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AUTOMATED SPEED BREAKER TO CONTROL SPEED OF VEHICLE BASED ON IOT

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ABSTRACT: ***Smart roads using IOT device is an exceptional hint which creates the drivers to initiative harmless compared to earlier. A large number of accidents occur due to high speed of the vehicle. Currently the traffic safety solution will force the high speed vehicles to necessarily slow down. The main objective of this project is to control the speed of any vehicles automatically in urban areas and restricted areas like parks, schools, hospitals and speed in restricted regions etc. Smart speed breakers are the traffic claiming devices where over speeding vehicles will activate the speed breaker and it will raise the speed breaker above the surface of the road and will give the physical remainder to the driver for slowing down the vehicle. If the speed of the vehicle will be in the given allowed speed limit then the speed bumps will remain flat on the surface of the road and the vehicle can pass through it comfortably. In implementation we are using an iron made flat speed breaker which is proficient of rising itself using control circuitry of embedded system. In this project, the Arduino controller relates the speed, if it outstrips the restricted speed the controller warnings the driver and the proximity sensors are used to detect the speed of vehicle and activate the speed breaker and a warning is shown to the driver using a standard traffic light signal i.e., Red led for slowing down and green to maintain the speed and a buzzer is also used to warn the driver of speed breaker ahead of him. If the speed exceeds the allowed speed an image is also captured of the vehicle and is sent to the cloud, which can be accessed by RTO for fining the vehicle.***

Keywords: Internet of Things, Arduino Microcontroller, Speed Breaker, IR Sensors

I. INTRODUCTION

Nowadays, Internet of Things (IoT) is a vital subject in technology industry, software engineering, Policy and has become significant news in mutually the print media and the social media. This technology is embodied in a wide spectrum of networked applications, systems, and sensors, which take benefit of improvements in computing power, electronics diminishment, and network interconnections to deal original competencies not possible earlier. Day by day new topics and research on IoT subject plenty of conferences, reports and articles and discussion the potential influence of the IoT uprising from new technology openings and business prototypes key worries about security, privacy, technical and interoperability.

In our day to day activity along with several objects, devices, sensors are connected via internet connectivity and computing power proficiency extended is called Internet of Things. The Oxford Dictionaries explained a brief description that raises the element information connected via Internet of Things. All devices and objects interconnected via the internet computing capacity is installed them to send and receive data.

Actually in Internet of Things is a structure where interconnected computing devices, digital machines, objects that are delivered with distinctive identification of the objects and capability to send data via network without needful human to human or human to devices connections.

Interconnected of all devices, vehicle and other items installed with software for computational power to send and receive data connected over Internet of Things. The idea of the internet of things author using is that it will provide the opportunity for information of the automotive industry. Depending upon the speed of the vehicle and the distance of the vehicle from the speed breaker, the device will automatically warn the driver that its speed is beyond the permissible speed. If the speed of the vehicle will be in the given allowed speed limit then the speed hump will remain flat on the surface of the road and the vehicle can pass through it comfortably. If the speed is more than the allowed speed, then the speed hump that rises above the road surface. This can be achieved by using an Arduino board and proximity sensors to detect the speed of vehicle and activate the speed breaker if speed of vehicle is above permissible limit and warning generation for the on-road drivers. Upon receiving the signals, Android device which is being used as a notification system will alert the driver that the speed is high or low by displaying it on the screen. If the speed of the vehicle is not in the allowed speed, then the sensors will activate the motor to lift and immersed speed hump to the road surface. Using the concept of internet of things, we can capture an image of over speeding vehicle and send it to traffic control center which will take respective action of either fining the owner of over speeding vehicle or by simply sending a warning.

A Speed hump is the kind of speed breaker, but in smaller size. But Most of the times Speed humps are most annoying thing in the running road, but sometimes it plays most important role in safety. E.g. even a driver who is driving in slow speed has to go over a speed hump which is annoying, for solving this problem we are introducing Automated Smart Speed breaker with IOT which will be surfaced and will show up only if the vehicle speed is higher than permissible limits. This is very useful in areas like Parking Lots, School/ Colleges, and many more. To control lift of the speed breaker Arduino based board are preferred, for real time control RTC circuit is used.

II. RESEARCH WORK

In this research, Road accidents are major issue facing by people across worldwide and key reason of accidents is irresponsible driving on speed breakers and ditches affecting high causalities due to no warning symbols maintenaied roadside, absence of street lights, deficient construction etc. There is a lot of research work is in progress in computer science related resolution but no element in positions of a product. Author developed an Android application to explain this and have collected data from various parts of Karachi city to identify forthcoming speed breakers during vehicle drive and ditches within a 10-12-meter radius. The application along with vector machine will be able to exactly caution users forward of time and prevent accidents which has been trained with data collected from various devices. [1] Speed breaker and ditch localities are loaded on the cloud machines and sorted using well-defined threshold. With limited power consumption, the model developed with expected speed breakers and ditches up to 85% exactness.

In this research study, as per requirements to have an automatic speed breaker on time request. Means whenever speed breaker required on the road, rotates gradually and become speed breaker and not required speed breaker will slowly disappear from the flat road and surprises working of decreasing speed of the vehicle. When there is need of spped breaker comes from road from ground. In embedded systems the implementation of system used iron finished hemi-cylindrical speed breaker which is capable of rotating with the help of control circuitry. It needed, it comes from the road by rotating itself from flat position and when not required the it slowly rotates and again and flat and joins with flat road.[2] On the flat road, users mention in the system to function on the road as sped breaker as embedded system with timer inside any time and date can be applied on which speed breaker required time clock for function on road and remains till the countdown to become zero. This is kind of speed breaker is required in several areas like school and any organization etc.

In this paper,Speed hump is the kind of speed breaker, but in smaller size. Automated speed hump will work on the real time clock. Most of the times Speed humps are most annoying thing in the running road, but sometimes it plays most important role in safety. E.g. Pick hours of traffic, for solving this problem we are introducing Automated Speed hump with RTC. At particular time.[3] This is very useful in areas like Parking Lots, School/ Colleges, and many more. Scissor jacks are used for lifting the hump, for operating jack DC gear motors are. To control lift of the jack Arduino based board are preferred, for real time control RTC circuit is used.

In this paper,Traffic congestion is rising issue across worldwide resulting fuel and time waste. Pollution and even stress during travelling time. In Indian road traffic, the issues like overcrowding, indefinite travel time are enchanting severe outcome which is also confused and piercing. Unreasonably used street lights avoid the loss of electricity regularly. Author used light sensors and motion sensors which can reduced the wastage of electricity. Several techniques have been projected to decrease traffic jams and recently.[4] Currently, researchers initiated to employ connected vehicle technology which is tough to develop on roads. In this paper, for smart roads author projected less cost innovative technology. Author started developing Smart traffic with help of ultrasonic sensors. Motion sensors. Light sensors, camera, and IOT devices.

In this paper,The traffic related accidents can have dire consequences. Traffic safety solutions of today forces heady vehicles to slow down more than necessary. Smart Speed Breaker is a traffic safety system where speeding vehicles activate the speed breaker and rises the speed bumps above the road surface and giving the physical remainder to driver to slow down the vehicle.[5] If the speed of the ongoing vehicles is within the permissible limit then the speed bumps stay flat on road surface and vehicles passes over it comfortably. It's modern way to keep control on speeding vehicles only and un-affect the legal speed vehicles. Further modification can be also done for emergency vehicles accessibility.

In this paper, this project has an objective to control the speed of all kinds of vehicles spontaneously in urban areas and also controlled areas like parks, school, hospitals and in a limited zone etc. Currently, rapidly growing world all the peoples do not have self-control on driving. Such peoples are driving vehicles in a high speed and resulting the police unable to monitor such things easily. This paper explains the projected work like how to control the speed without harming others. Such locations drivers do not control speed.[6] In such cases, electronic system takes control automatically to avoid accidents. In restricted locations, author used RF for representative the speed limit areas set it is placed front and back side of the restricted locations. RF device is placed inside the vehicle to collect he speed of the vehicle with help of speedometer in the vehicle. The controller matches the speed if it exceeds the benchmark the speed of the controller changes the driver and controls taken

repeatedly. In case driver fail to respond to the message an information along with the vehicle number is transferred to the nearest police station with the support of GSM technology and penalty amount is collected by driver in the nearest tool gate.

III. METHODOLOGY

The Proposed Automated Smart Speed breaker system with IOT which will be surfaced and will show up only if the vehicle speed is higher than permissible limits. To control lift of the speed breaker Arduino based board are preferred which triggers a motor for surfacing the speed breaker system, for real time control RTC circuit is used. Depending upon the speed of the vehicle and the distance of the vehicle from the speed breaker, the Arduino board sends a signal to buzzer to start the beep sound to warn the driver that its speed is beyond the permissible speed. If the speed of the vehicle will be in the given allowed speed limit then the speed hump will remain flat on the surface of the road and the vehicle can pass through it comfortably. If the speed is more than the allowed speed, then Arduino board sends a signal to servo 90 motor to rotate 90 degrees causing the speed hump to rise above the road surface. Arduino will also send the speed to connected android device which upon receiving the signals is being used as a notification system and taking images of vehicle and will alert the driver that the speed is high or low by displaying it on the screen.

Using the concept of internet of things we can capture an image of over speeding vehicle and send it to traffic control center which will take respective action of either fining the owner of over speeding vehicle or by simply sending a warning.

CALCULATION

1) Sensors are kept 10mts apart (scale 10mts = 10cms).
2) Allowed speed is <= 20km/hr.
3) Calculate minimum allowed time to travel between sensors.
   Let Time taken to travel at max allowed speed i.e
   20km/hr (20000mts/3600s = 5.56mts/sec) = x.
   Min Allowed Time to travel x= 10/5.56 = 1.798 seconds = 1798 ms i.e time taken to
   travel should always be greater than 1798ms. if less, then the vehicle is said to be over speeding.
4) Calculate speed if given timer t (ms) and distance d = 10mts
   speed = (0.01/(timer/1000))*3600

IV. IMPLEMENTATION

SENSOR

For detecting the speed many sensors are used like weight or IR sensors. IR sensors are used in our project which is a multipurpose sensor, which can detect the vehicle speed. IR sensor emits the light, which is invisible to naked eyes but the electronic components can detect it. Our first module deals with the detection of vehicle speed on the road using IR sensors. IR sensors are placed at road at a distance from each other.

ARDUINO CONTROLLER

The Arduino IDE provisions the languages C and C++ suing exceptional instructions of code structuring. The Arduino IDE provisions a software library from the Wiring project, which delivers various mutual input and output events. The Arduino controller is the key control unit of the system that will receive the input signals from the sensors, process it and according to it calculate the speed of the vehicle. In this module, IR sensors are used along with the Arduino board. Using IR sensors input speed of the vehicle is calculated.

BUZZER ALARM

A buzzer or beeper is an audio signaling device which may be mechanical, electromechanical or piezoelectric. Here this work this buzzer will beep as the sensor sense the speed of the vehicle above the given speed i.e 20km/hr. Buzzer accepts the response send by together the sensor to the control unit and replies conferring to the code that loaded into the microcontroller. The speed breaker fitted with sensors senses the speed on the road and directs it to the Arduino microcontroller. This uses the information received from sensors and check whether it is above or below the permissible speed and if it is above the permissible speed then the buzzer will start sounding.

ANDRIOD DEVICE

In this module, an android device is used to capture the image of the over speeding vehicle. Using the device internet, the image is send to the RTO server along with the speed so that action can be taken against the driver for over speeding of the vehicle.

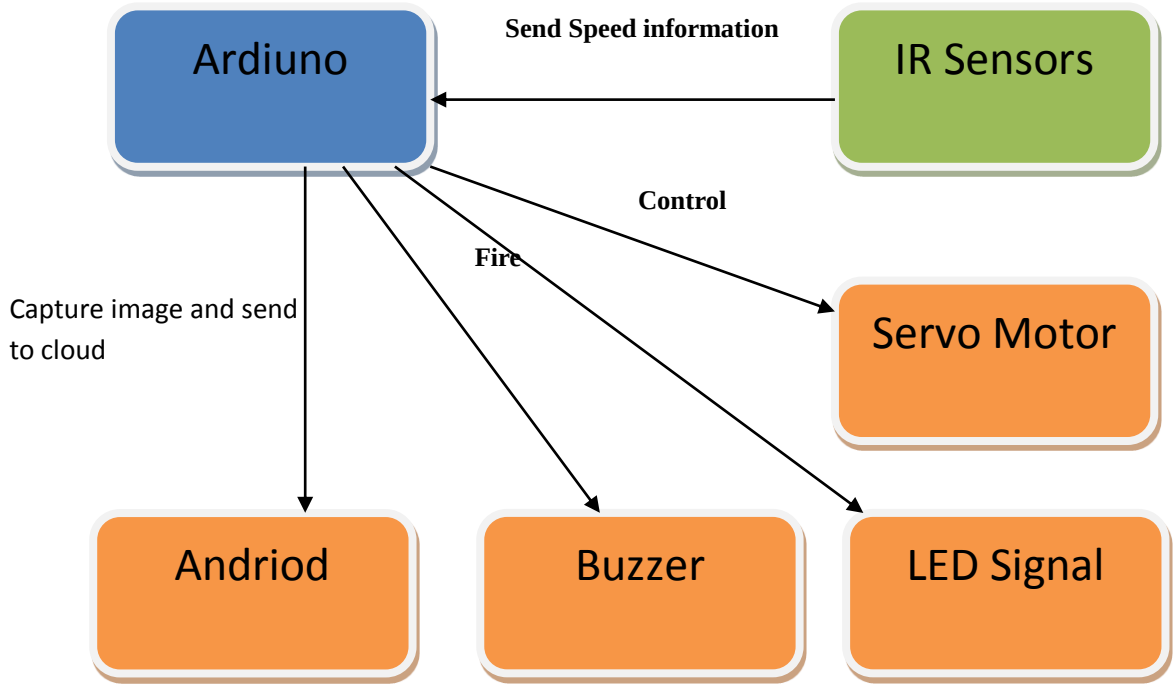
SPEED BREAKER

In this module two proximity sensors are being used along with a microcontroller, led lights, buzzer and a servo motor. Using proximity sensors inputs speed of vehicle can be calculated by the microcontroller which based on its calculation controls the servo motor. If the vehicle speed is over set limit of 20km/hr then the servo motor is triggered and the speed breaker is raised

from underground to surface. If the speeds are low, then the speed breaker goes down. Buzzer and led lights are used to warn the driver about a speed breaker ahead of him.

RTO SERVER

IOT aims to connecting various devices over the internet and allows communicating with each other. In this module, a web application has been developed using PHP which handles the post request containing the image of vehicle and speed of vehicle and stored in the database.



V. RESULTS

The main objective of the project is to control the speed of the vehicle. The 2 sensors collect the respective information and feed it to the Arduino controller, the control unit of Arduino processes the information and with the help of internet the information is sent to the RTO server by saving the image and speed of the vehicle. The entire experimental setup for proposed system and the final results is as shown in below snapshots:

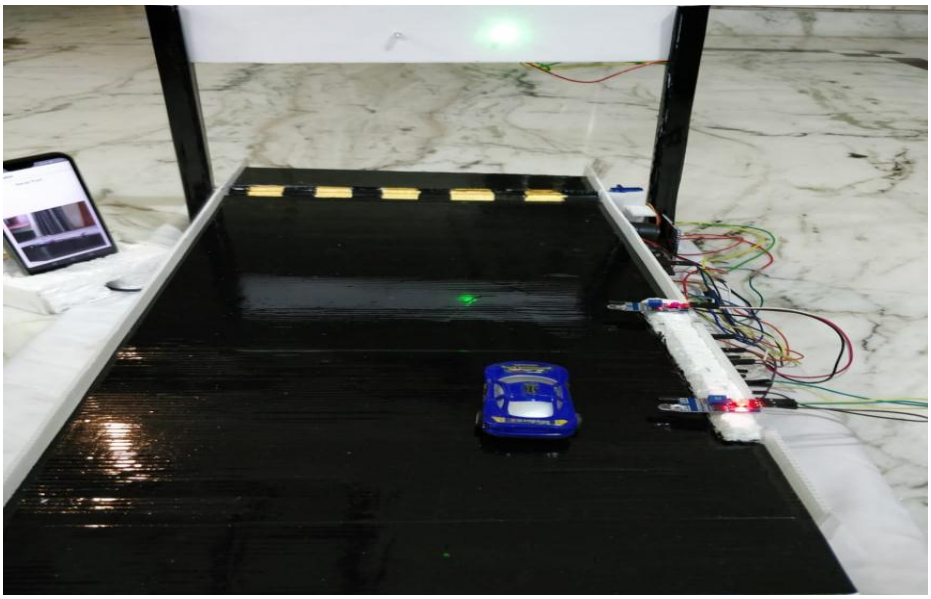


Fig 5.1 Shows the implementation of the smart breaker by displaying the green light as the breaker is under road surface.

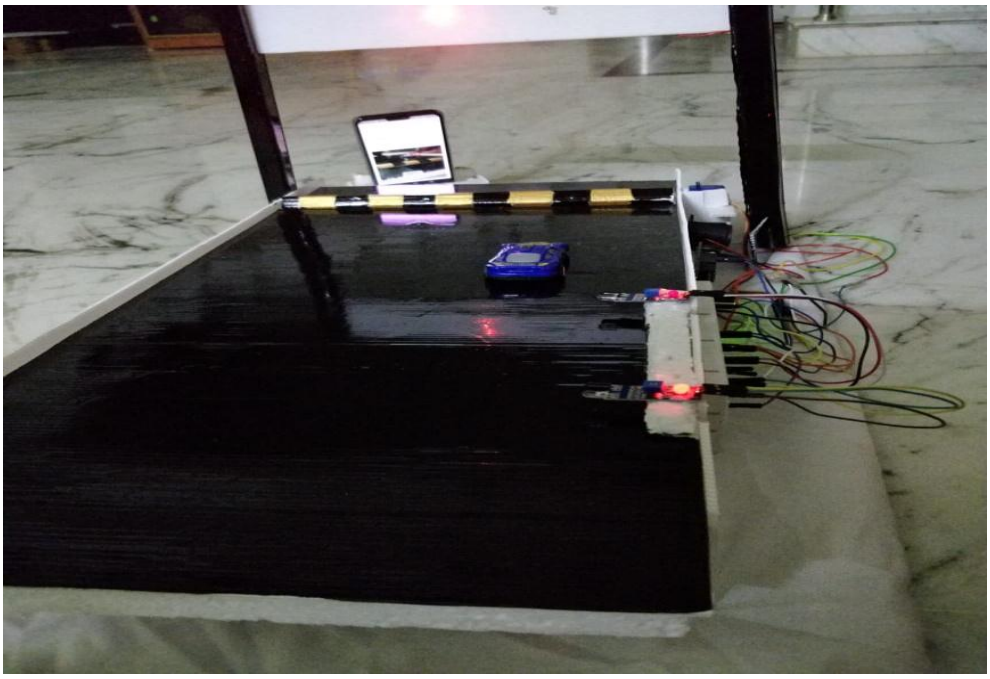


Fig 5.2 : Shows the implementation of the breaker by displaying the red light as the vehicle is over speeding and raising the breaker above the road surface.

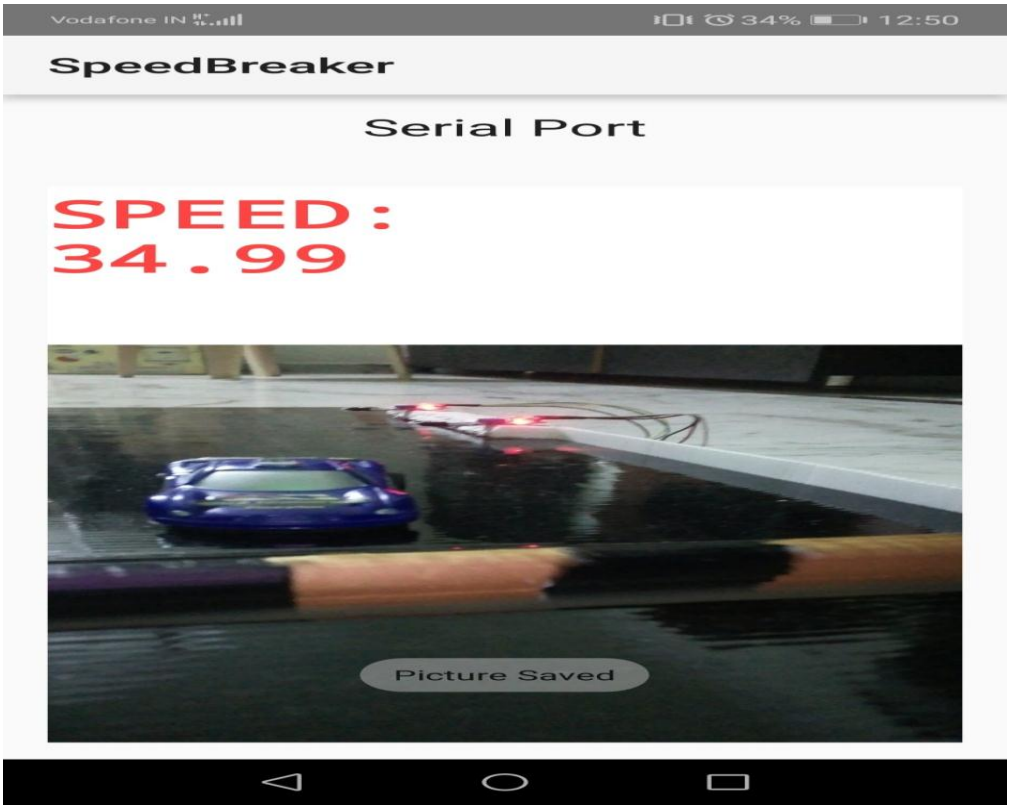


Fig 5.3 : Shows the image of the application that captures the image of the vehicle that is over speeding and displays the speed of the vehicle.

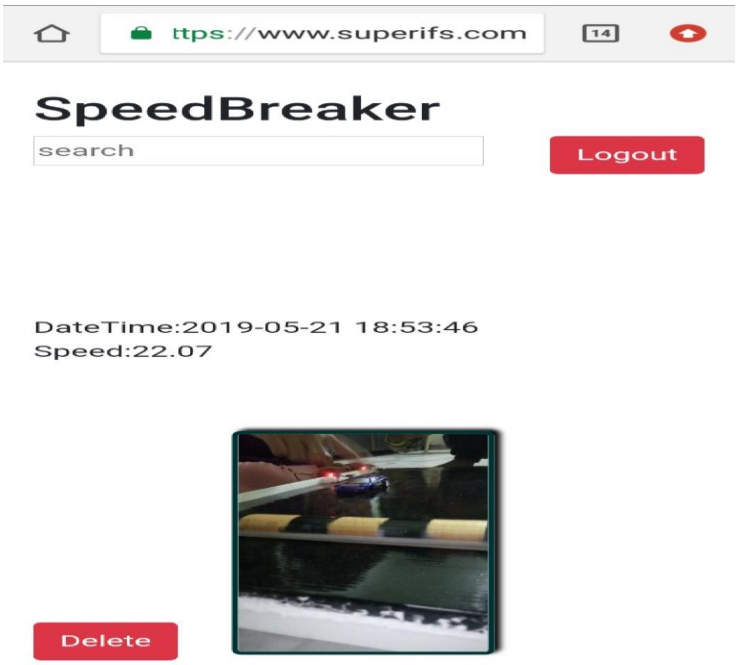


Fig 5.4 : Shows the image of the vehicle that is over speeding with the speed, date and time

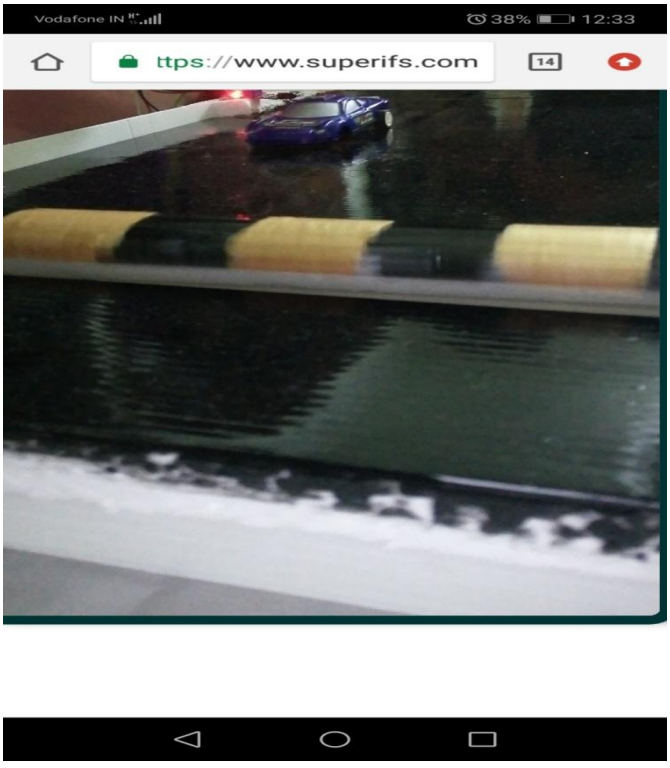


Fig 5.5: Shows the zoom in image of the vehicle.

VI. CONCLUSION

We proposed and implemented a Smart Speed breaker system, Smart speed breakers are the traffic claiming devices where over speeding vehicles will activate the speed breaker and it will rise the speed bumps above the surface of the road and will give the physical remainder to the driver for slowing down the vehicle. If the speed of the vehicle will be in the given allowed

speed limit then the speed bumps will remain flat on the surface of the road and the vehicle can pass through it comfortably. In implementation we will be using an iron finished flat speed breaker which is skilled of rising with the help of control circuitry of embedded system. In this project we used an Arduino board and proximity sensors to detect the speed of vehicle and activate the speed breaker and a warning to shown to the driver using a standard traffic light signal i.e., Red led for slowing down and green to maintain the speed and a buzzer is also used to warn the driver of speed breaker ahead of him. If the speed exceeds the allowed speed an Image is also captured of the vehicle and is sent to the cloud, which can be accessed by RTO for fining the vehicle. We have tested our system on multiple times called as stress testing to see if the model works correctly in stress and the results are good as expected.

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