

Project Title: Speed Limit Detector

Group Name: Triple G

Members:

1. Mark Maror Ariik Maror
2. Veronica Achuil Abuok
3. Martin Garang Garang

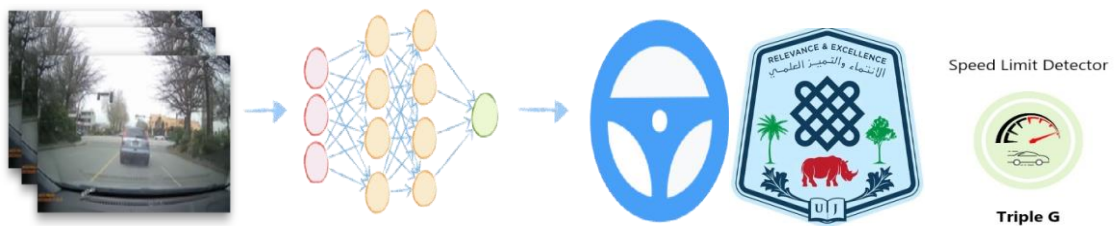


Figure 1: this is an explanation of our teaser figure, which showcases the coolest part of our project in deep learning.

Division of responsibilities of the project is as follows:

1. Martin Garang Garang

Responsible for the system design flows, both logical and implementation part

2. Veronica Achuil Abuok

Responsible for developing the algorithms and the code which will act as neural network of the system.

3. Mark Maror Ariik Maror

Responsible for mechanical implementation part of the system, video, making sure hardware are capable with software.

Abstract

Moving with over speed is among main causes of road accidents. Though drivers of the vehicle may intentionally drive above the speed limit set, there are also cases where they unintentionally find themselves in case of maximum speed violation. To overcome all of these situations if we have an automatic system to regulate speed and to warn drivers in case of maximum speed violation could help in preventing accidents. We intend to develop an automatic speed limit violation detection and warning system hardware prototype that will work in parallel with android application to automatically control speed used by moving vehicles. This system has the ability to notify the drivers in real time in case of maximum speed violation so that they can change the speed, it will as well notify the traffic police in charge so that punishment may be taken in some serious violation cases. When drivers are using speed which is above the maximum speed set, the system will give them alert and send them a message containing all information about the vehicle which violated the speed limit and the speed used by that vehicle. This system directly send SMS to the registered user's telephone numbers both drivers and traffic police or road safety personnel in charge. The message which is sent must contain details about the vehicle, and the speed used by that vehicle in case of speed limit violation. The whole development of this project requires android smartphone, an IR sensors that works with a programmed microcontroller, 16 x 2 LCD display to showcase the speed of each vehicle passing through; two laser beams which are placed apart exactly in some meters for measurement of vehicle's speed while interrupting those laser beams. The amount of time used by the vehicle to move from start laser to end laser is measured using the circuit and is displayed on LCDs. Besides, when the vehicle violate the speed limit a notification message is sent to both driver and traffic police.

Keyword: Android, Arduino, Infrared sensors, reporting.

Introduction:

This project named Triple G. Speed Limit Violation Detection and Warning System is a system which is able to detect the speed of the moving vehicle and compare it with the accepted speed in a certain area. If the vehicle is moving with over speed the system is able to warn the drivers and tell them to change that speed. The system is made up of a smart phone application that is able to sense area where there is a speed limit that drivers cannot exceed and this will be done mainly to reduce road accidents that happen due to speed limit violation, if the speed violation occurs the application will have the ability to notify the drivers in real time so that they can change the speed, it will as well notify the traffic police in charge so that punishment may be taken in some serious violation cases. One of the main causes of road accident is moving with over speed. In case where the drivers are willingly or accidentally moving with over speed, it may put themselves and others in danger. To overcome this issue, a proper mitigation is needed to be taken into account.

We developed Triple G. Speed Limit Violation Detection and Warning System as a measure which can be taken to reduce road accident caused by over speeding, this system is able to notify the driver immediately on time of speed violation, if the drivers get this violation notification, they must reduce the speed on which they were moving on. The violation report will also be sent to traffic police personnel in charge, the report sent to traffic police will contain vehicle identifications, geographical position coordinate of the vehicle, the owner of that vehicle, the time of speed limit violation and the speed that vehicle was having at that time.

Objectives:

- Develop an AI intrusion detection system to identify and alert over speeding vehicles
- Allows for real-time monitoring of traffic speed and automated number plate recognition using image processing.
- Provides valuable data for traffic management and enforcement

- Monitor the output and input shaft speed

Methodology:

Proposed unit is a stationary unit in form of single camera mounted on the poles or traffic light or any other suitable location that detects the speed of moving objects.

- In case of over speeding by vehicles buzzer alarms for intimating interceptor or any other law enforcement unit any moving object display by LCD.
- This system focuses on finding speeding of vehicles on curved path as well as on linear path.
- The algorithm developed can measure speed of more than one vehicle at any point of time.
- This system may reduce manpower involvement in traffic management systems.
- This system bring transparency in traffic management system
- This system when used on commercial scale proves to be a helping hand to traffic police in managing traffic as well as maintain law and order by controlling fraud cases.
- System also captures the frame of moving object which provides us with snapshot of moving object at a particular instant.
- Automated speed detection technique is integrated with law enforcement automated number plate recognition while detecting a vehicle a crossing speed limit system by using number plate recognition technique displays the number of speed violating vehicle and same can be communicated to the end user vehicle.
- This system may reduce manpower involvement in traffic management systems.
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Scope of the project:

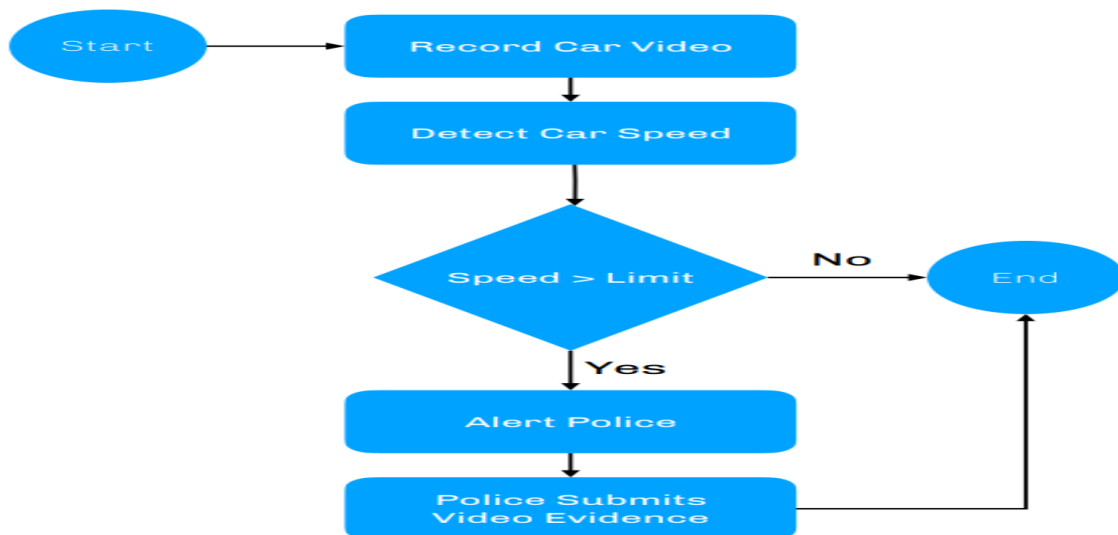
- **Road safety:** The timely checking of the over speeding vehicle will reduce high percentage of road accidents.
- **Automation in law enforcement:** The system being completely automatic reduces the number of traffic police officers needed to deploy in the real field for checking speeding vehicles.
- **During the cases of speed limit violation,** the violation report is sent to traffic police. So, for some serious violation cases the drivers may be charged with a fine. Because the report sent to traffic police will contain all details about vehicle identification. With very few enhancements in the proposed system new features can be easily incorporated such as:
- **Saving peoples' life:** with the help of this system we will not hear about the accidents caused by over speeding.

Definitions of key terms:

- **Speed Control System:** This is the system which is able to control the speed of any moving object. We have systems which are currently in use where traffic police officer take the speed radar gun in hands and point it on the moving vehicle, from here the speed radar gun can measure the speed of that moving object. We want to establish an automatic system which functions similarly with that speed camera but it will do so using sensors where there will not be any human assistance.
- **Speed warning system:** this is the system capable of warning the drivers in case of speed limit violation. Tis system calculate the speed of the moving vehicle and compare that sped will the currently allowed speed, when the maximum speed is violated the system warn drivers by giving alert or sending message to the one who violate the speed limit.

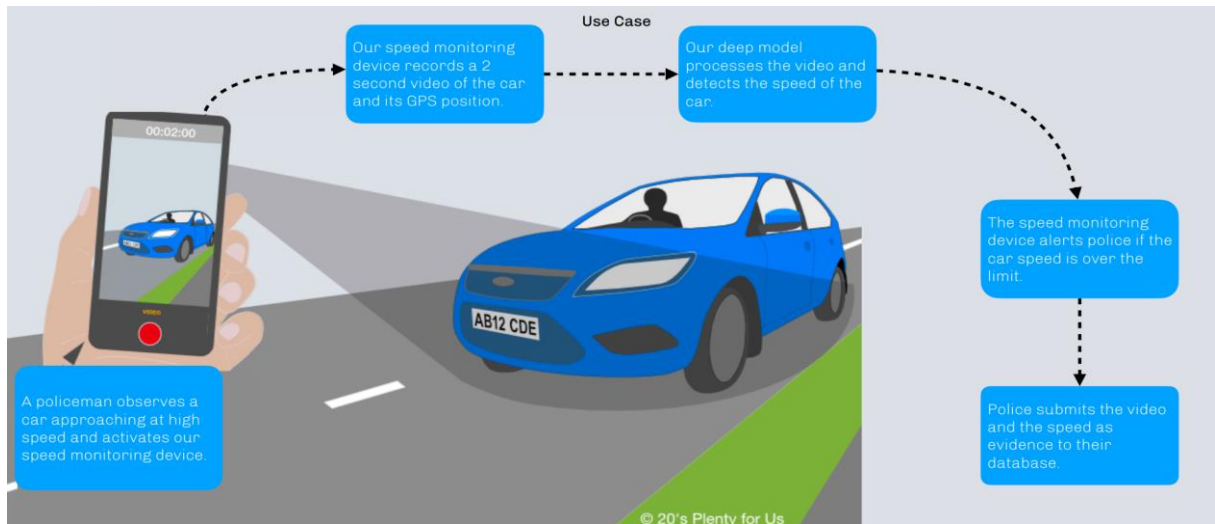
- **Road Side Unit:** can be defined as the computing device which is located on the road and is used to capture data about the moving vehicles.
- **On-Board Unit:** refers to the computing devices which is installed in a moving vehicle and is used to communicate with road side unit.
- **Master Control Center:** this is also called control center, this is where all the data captured by road side unit or on-board unit are sent to be stored analyzed and processed.
- **Control Unit:** this is the module responsible for controlling how devices communicate with other different module
- **Arduino:** also defined as multi controller, is an open source platform to be used while developing projects based on electronic concepts. It has its own integrated development environment which runs on the computer and it has its hardware part which can be programmed to perform a certain task.

High Level Diagram:



The high level diagram constitutes that the flow of information of the speed limit detector which the system start to record the car video. The detector capture the speed of the car and the system will alert the police about the activities which are happening on the road side. Therefore the police officer will get a collect video for evidence and then track the car through our built system.

Use case diagram:



Use case is the type of diagram in unified modelling language in deep learning which shows actors or users and the task that they have to make or accomplish in the system. It is made up of use cases or tasks and actors or users who have ability to perform a particular task in the system. It helps to understand the whole functioning of the system in one place. It shows the whole system scenario and the actors who have to accomplish a certain task. It helps to get the functional requirements of the whole system. It has particularity of being easily understood by business user, and using help in easy communication between developer and end user.

Dataset:



Figure 1. Tracking location

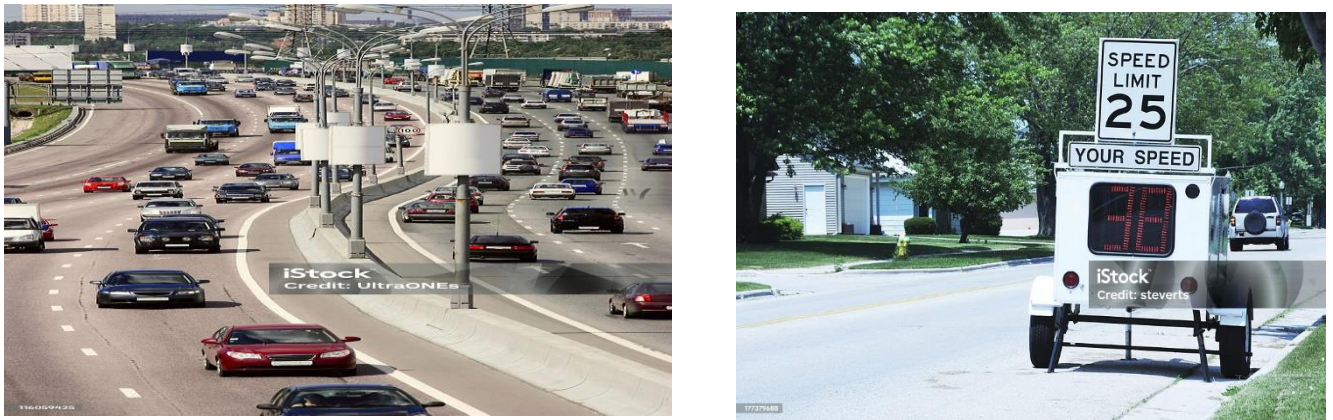


Figure 2. A camera system setup on the road side to record

Outcome of the project:

- Continuous learning and improvement of the AI system's performance over time.
- Allows for real-time monitoring of traffic speed and automated number plate recognition using image processing
- Improved vehicles normal speed and calculate speed with the allowed speed in a that area.

Conclusion:

Summing up, the main purpose of this project is to develop a mobile application that will help to report the occurrence of an over speed at the exact time. With the help of this system Traffic police and road safety department can effectively monitor the speed of any moving vehicle. And for drivers, using this system will mainly help them to monitor the speed so that they can avoid rushing which may sometimes result in accident.

Using this system, Traffic police and road safety department can easily be informed that there is an over speeding vehicle somewhere, so that they may take preventive measures for that area. The over speed reporting system was successfully designed, implemented and tested, and it notifies Administrator that there is an over speed car that has occurred and provides the location. It also alert and send message to the drivers in real time of over speed occurrence so that they can diminish the speed. This application will also allow Traffic police and road safety department in making the report about the over speed so that they can implement countermeasures to reduce the over speeding risks.

Recommendations:

Currently, traffic police and road safety department use speed radar to monitor speed of a moving vehicle, we the members of Triple G group recommend the use of this system. Because this system will help them to get information about speed of all the moving vehicles, the system also has the database to store information about speed used by vehicles so that they cannot be lost.

We strongly encourage drivers to use this mobile application as it will help them to get notification about speed they use. We also recommend that the system can be further implemented to add the real sensors because we used Arduino only for demonstrating how things should work.

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