

A Study on Design and Testing of Smart Speed Breaker

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Abstract: Now-a-days traffic related accidents has increased can have ominous consequences. And to overcome these problems and getting all vehicles to drive at an appropriate speed leads to the smoother and safer traffic flow. And the traffic safety solutions come from safety driving and forcing the speed of vehicles to be slow down than necessary and maintaining them in constant speed. In addition to it also leads to traffic gentler down. Complex traffic situations call for a smarter solution as: Actibump. Actibump is a traffic safety system where speeding vehicle activate an inverted speed bump integrated into road surface with aligning of mechanism and operational functions of stepper motor in it used for movement of special alignment of roller for inverting of speed hump placed. The lowering of speed hump depends upon the speeding of vehicle and decides the lowering centimeter of system. These inverted speed bump is a robust construction which plays a role in safety and approachability tends to be lowering the emissions due to speed bump and noises produce. And it also acts as a flatten surface to the drivers under limit which makes an efficient driving. The purpose is to employ a proto model to overcome all the faults and make a use in advancing and developing technologies.

Keywords: Acti bump, Speed hump, Speed bump.

1. Introduction

India is developing country with the second largest road network in the world. Out of total stretch of 5.4 million km of road network, almost 97,991 km is covered by national highways. It's already a huge challenge for the Indian government to provide world-class road, due to sheer magnitude. On an average, a person spends anywhere between 30 minutes to two hours of their day driving. The rapidly increasing population increases the traffic and good control on traffic is very necessary for safety and also reduces travelling time.

A. Types speed of breakers

- Speed bumps
- Speed humps
- Speed cushions
- Speed table

B. Speed breaker warning system

We propose a system named the Speed-breaker early Warning System (SWAS) that uses a smartphone based

application to alert the driver in advance when the vehicle is approaching a speed-breaker. This gives the driver sufficient warning (and time) to slow down to a safe speed. SWAS can warn the driver even when there are no warning signs or lights on the road, or when the markings are inconspicuous due to low visibility conditions.. Smartphone based application is a viable solution for the developing world because of the increasing availability of low cost (less than \$100) Android based smartphones. The main challenge lies in populating the SWAS database with speed-breaker locations. To accomplish this, the same smartphone application that provides speed-breaker warnings also detects new speed-breakers.

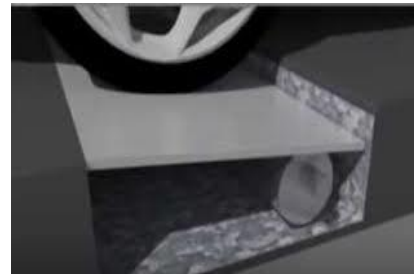


Fig. 1. Speed breaker warning system

C. Advantages

- It is a very reliable circuit and also there is a complete elimination of manpower.
- It uses the high technology, products, core devices are intelligent controllers and the time control of the braker can be set in advance in long durations depending upon the need of the locality.
- It has a long life and its operation can be set for an year in advance.
- It leads to the conservation of the natural resources particularly the fuel which is consumed by vehicles.

D. Disadvantages

- Driver will drive the vehicle in drink and drive it may cause of accidents.
- It is very dangerous in night time without installation of proper lighting.
- Risk for new drivers and youth will be neglect these type of cautions.

2. Methodology

A. Materials used

- Cylinder ram
- Top plate
- Chain
- Concrete encapsulation
- Stepper motor

B. Cylinder ram

A cylinder is an actuator that is constructed of a piston or plunger that operates in a cylindrical housing by the action of weight under pressure. A cylinder housing is a tube in which a plunger (piston) operates. In a ram-type cylinder, a ram actuates a load directly.

C. Chain

A chain is a serial assembly of connected pieces, called links, typically made of metal, with an overall character similar to that of a rope in that it is flexible and curved in compression but linear, rigid, and load-bearing in tension. A chain may consist of two or more links.

D. Concrete encapsulation

Details and faculties for integrating on the test track road, water drainage arrangements for rain water, sealing, wiring conduits, control box to the sides. The concrete block constructed with dimensions of 10cm thickness of all sides of block dimensions of 60.5 cm length, 45 cm breadth, 22 cm depth. These concrete block protect the whole structure and stepper motor and it resist the load of vehicles and other effect.



Fig. 2. Concrete encapsulation

E. Stepper motor

A stepper motor is an electromechanical device it converts electrical power into mechanical power. Also it is a brushless, synchronous electric motor that can divide a full rotation into an expansive number of steps. The motor's position can be controlled accurately without any feedback mechanism, as long

as the motor is carefully sized to the application. Stepper motors are similar to switched reluctance motors.

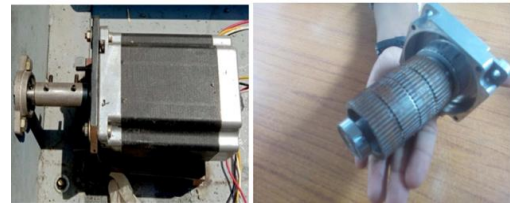


Fig. 3. Representation of view of stepper motor internally and externally

F. Upward motion of smart speed breaker

In this assembly the bump are rises few centimeter above the road surface and give physical remainder to driver. The upward motion to the bumps is provides by various mechanism like Rack and Pinion mechanism, Scissor Jack mechanism.



Fig. 4. Upward motion of speed breaker

G. Down word motion of smart speed breaker

In this assembly the bumps of smart speed breaker lower into the road surface production notch in road surface thus giving physical remainder to driver. The downward motion of bump is provided by roller mechanism.

H. Mechanism of intelligent speed bump

A road module for regulating a pass ability of vehicles on a roadway. The road module includes an elongated container immersed across the roadway and having an upper plane being essentially at level with the roadway. A lid is pivotally arranged and hinged along an edge of the container. The edge extends along a longitudinal side of the container facing vehicles approaching the road module. The lid forms at least a part of the upper plane of the container. An eccentrically counted cylindrical roller is configured to support the lid at an opposite longitudinal side of the container. The roller is rotatable between an upper or a lower position. An actuator is configured to rotate the roller to lower and raise the lid, thereby forming a downward ramp in a passing direction of the vehicles when the roller is in the lower position.



Fig. 5. Road module of speed breaker



Fig. 6. Proto model of breaker system

3. Testing and result

A. Functionality description

Bump is a dynamic speed management system. If the velocity of an oncoming vehicle is above the speed limit a hatch, integrated into the road surface, is lowered a few centimeters creating an inverted speed hump. This gives a physical reminder to the speeding driver. Vehicles driven at legal speed are unaffected and simply pass the hatch on a level road. Act bump makes it possible to secure a legal speed and thus increase road safety and security without disturbing the traffic flow. This makes it particularly suitable for situations where static solutions provide negative side effects. These side effects are usually in the form of unhealthy work environment for bus drivers, impeded accessibility, congestion, ground vibrations and noise. The Act bump system is managed and controlled over the internet. Each Act bump installation is a permanent point of measurement since the web system. Edeva Live continuously collects statistics. The statistics provides a concrete basis for adjustments and evaluation of the installation. The system also provides functionality such as time related speed limits and the possibility to make exceptions for, for example, emergency vehicles. Act bump is a robust technical solution that combines good accessibility with the right speed. LINKOPING MUNICIPALITY the Rydsvägen intersection used to be a high risk crossing. Approximately 70% of passing vehicles were speeding and top speeds were high. The respect for the traffic lights amongst the pedestrians and cyclists was low so the lights did not provide the desired safety effect.

B. Installation

We have achieved an even speed profile along with an 85th percentile speed below 30 km/h (20mph), which is very positive. The site is now what we call 30-secured. This is very difficult to achieve on a road network frequented by buses because of the adverse effect of vibrations and bumps on the health of bus drivers. We have also found that the technical safety measure has reached a high level of acceptance in all groups of road users. Jonas Negron, Ellinor's successor, says: We are very happy with the three Actium installations we have. The results are very good.

This is exactly the trend the road proprietor desires. It is not just about lowering the high speeds; it is also about raising the unnecessarily low speeds. At a static hindrance, larger vehicles are forced to slow down to lowers speeds than the lighter vehicles. Everybody can drive over the Act bump at the same

speed. An even traffic flow is achieved when all vehicles maintain a steady speed. This also decreases congestion which in turn delivers environmental advantages such as reduced exhaust.

C. Output of the project

The figure states the speed breaker system function is illustrated as to be it is designed be depending upon the speed of the vehicle to ride



Fig. 7. Speed breaker when the speed is within the limit

upon the zone is in built in the software and the sensing devices sense the vehicle speed and then function their activation and deactivation processing and here it is in the initial stage i.e. even to the surface of the road.



Fig. 8. Activation of system when speed limit is exceeded

Here we have achieved the moment of speed breaker system as per speed limit by the alignment of roller connected to the roller functioning through a software inserted through Arduino circuit. Expected results from sub system and super system.

4. Conclusion

- The average speed and 85-percentile speed of free vehicles are lower with intelligent speed breaker than without, comparison before-after study.
- After implementation of Intelligent speed breakers, a larger share of drivers yields towards vulnerable road users crossing the street, comparison before-after study.
- Noise levels are not higher with intelligent speed breaker than without, comparison of before-study and study after implementation of Act bump on street without speed bump in before-situation.

The results show that the average speed and 85-percentile speed of motor vehicles have decreased and that the share of drivers yielding towards vulnerable road users has increased

after the implementation of Act bump. The difference in share of drivers yielding, however, was only statistically significant for those driving from the city centre. Motor vehicle speeds are correlated with the expected traffic safety effects in terms of reducing risks of accidents and injuries. The results also show that noise levels have decreased by the implementation of intelligent speed breaker, while the number of indications of vibrations has increased. This is compared to the situation without intelligent speed breaker, i.e. a location without any speed bump. The hypothesis therefore concerns the effect of intelligent speed breaker in comparison with other types of speed bumps. Noise and vibration levels on sites with other types of speed bumps have not been measured within this evaluation study.

A. Future aspects

- Scope of this project idea is very bright as is a lifesaving tool and there is nothing more important than human life.

- In future every vehicle will have such type of system that will reduce number of fatal accidents.
- The system with ultra-sonic sensor will be very effective while driving in hilly areas where sharp turns causes problems especially in night.
- This system will also reduce vehicle mash-up on road while over-taking or going with high speed as it will detect vehicle in front and automatically maintain safe distance and speed.

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