

SMART VEHICLE SYSTEM

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Abstract: In this technologically growing world, transportation has been the most important aspect and one of the greatest innovations of all time. Transportation reduces the time of journey and also facilitating the modern world to collaborate, but on the stake of a life. Yes, globally 2.2% of the deaths are due to accidents which nearly counts to 20-30 million people annually. Our smart vehicle system is a step ahead towards the safety of drivers , to aid them protection by using computer based vision systems to focus on different aspects of speed, sleep, area, pedestrains.etc providing them with driving security to save themselves and also others.

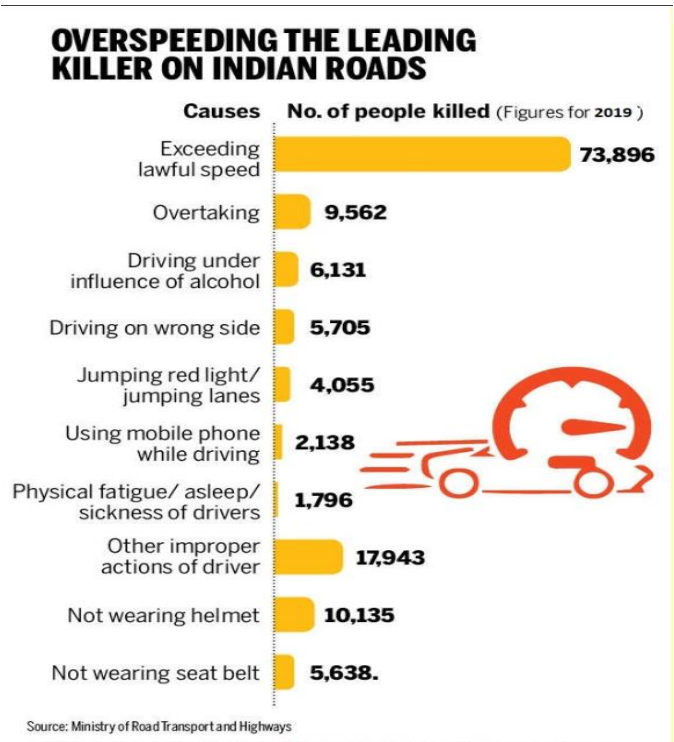
I. INTRODUCTION

The modern world has the transportation as it most important aspect , hailing to millions of vehicles and many kinds of mediums to travel , transportation to some extent has turned into game of life with the stake of death. As an engineer the onus lies on our shoulder to provide a solution for this problem which is efficient as well as feasible.

As our approach to this problem statement we have endorsed the computer vision based systems and machine learning algorithms to facilitate our need of providing security to the driver. Our main criteria of vehicle structure focused here are the four wheeler vehicles the reasons for which will be mentioned in the further article. The categorization of safety systems are been done on the criteria like physical state of the driver, surrounded environment of the vehicle and location of the vehicle. The solutions which we have provided are like detecting the sleep state of the driver and warning him, detecting the sign boards on the drivers way and producing an alert, and warning the driver regarding if any area is accident prone or school zone or residential zone because these are the areas where some restrictions are to be followed.

II.LITERATURE/SURVEY

Getting into the details of the number of road accidents and tragedies happening due to different reasons over the past few years. Some of the reasons might be like overspeeding , moving in wrong direction , trespassing traffic rules , alcohol consumption and lack of awareness of the area ambience which might be like an accident prone area or a residential area or a hospital area.



Figures:- Accident Statistics of India

From the above statistics we could observe that most of the victims of death were the two wheeler drivers which might be because of self-negligence or because of negligence of four wheeler drivers. This was the main reason for us to focus on the design of alert system for drivers of four wheelers, so that they could provide safety for themselves and inturn others.

III.METHODOLOGY

Heading towards the point wise solution for each problem at the prototyping level

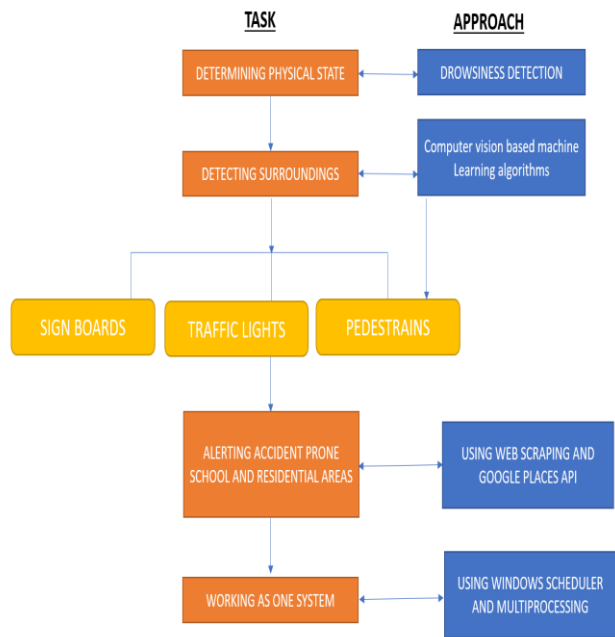
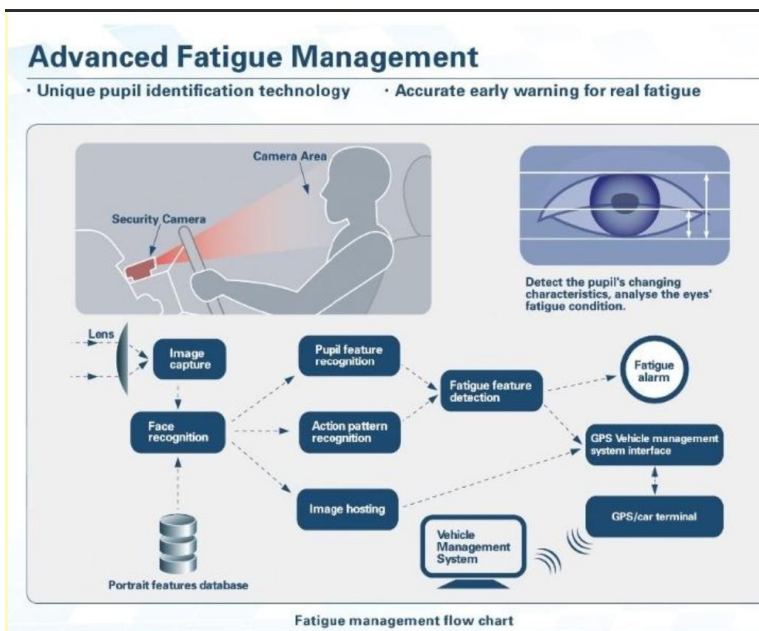
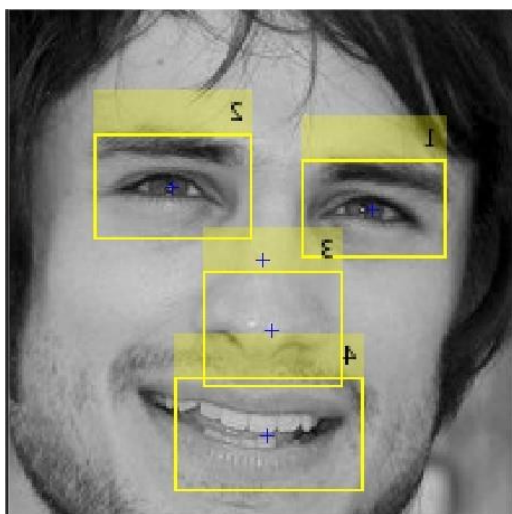


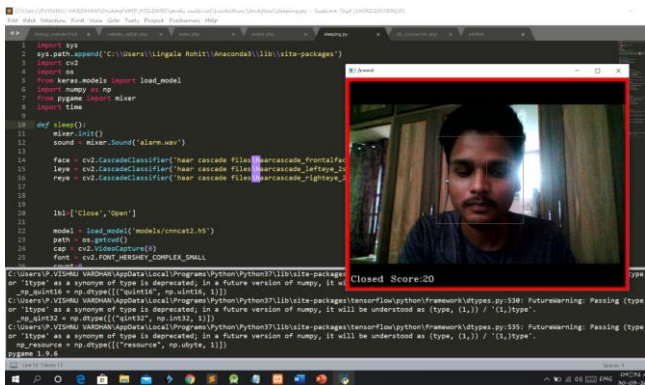
Fig:- Flow Chart of Project

A.Drowsiness Detection

It is based on the computer vision algorithm which detects the eyes



Our results:



B. Detecting Surroundings

The three main parameters which are being focused in this discussion are:

Detecting sign boards , detecting traffic lights, detecting vehicles and pedestrains.

The steps to achieve this are like:

i) Labelling data:

This is being done manually by using the software called vott:

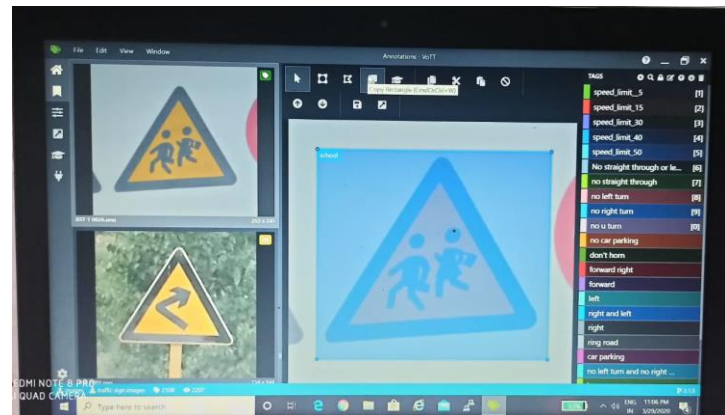


Fig:- Screenshot of software for labelling data

ii) Training data to the algorithm through cloud:

This process was not very successful for us because free tier amazon cloud services were not sufficient to meet our GPU needs

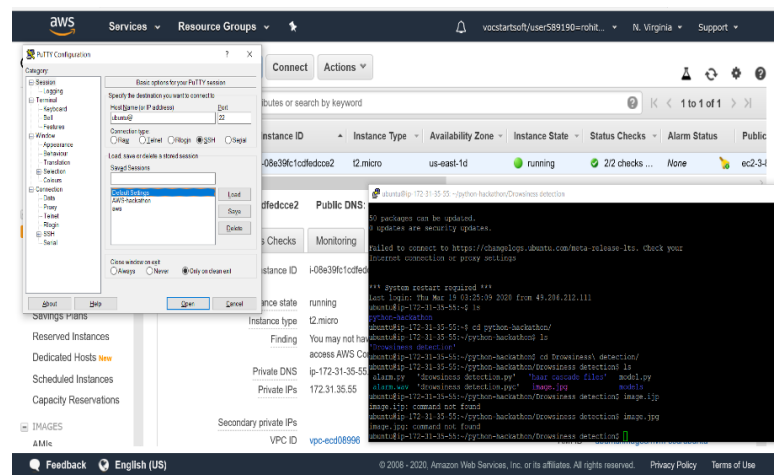


Fig:- Training data in AWS

iii) Running the algorithm:

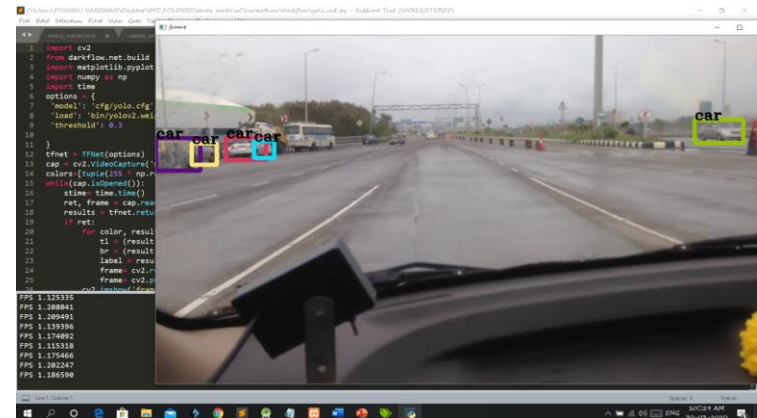


Fig:- First Program Output

The main drawback we found here is that the fps rate, which is not suitable for a real life prototyping system.

iv) Increasing the fps:

To achieve this we have gone for the tensorflow GPU version , which drastically increased our frame rate by nearly 5 times.

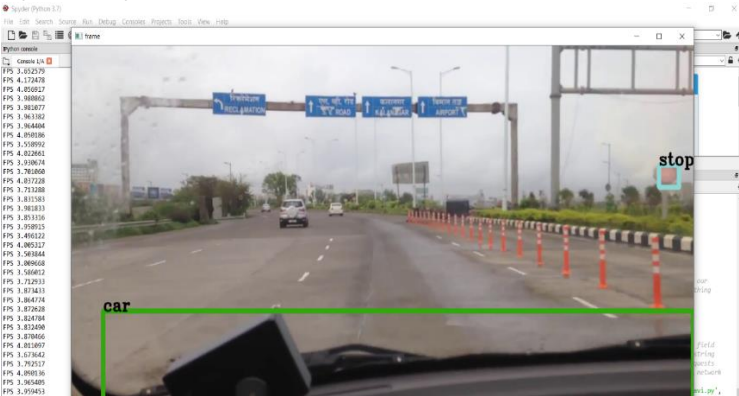
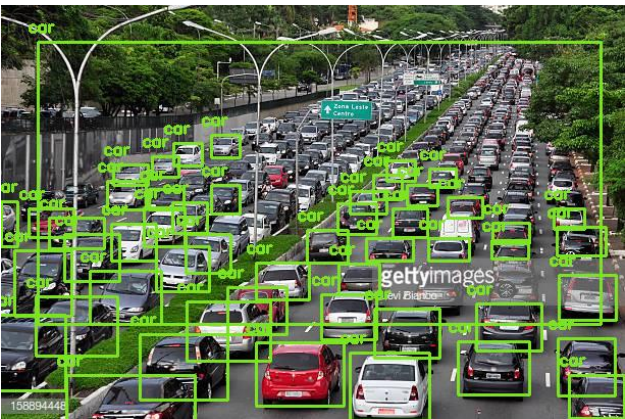


Fig:- Program Output with increased FPS

V) Our outputs:



Figures:- Final program output for detection

C. Fetching Accident prone Areas

To achieve this we have gone for web scraping for which we have scraped the data from the hyderabad traffic police website and embedded it into the program to find the coordinates of the location which are accident prone which are being mentioned in the database of Hyderabad traffic police site

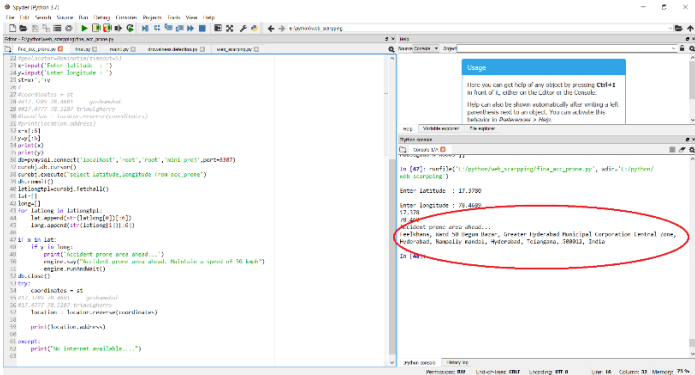


Fig :-The output we obtained

D. Integrating to work as one system:

To achieve this we have chosen to go with windows task scheduler with which we are able to run these multiple processes at a time to work as one system

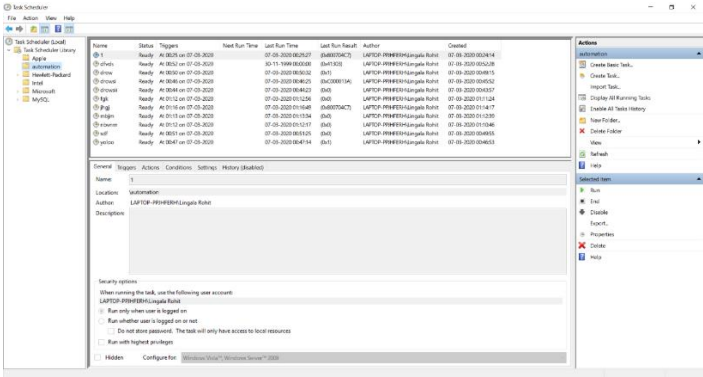


Fig:- Showing the Windows Scheduler

IV. RESULT AND DISCUSSION

Our final result may be depicted as shown in the figure below:

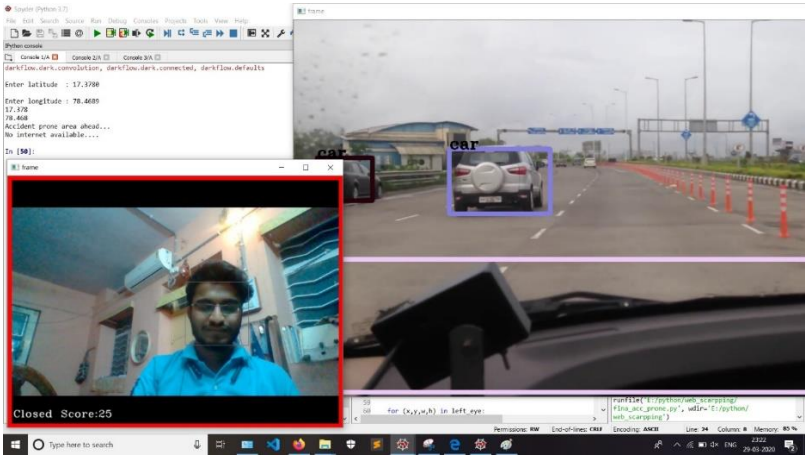


Fig:- Whole system working as one

Which speaks about the system and its capability of handling different tasks together which includes external environment detection and monitoring the physical state of driver simultaneously. This system showcases its ability to be used as a smart alert system for a driver to some extent satisfying the needs of being a prototype.

V.CONCLUSIONS AND FUTURE SCOPE

The most important conclusions which can derived from the above approach are.

- i). machine learning algorithms requires high computing power and huge data to train which requires cloud based virtual GPUs to train.
- ii). A suitable processor for machine learning must be used. Like jetson nano to show the hardware implementation.
- iii). Frames per second and efficiency plays an important role in real life application of machine learning algorithms.

The future scope of this approach is more prominent because every aspect is going to be dealt as a problem of artificial intelligence . Even in present we have many examples like self driving cars which have these systems in them. This project is our approach to understand those systems and include our contribution if any.

VI. LIMITATIONS OF OUR APPROACH

- i). Efficiency of the system might decrease in cloudy , dusty or misty environment.
- ii). Availability of internet , so as to fetch the location of accident prone areas.
- iii). Usage of spectacles by driver , our system will not be able to detect the required coordinates.

ACKNOWLEDGEMENTS

We are very thankful to Mr. V. Krishna Mohan Sir, Assistant Professor, ECE Dept. , Vasavi College of Engineering , for providing the initiative for this project and guiding us through the course to complete the project with his valuable suggestions . We are also thankful to Vasavi College for providing us with resources and equipment in developing the project. We express the sense of gratitude to every individual student and teacher who directly or indirectly helped the project to be as it is now.

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Link to our project repository:

<https://github.com/rohit172001-eng/Warning-system-for-driver>