iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VII **Month of publication:** July 2021

DOI: https://doi.org/10.22214/ijraset.2021.36248

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

Accident Prevention Road Safety Model with Speed Breaker Power Generation

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Abstract: ***The implementation of the Collision Avoidance System is aimed to reduce the risks of collisions at the hairpin bend on a Hilly track, Ghats, or other Zero visibility turns The proposed system contains a set of proximity sensors, warning lights combined with a convex mirror is installed by the side of the road. Moreoverthis project is about the design and manufacturing of speed breaker power generator. In this project we are trying to utilize one such source. In this report we explain in detail the various stages of research, design and manufacturing which was involved in the construction of various components such as springs, generator, rack and pinion mechanism.***

Keywords: Collision Avoidance, Hairpin Bends, Proximity Sensors, speed breaker power, shaft, guiding pipes.

I. INTRODUCTION

It is estimated that more than 1.35 million people die worldwide as a result of road traffic crashes and almost 50 million are injured per annum In Narrow roads, Hilly areas, Ghats sections, negotiating hairpin bends and curves is not an easy task. Often modern cars have a collision avoidance system built into them known as Pre-Crash System, Forward Collision Warning System, or Collision Mitigation System in order to reduce the severity of a collision. But majority of vehicles on the road, especially heavy motor vehicles lack in such a system. In this paper, the implementation of the Collision Avoidance System is aimed to reduce the risks of collisions at the hairpin bend on a Hilly track, Ghats, or other Zero visibility turns.

Moreover it is very significant to design pollution free energy generation system. Speed breaker power generation is the most emerging technique which produces electrical power with minimum input. An experimental study to generate electricity by speed breaker with accident prevention road safety model is describe in this paper.

II. EXISTING METHODOLOGY OFACCIDENT PREVENTION

A. Vehicle Horn

This is one of the traditional ways to negotiate a hairpin bend. The drivers on both sides judge the distance of one another based on the intensities of sound from their respective horns. This method although being the simplest poses to be highly inefficient also causing a lot of confusion between the drivers.

B. Headlights

Flashing headlights during the night works similar to the vehicle horn making it yet another inefficient method. Also this method is completely ineffective in day light conditions.

C. Convex Mirrors

This setup is most widely used nowadays to give a glimpse of any vehicle approaching the hairpin bend from the opposite end. But, these have their shortcomings such as the mirror needs to be kept clean at all times which is difficult in hilly areas as its always cold and misty, thereby reducing its visibility. Also the time taken for the driver to view the mirror and react is high resulting in a poor judgement in return resulting in a mishap.

III. SPEED BREAKER POWERGENERATION

It is very significant to design pollution free energy generation system. Speed breaker Power Generator (SBPG) is the most emerging technique which produces electrical power with minimum input. An experimental study to generate the electricity by SBPG is described in this paper. In this system, a rack and pinions mechanism is used for the production of electricity. When a car reaches on the speed breaker, the rack moves downward to generate linear to rotary motion using pinions. The rotary motion is transferred to DC generator which generates DC power which is stored in batteries same as in solar technology. The generated power can be used for the domestic purpose or commercially, which are present near the speed breaker. This examined that SBPG is generating 273.24W on single push under the application of 400kg. In an hour, passing 100 cars of 400kg can generate 54.59 kWh. This mechanism utilizes both downward as well as the upward motion of the rack.

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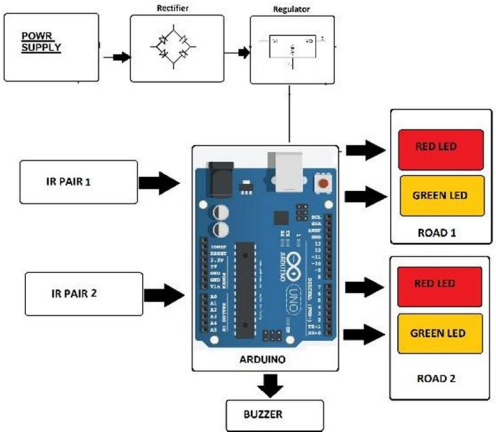
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
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IV. THE IDEA OF ELECTRICITY FROM SPEED BREAKER:

This idea will be advantageous; for generating electricity for the traffic signals, streetlights, and then for many other purposes. The Transcalm road bump which is a speed breaker was invented by a British engineer Graham Heeks, vehicle is in motion it produces various forms of energy like the “Heat Energy”, which is produced due to friction between tyres of vehicle’s wheel and the road i.e. rough surface, or when vehicle traveling with a high speed strikes the wind. This heat energy produced is always lost in environment and remains unused which is just the wastage of energy abundantly available around us. In this paper, one such method is referred and explained in order to generate “Electrical Energy”. This method uses the principle of “Kinetic Energy to Electric Energy conversion”..

V. WORKING

This paper proposes a simplistic approach for the implementation of a Collision Avoidance System in hairpin bends on a hilly track, Ghats, or zero visibility turns using proximity sensors.

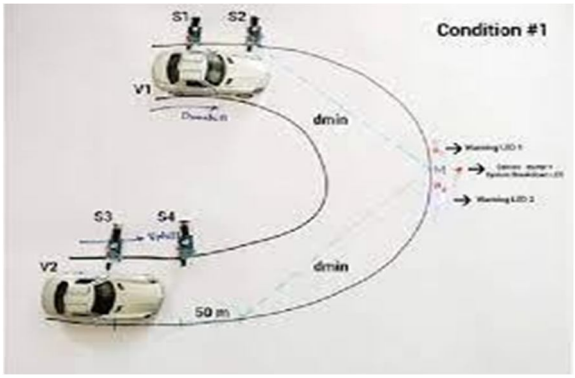


Above figure shows the block diagram of proposed methodology. It uses four IR sensors, which are placed on either side of the hairpin bend. Two sensors S1 and S2 are installed by the side of the uphill section of the road, similarly two more sensors S3 and S4 are installed by the side of the downhill section of the road. The sensors are mutually exclusive and are connected to ATmega328P microcontroller through wires. Based on the output of sensors, position of vehicles on either side of the bend is detected which is provided as an input to the microcontroller. The microcontroller which works on a power supply of 9V runs a Priority algorithm which triggers the warning LEDs to glow

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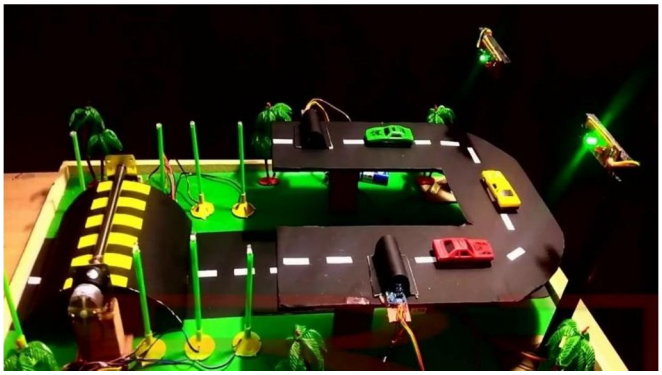
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(W1 in Downhill or W2 in Uphill) and thereby intelligently controlling the movement of vehicles at the bend. Warning LEDs along with a convex mirror are placed at the center of the outer curve of a hairpin bend. Another LED (W3) is placed in order to notify a system breakdown.



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The parts like gear motor, spring, white led, motor cramp, plastic lamp are assembled using a bottom up approach. The base plate lies at the lower most parts which would lie underground. Then the springs are fitted around the guidance pipes of the base plate. These springs provide upward force which will bring back the speed breaker to its original position. Then the top plate is fitted into the springs using guidance pipes. This acts as the actual speed breaker. Then the rack and pinion is fitted at the center of the top plate so that it can absorb maximum force of the vehicle. The rack and pinion are coupled with two idler gears one of which is then coupled to the motor.Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub- topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced. Styles named “Heading 1”, “Heading 2”, “Heading 3”, and “Heading 4” are prescribed.



A. Advantages

1) We can have annual electricity generation with the help of this method without depending on other factors.
2) Power generation takes place reasonably and by using non-conventional energy sources which will help to preserve the conventional energy sources for our adjacent future demand.
3) There is no usage of any fossil fuel hence electricity is generated by renewable means.
4) Pollution less energy generation (A. S. Fawade, 2015).
5) Simple construction, mature technology and easy maintenance. 6) This method requires less measure of floor area and also the traffic is not obstructed.
6) It is economical and not difficult to install.
7) This method is promising due to its good efficiency and energy recovery criteria.

VI.ACKNOWLEDGMENT

We express our deep sense of gratitude and indebtedness to our project guide Mrs. Priyanka (Assistant Professor) Department of Electrical and Electronics Engineering for providing precious guidance, inspiring discussions and constant supervision throughout the course of this work being carried out. His timely help, constructive criticism and conscientious efforts made it possible to present the work contained in this project.

We take this opportunity to express our profound gratitude and deep regards to Dr. AS Yadav (Head of Department) Department of Electrical and Electronics Engineering, for his exemplary guidance monitoring and constant encouragement throughout the course of this project.

Our thanks and appreciation also go to our project mates in developing the project and people who have willingly helped me out with their abilities

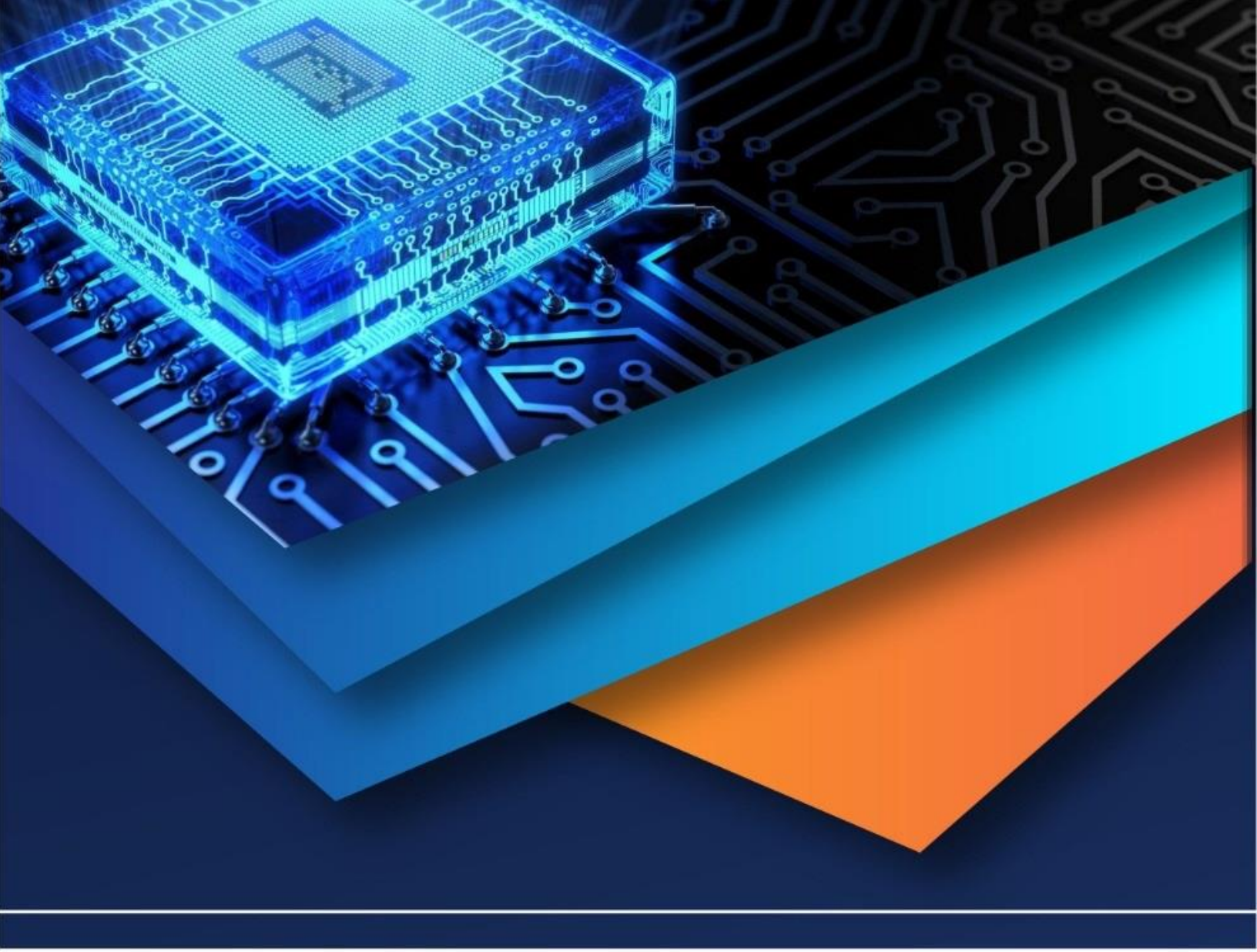
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