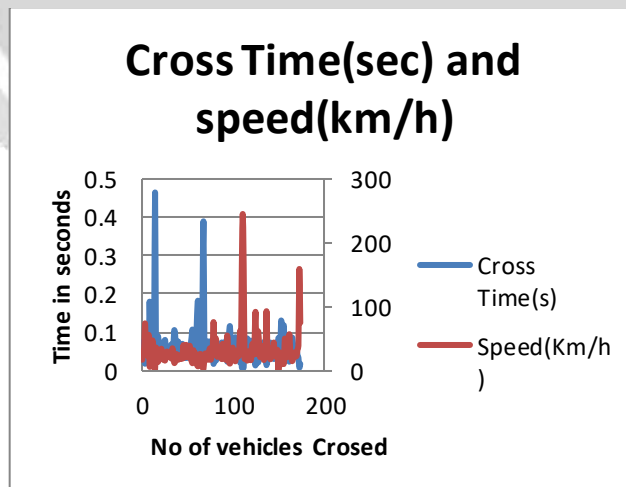


Fig 4.5:Graph comparison between cross time and speed of vehicles

According to the comparison graph, anytime the speed rises, the cross time reduces, proving the relationship between speed and time, as speed = distance /time.

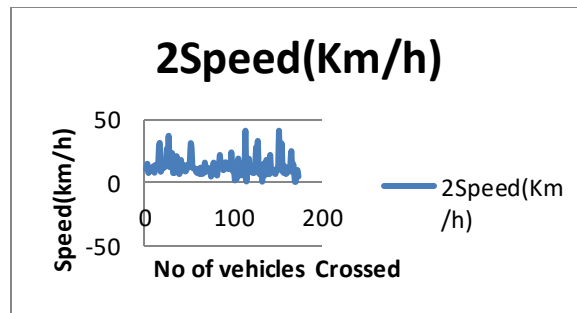


Fig 4.6: Graph between speed and no of vehicles crossed after placement of Reflective Plate

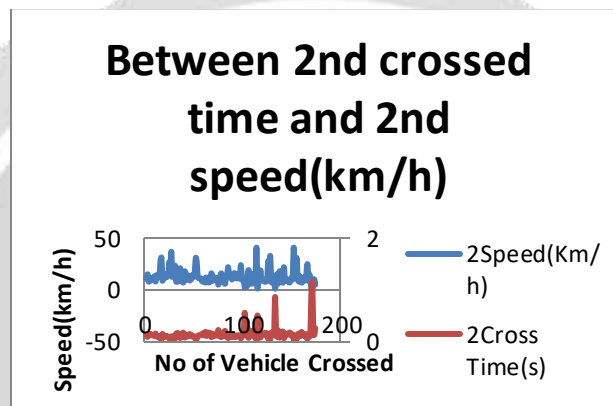


Fig 4.7: Relation between Speed and Cross time of vehicles after Reflective tape placement

**Vibration analog Value Graph:**

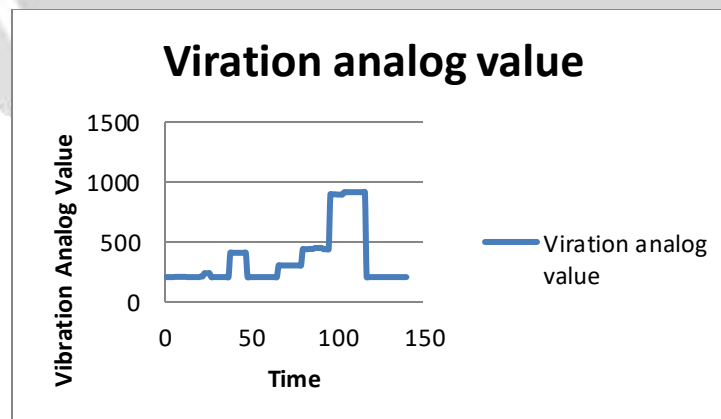


Fig4.8 : Vibration Analog Value Graph

As it is visible by the vibration analog value chart ,when strike force or vibration is high is shows an maximum elevation of 910 unit as according to the chart and with very less or stable condition is shows an default value of 204 unit.in case of medium vibration or if some heavy load vehicles passes beside from the sensor the a medium elevation is shown.So reading this value and considering the default analog unit value as 204 and in case of accident or maximum disturbance near the sensor the value would be 910 means greater the 890 .



Graph for Vibration sensing and SMS sending:

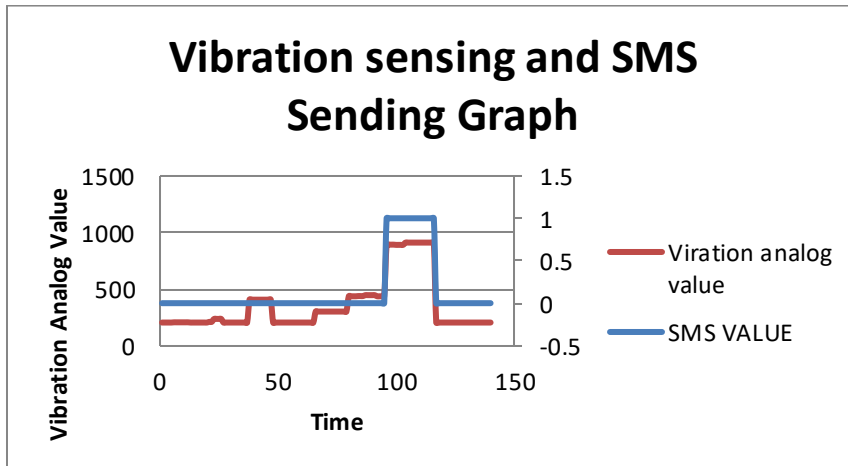


Fig4.9: Vibration sensing and sms sending graph

For sending SMS 890 value is considered to be the alert value .as according to the sms sensing and vibration sensing graph it is clear that when accident or a threshold value of 890 is set in the system,it senses the values at every 10 seconds and when the threshold value goes above the 890 value sms is sended by the system to some particular added number(Emergency numbers can be changed by Reprogram).

In graph 1 means sms is sended and 0 means no activity from sms sending unit.

**Sample SMS Received:**

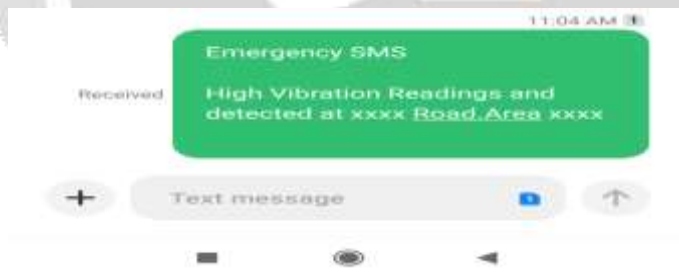


Fig4.10 : Sample sms Format

**5.Conclusion:**

**5.1 Relation between speed of vehicles before and after reflective tape placement**

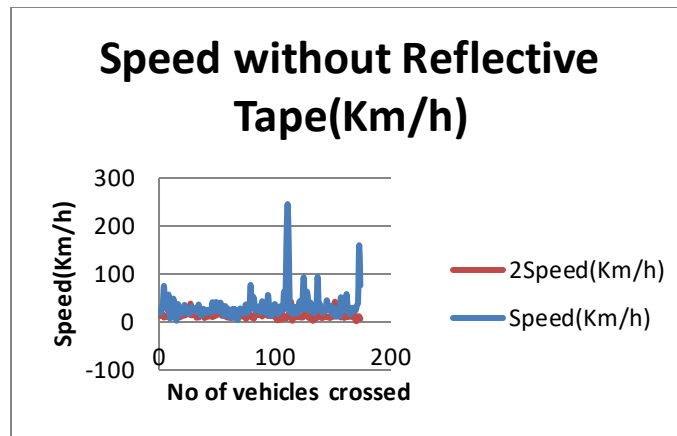


Fig 5.1 : speed Comparison Graphs Before and after Reflective Tape placement

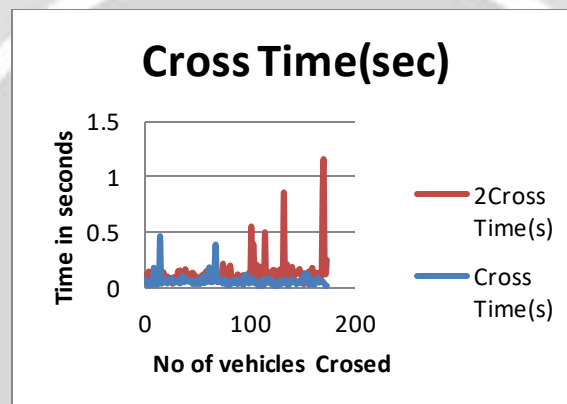


Fig 5.2 : Cross time Comparison of vehicle before and after Reflective tape placement

According to the speed Comparison Graphs Before and After Reflective Tape Placement, the speed (km/h) graph is greater than the 2speed (km/h) graph. As a result of this graphical depiction, it is obvious that a non-metalized reflective tape can be utilized for indication or alertness purposes at any unlawful or undesirable speed breakers. It is obvious from observation that when reflective tape pieces are employed on the speed breaker, the tape displaces from its placements and eventually loses its reflecting ability due to the constant movement of vehicles over it. Reflective tapes or paints should be put on every vertical stand at the side of the road for long life awareness. It cannot inform all drivers since some are unable to look at the side area.

However, this strategy decreases the speed of around 80-90 percent of drivers. The biggest issue at the undesirable speed breakers is not the speed breakers, but the speed of the vehicles. If a motorist crosses a speed breaker without slowing down, several fatalities can occur, such as a quick jolt that can shatter the spinal cord or unbalance the vehicle, resulting in severe injuries. As a result, a speed lowering mechanism that is inexpensive enough to be applied at all undesirable speed breakers is required. Looking at the cross time comparison graph, the second time implies that after the installation of reflective tapes, the cross time is lowered, implying that cars take longer time to pass through the speed breaker and vice versa. So, based on this project's observations and testing, it is determined that a simple reflective tape can be useful in preventing abrupt road accidents caused by cars crossing at excessive speeds from undesirable or any speed breakers.

## 5.2 CONCLUSION:

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### 5.3 FUTURE SCOPE:

- 1) According to the findings of this project's testing and analysis, every reflective tape, paint, or substance loses its effectiveness after a set amount of time, sooner or later.
- 2) LED strip indicators are a clear, non-degrading approach that may be utilized for indication and awareness.
- 3) Solar-powered LED strips are an excellent and automated road safety indicator that may be deployed.
- 4) However, the installation of solar panels raises the overall cost of implementation.
- 5) In the future, Piezo disk-based LED alertness indicators may be utilized, which do not rely on solar light and instead rely on the pressure and vibration of driving cars.
- 6) Solar LED Blinkers are less expensive than solar panels, are simple to use, and require no maintenance.
- 7) Smart LED indicators can be used to alert drivers when they exceed the speed limit.
- 8) Digital and smart systems may be utilized to automatically compute, assess, and respond in response to a scenario.

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