

Forward Collision Alert on Stable Vehicles Using Ad-Hoc Network and Image Processing

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Abstract:

The idea pitches and solves a specific case study alone. There are many crashes in recent years especially hitting a stable vehicle in roads which is halted due to some emergency or a breakdown condition. This can be prevented by prior forecasting of information between vehicles. The communication may be established by means of Ad-Hoc networks or Wi-Fi or any other radio circuits. Before sending a alert signal to the moving vehicle in the network, the network should check the vehicle in stable condition is on road or off road (Parked outside the road), some parameters (speed, direction of the car), GPS location. To check whether the car is on road it comprises two processes. The first one is by means of image processing. The camera is placed in the wind-shield or at the number plate of the car in a tilted angle. This system gets activated when the RPM or speed of the car reaches zero with a delay. As the system is activated the camera takes the image and sends image processing unit. The image processing unit splits the image into three. Then it checks for the content of blackness in each part. If the content of blackness is high, which send a value 1 otherwise 0. The outputs are collected from the three parts of the image and divided by 3. If the probability is $2/3$, $3/3=1$ then the probability of parking the vehicle on the road is high. If the probability is $1/3$ then the probability of parking the vehicle on the road may be low. When the probability is low further the part is checked by the same process and derives the output finally. Goggle API the vehicle density is obtained. Based upon these outcomes decides the data to be sent or not. The output may be displayed in a display unit or mobile display unit or a dashboard alert.

Introduction:

With over 1,30,000 deaths annually, the India has overtaken China and now has the worst road traffic accident rate worldwide. Every day in India nearly 1214 serious road accidents occur, according to the Ministry of Road Transport & Highway, Law commission of India, Global status report on road safety 2013. One serious road accident in the country occurs every minute and 16 die on Indian roads every hour. Tamil Nadu is the state with the maximum number of road crash injuries. Top 5 Cities with the highest number of Road Crash Deaths (Rank –Wise):

- 1) Delhi (City)
- 2) Chennai
- 3) Jaipur
- 4) Bengaluru
- 5) Mumbai

So, hereby prevent the accidents due to blind spots, which in turn reduce the overall number of accidents. Many innovative and efficient ideas has pitched through this domain to solve this issue. So, this idea pitches and solves a specific case study alone. There are many crashes in recent years especially hitting a stable vehicle in

roads which is halted due to some emergency or breakdown condition.

Limitations of existing concept:

- Mercedes-Benz ML350 safety system runs on RADAR (Radio Detection and Ranging) which is highly expensive rather this project is cheap.
- Vehicles in market ensures, the safety measures after the occurrence of accidents like Air bags, etc. But this product is used for accident prevention.
- Road accidents have earned India a dubious distinction and no special safety device has been installed for accident prevention in the existing system (normal cars).
- The ultimate aim of the market doesn't concern about safety of a common user. This product is cheap and of safer mode.
- Tesla self-driving cars actually run on RADAR whose range is several hundred meters and Wide angle camera near windshield, which again becomes costly.
- Volvo trucks, comes with inbuilt anti-collision system with RADAR

for sensing the distance at which the vehicle is located and camera to sense what kind of vehicle, which again becomes costly.

Details of operation:

Assume a case suppose two vehicles, One heading with great speed and the other in stable condition (Not at motion) and they are parked in the road due to break-down or any other case which may lead to accidents. The probability of occurrence of accident is especially at poor visibility conditions, it is highly impossible for a vehicle heading up with great speeds and it is highly impossible for a driver to control at this situation. So, we expect forecasting of collision and prior alert & suggestion may avoid many risks. This way we alert driver and assist in preventing accidents due to negligence of the driver and poor visibility of the roads.

- **Ad hoc networking-** A ad hoc network is a continuously self-configuring, infrastructure-less network of devices connected without wires. We here prefer Inter-Vehicle communication (IVC) a advancement Intelligent vehicular ad hoc networks (InVANET). So, we can create V2V (Vehicle to Vehicle) communication. Here, we use zigbee

modules for data transmission and receiving.

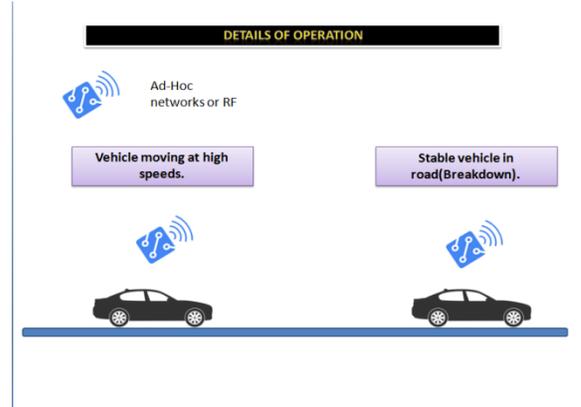


- **Android Studio-** Modify Google maps for our convenience, with the help of their API. ‘

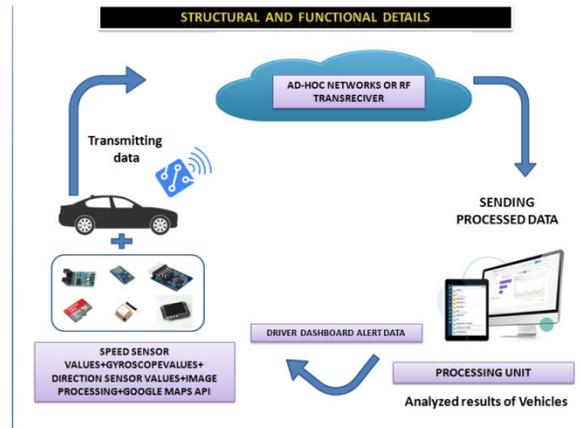


We here adopt **Inter-Vehicle communication(IVC)& Intelligent vehicular ad hoc networks (InVANET)**. A vehicle serves as a host which creates a **DSRC (Dedicated Short-Range Communication)**. When another host comes into the range of other they can communicate between them. In case of junctions, based upon the direction of the vehicle the alert will be given. When the internet connectivity is poor the system will automatically switch to Ad-hoc network. By combining those topologies, the data can be transmitted and received uninterruptedly, to prevent those kinds of accidents. In a free road all the sudden the speeding vehicle (high speed) can't stop seeing a vehicle in

the lane halted due to a problem (Breakdown, punter, ect.). By means of data from halted vehicles and the fast approaching vehicle, accidents can be prevented.



Structural and functional details:



Novelty:

The existing solution is costly or not precise. In spite of finding many solution for case study is found, but this case study is left unsolved. Even though connected car technologies exist already, we wanted to propose a better solution with better algorithm for Indian terrain. Indian road

transport is not well developed as other countries where connected car technologies have been implemented. Hence our proposal is more exclusively design and developed for the Indian terrestrial conditions. Here we design in such a way. So, that the stable vehicle standing is in turned off condition the data transfer occurs after checking the various data.

Advantageous key factor(s) :

The remarkable factors are:

- Safety.
- Improving visibility.
- Solving society's problem.
- Cheap.
- Endless applications.
- All in one.
- Innovation.
- Ease to use.
- Specially designed to Indian terrain.



Benefits:

- Saves the valuable life of humans.
- Reduces accidents and never contribute accidents rate to strike a hike anymore.

- Adaptable.
- Easy installation.
- Less cost.

Cases:



Conclusion:

- Future expansion of this project contributes a great part in reducing accidents.
- It is installed in such a way to cars, based upon the internet connectivity speed switching on takes place, otherwise the parallel switching occurs to **Ad-hoc networks**.
- This provides a smooth, safe and **comfortable journey** for the customer.
- This product will hit the market as this product has not been

implemented to almost all vehicles, which is the ultimate aim.

- This product helps in reducing the number of accidents occurring due to blind spot, rash driving, ect.
- It also can be further developed to reduce the accidents occurring due to bumps and potholes.