**GPU Enhanced LIDAR for Real Time 3D Sensing**

**Project Abstract**

**by**

**CMPE 295A**

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**ABSTRACT**

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Three dimensional environment sensing and imaging are an integral part of autonomous vehicle, computer vision and machine learning technologies. Existing 3D sensing techniques include Light Detection and Ranging (LIDAR), Image Processing using digital camera and Radio Detection and Ranging (RADAR). Existing LIDARs with image processing capability poses challenge of increased cost, reduced sensing distance and meager additional features. As a result, there is need for cost reduction, improvement in distance sensing and addition of features to the existing LIDAR.

The project aims at hardware and software design for the LIDAR using powerful OpenCV, OpenGL, CUDA and Embedded C programming techniques and algorithms embedded onto the NVIDIA Jetson TK1 development board. The board is equipped with a fast Arm A15 CPU and NVIDIA Kepler GPU with 192 CUDA cores. GPUs are the current state of the art processors which are used in accelerated computing for scientific, engineering, analytics etc. applications. GPU offers unprecedented computing by carrying out compute intensive tasks in an extremely fast and parallel manner and saving the CPU for the sequential tasks.

In this project, we will design a LIDAR with increased sensing distance and added feature of Augmented Reality integration with camera feed. The prototype LIDAR will be able to sense up-to a distance of 10-20m as compared to existing LIDAR which can measure only up-to 6m. The outcome will be enhanced 3D environment sensing LIDAR prototype which can be integrated in self-driving vehicles for real-time sensing of the environment and taking better driving decisions.