Interim Report On*:*

***Finding Steering Angle and self-braking using Deep Learning.***

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**Introduction:**

Before the invention of engine, the humans made large efforts for their long journeys. After the invention of *Steam engine*, it become easy for humans to undertake long journeys and explorations with minimum efforts. Over the years, the power of the engine increased so that the vehicles become more powerful and highly advanced and are available for everyone.

As the vehicles becomes more powerful, the security of car’s material and security of the people is very important. Security measures such as seat belt, and air bags have reduced the number of accidents. In modern vehicles, the control system and emergency braking system is introduced that override the drivers to prevent the dangerous situation such as anti-lock brakes and traction control. Many car manufacturing companies are trying to reduce human efforts to drive the car for which they have invested heavily in *artificial intelligence* research, i.e. to create an operator that drive the car safely without any human conduction.

The autonomous driving system is implemented by using different technologies such as GPS sensing and different sensors to avoid collisions. Most modern autonomous vehicle uses a combination of cameras, Light Detection and Ranging and other sensors to create robust but expensive system. The main concern of autonomous driving is to steer the car in the right direction. For this we designed neural networks to predict the steering angles and self-braking. These networks use images, called *dataset* which are captured from the cameras mounted behind the windshield of the car, as an input and calculate the steering angle and self-braking.

**Project Requirements:**

The project consists of two parts. The first part uses the neural network to predict the steering angle of autonomous car. This network use dataset as an input and calculate the steering angle. The second part consist of detector that detects traffic signs, traffic signals and road users. These detections are used for self-braking. Both the part of project will deliver the results in real-time. For these two parts of project we classify the requirements as hardware requirement and software requirement.

* **Hardware Requirement:**

GPUs (Graphics Processing Unit) is highly specialized component as compare to the CPU. It is extremely efficient in parallelizable computations. They contain hundreds and thousands of cores, which enables computations while maintaining the real-life performance. This enables efficient optimization of neural networks.

* **Software Requirement:**
* *Compute Unified Device Architecture Unit* (*CUDA):* parallel computing platform created by NVIDIA. Helps to give access to any CUDA enabled GPU.
* *Tensor Flow:*  It is machine learning library, but it is also called as general computational library due to its versatile design. Because of its generalized designed, TensorFlow is applicable to wide range of problems and domains, and make syntax for building ANNs quite complex.
* *Data:* The most important aspect to consider when designing the ANNs is the availability of datasets. These datasets are in ROSbag format so we convert it into jpg format using python.

**Experimental Setup:**

To predict the steering angles of self-driving car we need to download the Dataset publicly available by the Udacity. The dataset is approximately 40GB in size that contains different images collected by the car under different and challenging weather, roads and illumination conditions. These datasets contain asynchronous and synchronous events. These datasets are used to train our autonomous system.

A screenshot of a cell phone

Description generated with high confidence

Once trained, the network is used to generate steering commands from a single front center camera. After the training of our network is done, we then test our network through Udacity’s open source Self-Driving car Simulator. To detect the traffic signs, traffic signals we used such images that will train the network for self-braking. Again, this is part of the project is also tested in simulator.

**Result:**

As the project is going on, we still work on the project to get the accurate results.