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<b>Name of College:</b>	Vellore Institute of Technology, Vellore
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<b>Theme:</b>	AI based computer Vision >> Deep Learning based driver monitor system

<b>Problem Description:</b>	Please describe the existing problem you are attempting to solve
<p>Existing Cars and vehicles do not have an adequate monitoring system for drivers. It is not possible to detect if existing driver are capable of driving or are vulnerable to road accidents. This causes troubles at time of driving for passengers as well as for companies. If the car be equipped with adequate measures for safety of passengers, which help to track down driver, then the problem of safety would be solved.</p> <p>We need to device a system that is efficient to track down driver's control and ability to drive. This system can also warn the driver if his driving is bit harsh and unbalanced. This will help the driver to drive safer.</p>	

<b>Solution Approach:</b>	Please describe the complete solution that you have in mind in as much detail as possible. Pl use diagrams, charts, etc. to illustrate.
<p>We propose a Deep Learning based solution for real-time monitoring of driver. The system will analyze different aspects of a coach driver and decide his performance while driving. This can help to reduce or even prevent accidents caused by rash driving done by these drivers, saving a lot of lives. The system consists of following aspects</p> <ul style="list-style-type: none"> <li>• Dashboard Camera for Facial Analysis</li> </ul> <p>A camera will be placed on the dashboard of the bus to capture the face expressions of the driver. This data will be sent to an ML algorithm which will perform sentimental analysis on the data as to predict the emotion expressed by the driver. Extreme emotions will be flagged and the data will be sent to the company for analysis.</p> <p>The camera also targets at the driver's eyes, which can show us signs of fatigue, drunkenness and other situations when he is driving.</p>	

- **Posture Analysis:**

Pressure sensors will be present on the driver seat as to detect the posture of the driver. Posture of a person can give us the insights into his mental condition. A disturbed person will not have a proper posture.

- **Grip on the Steering wheel:**

The way a person grips the steering wheel can also give us information about the status of the person. For example, an angry person will hold the steering wheel harder than a calm person. Shivering hands can also be detected by this method.

- **Dashboard Analysis:**

Data such as the acceleration curve, or the speed analysis obtained from the dashboard of the vehicle can give the company an idea about the driving quality of a particular driver. Helping them to make proper decisions, in case any incident occurs. The dashboard for analytics will provide any company a deep insight of how the driver is driving taking into account all the above factors.

- **Data Transmission and Analysis:**

All the collected data will be sent to a central cloud server for processing. After the processing is complete, the results will be shown to the company in the form of the driver profile. All the data in processed and raw form will be stored on the server if required for further analysis.

<b>Novelty:</b>	How different is your solution approach from existing solutions, if any.
	<ul style="list-style-type: none"> <li>• Existing solutions offer minimalist control over drivers. They do not offer the current Realtime status of driver's overall positioning and control</li> <li>• We offer innovative approach through Deep Learning; that can enable us to monitor passenger's ride, by analyzing the driver.</li> <li>• Our focused facial and control analysis can provide in depth insights on accidents as well, which can be helpful to design vehicle safety.</li> </ul>

<b>Implementation Plan:</b>	Please describe the implementation plan for the complete solution, including possible technologies that can be used, data sets required etc.
<ul style="list-style-type: none"> <li>• Deep Learning: - Deep Learning is used for facial analysis, emotion detection and for tasks which involve driver's control and ability. We will use the popular tensorflow framework here.</li> </ul> <p>Datasets used: - Drunken eyes dataset, emotion analysis datasets, also facial keypoint analysis datasets. Some of the datasets would be prepared by us, as they aren't available.</p> <ul style="list-style-type: none"> <li>• Internet of Things (IoT) : - We use IoT for driver's grip detection and posture analysis which helps to understand driver's situation. We use a simple microprocessor such as Raspberry Pi.</li> </ul> <ul style="list-style-type: none"> <li>• Computer Vision: - We use CV techniques to analyze face morphologies and current road scenario, this helps to understand if the driver interprets the real-life well.</li> </ul> <p>Other technologies such as Google Maps API for realtime navigation analysis are also used. We use Node.js using REST APIs for server side deployment. We will present our implementation through a live web dashboard.</p>	

<b>Demo Day Plan:</b>	Please describe, out of the complete implementation plan, what can be shown on the demo day (12 <sup>th</sup> Jan / 19 <sup>th</sup> Jan)
<p>We aim to provide a real-time demonstration which will show how the driver's response and tracking can be implemented in the car.</p> <p>We will show how the results were generated on our dashboard system which involved the monitoring system.</p>	