A theoretical explantation of a technical device for accident prevention and road safety

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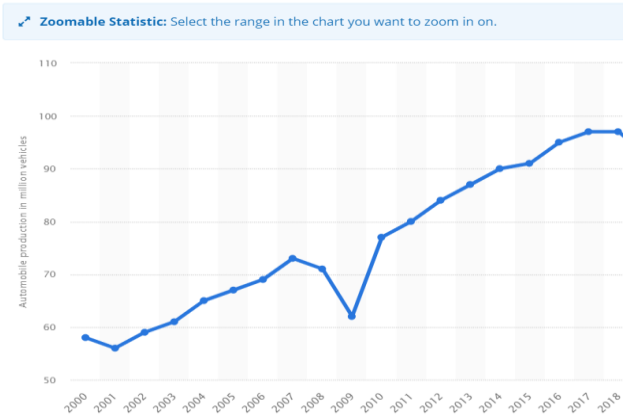
Abstract— ***The world has become a better place to live. There is a rapid technological growth every day in Automobile industry. Today we have the enough technology to manufacture high-end vehicles which can move at the speed of spound.***
Now the question is that, is this a boon or curse? Will it be safe if these vehicles come into the hands of future/present youth? Now it's not only the responsibility of the government and system, but also the parents who should always guide their children and should brig awareness in them about road safety. But, in this competitive world, it's not possible for parents to keep an eye on children 24/7. WHO says millions of teenagers lose lives on roads due to over speeding every year? We came up with a simple product, which is to be equipped with the child's bike or car that sends alert signals to parents whenever he/she exceeds a particular speed limit on particular road.

Keywords—Over speeding, GSM and GPS module, Arduino.

I. INTRODUCTION

Road safety is of the prime importance as road accidents are among the biggest causes of death in the country with the number of vehicles increasing on our roads increasing with every passing hour, it's of the vital importance for everyone have traffic awareness and understand and respect all the road safety. The number of vehicles on roads are increasing rapidly every year. Every four-minute, one person is killed in India because of a road accident . Fig 1.a shows worldwide motor vehicle production from 2000 to 2018. [source : • Car production: Number of cars produced worldwide 2018 | Statista] Corresponding to this, number of road accidents is also increasing. Table 1.a shows number of road accidents from 2000 to 2018 in India.

Fig1.a



Approximately 1.35 million people die in road crashes each year; on average 3,700 people lose their lives every day on the roads. An additional 20-50 million suffer non-fatal injuries, often resulting in long-term disabilities.
More than half of all road traffic deaths occur among vulnerable road users—pedestrians, cyclists, and motorcyclists.
Road traffic injuries are the leading cause of death among young people aged 5-29. Young adults aged 15-44 account for more than half of all road deaths.

S No	Year	No of crashes reported	No of deaths recorded
1	2015	5,01,423	1,46,133
2	2016	4,80,652	1,50,785
3	2017	4,64,910	1,47,913
4	2018	4,67,044	1,51,417
5	2019	4,49,002	1,51,113

II. IMPORTANCE OF ROAD TRANSPORT AND NETWORK

Undoubtedly, Road transport is a vital mode of transportation which helps millions of people every minute by connecting almost all places in the world. They play an important role in transportation of goods and passengers. India's road network is the second largest in the world accounting 5,603,293 km (3,481,725 mi) in total. Probably the busiest road network in the world.

So, whenever an accident occurs, it's not only the loss of life, but economical lose will also be there. So, it is important to make sure that the vital mode of transportation is safe.

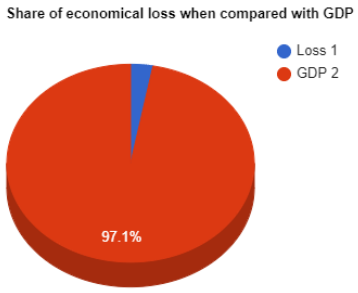
MAIN ROLE

- Connects major cities and helpful in travel for short distances
- Best mode of mobility in rural areas
- Faster and safer delivery of goods
- Cost efficient in building the network

III. FINANCIAL IMPACT DUE TO ROAD ACCIDENTS

Recent survey from a tech magazine says that in economic terms, the cost of road crash injuries is estimated at roughly 1% of gross national product (GNP) in low economy countries ,1.5% in middle-income countries and 2% in high income-countries. [1]

The estimated economic loss due to road accidents in India itself is 3% of country's GDP ($8.2 billion).
There are about 1.25 million deaths due to road traffic accidents in the world and 22-50 million cases of non-fatal injuries every year. Pedestrians, cycle users and motorcyclists are more vulnerable to accidents. Not only the victims but simultaneously their friends and family members are affected by the consequences of these road traffic accidents.[2] The below pie chart shows share of economical loss due to road accidents when compared with total GDP of the country.



IV.ANALYSIS OF THE FACTORS

An importance element in dealing with road safety is ascertaining the magnitude and characteristics of the problem This includes

- What risk factors are contributing; over speeding; drunk driving; sharp curve.
- In which geographical area the greatest problem is found
- An understanding of the volume of traffic deaths, injury and crash
- Category of road user most affected; age sex; pedestrian

When it comes to the teenagers, the most contributing risk factor is over speeding. New inventions are coming up every day in automobile industry. Today we are as advanced as to make high end vehicles which can chases the speed of sound.

When these vehicles come into the hands of teenagers, undoubtedly, it's chaos on roads. Parents buy high speed vehicles for children out of love and forget to have an eye on safety and risk factor. We came up with a simple practical solution which is less affordable to solve the problem of overs speeding of teenagers.

V.PROTOTYPE OF THE PROJECT OR PRODUCT

VA Product working

The product basically contains two system. One is used to detect the speed of the vehicle and the other is used as a communication module.

An Arduino based vehicle tracking system using GPS (Global Positioning System) and GSM (Global System for Mobile Communication) module is fixed in the vehicle. It measures the speed of the vehicle continuously as soon as the vehicle key is turned on.

The parent is able to set particular speed limits in particular locations at any time. When the vehicle exceeds a particular speed limit, it immediately sends a text message to the parent's registered phone number.

Thus, the child fears of driving at high speed.

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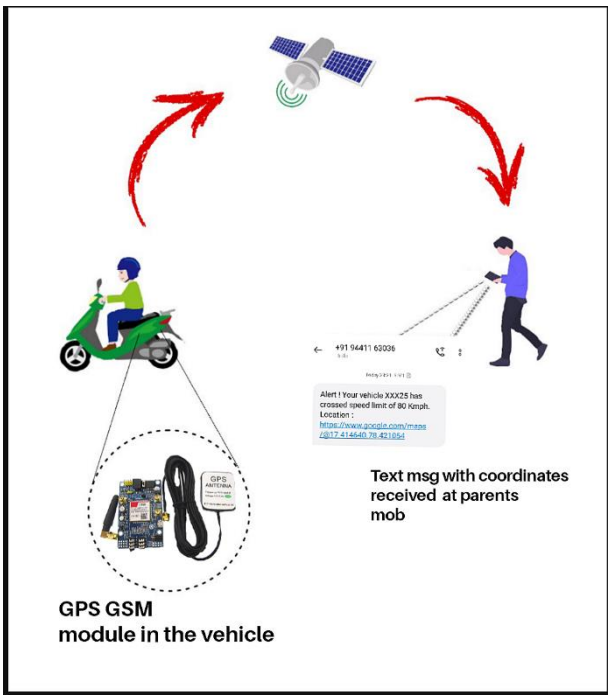

V. PRODUCT MANUFACTURING

The construction of the product is simple, cost-efficient and easy to make.

The main component of this product is a GSM and GPS module. For a long time, existence of the product, we preferred to use a proper low powered module. We preferred A9G GSM+GPRS+GPS module. The complete system is so small that it can be fit into possibly any vehicle. It can be operated using a simple 3.7V Lithium-ion battery. The board is programmed by Arduino ide. The board will take some time for determining the location by fixing the GPS co-ordinates. The Arduino code is made such that it sends an alert message along with co-ordinates of the location whenever the vehicle exceeds certain speed limit. One can also make this project using NEO-6M GPS and sim800/900 GSM module.

The model can be programmed by a micro-USB port and can be powered by a 3.7 V Li ion battery. It has a switch to turn on and off. The model has GSM and GPS antennas. One can insert a micro sim in the model which is used to send text messages to the guardian. The model has a micro-SD port. We can use an SD card to save the data in text format. The board doesn't need an external DC jack or higher power supply

VI. FEATURES OF THE PRODUCT

- Less power required for the board
- Easy to fit it anywhere in the vehicle due to its small size
- Less cost for the manufacturing of the product
- Simple and a workable solution

VII. FUTURE DEVELOPMENTS

1.EASY TO ACCESS BY GUARDIAN FROM ANYWHERE

In some situations, when the mobile phone is not available or in case of any network problem, the guardian should be able to access the details through an aplication or from a certain server/wesite.

2.FLEXIBLE WITH LOCATION

Let's say, a person is moving from point A to B through a1, a2 and a3. It is not possible to maintain the same speed limit throughout the journey.

Example: Assume the routes (A to a1) and (a3 to B) are highways. The other routes/paths are ghat roads. It is not possible for one to maintain the same speed on both ghat roads and highway. So, it is necessary to keep certain speed limits for certain routes or paths. Say, speed limit for the route1 (A to a1) is 100kmph and 70kmph for the second route i.e, (a1 to a2).

3.SAFER ROADS FOR MEN AND WOMEN AT NIGHTS

We often encounter the breakdown of vehicles due to the completion of fuel or system failure on remote routes at odd hours. The low powered GPS GSM module which is equipped in the vehicle sends latitude and longitude of the breakdown location to the nearby petrol bunks or mechanic shops.

This is extremely useful for women who work lately.

Acknowledgment

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