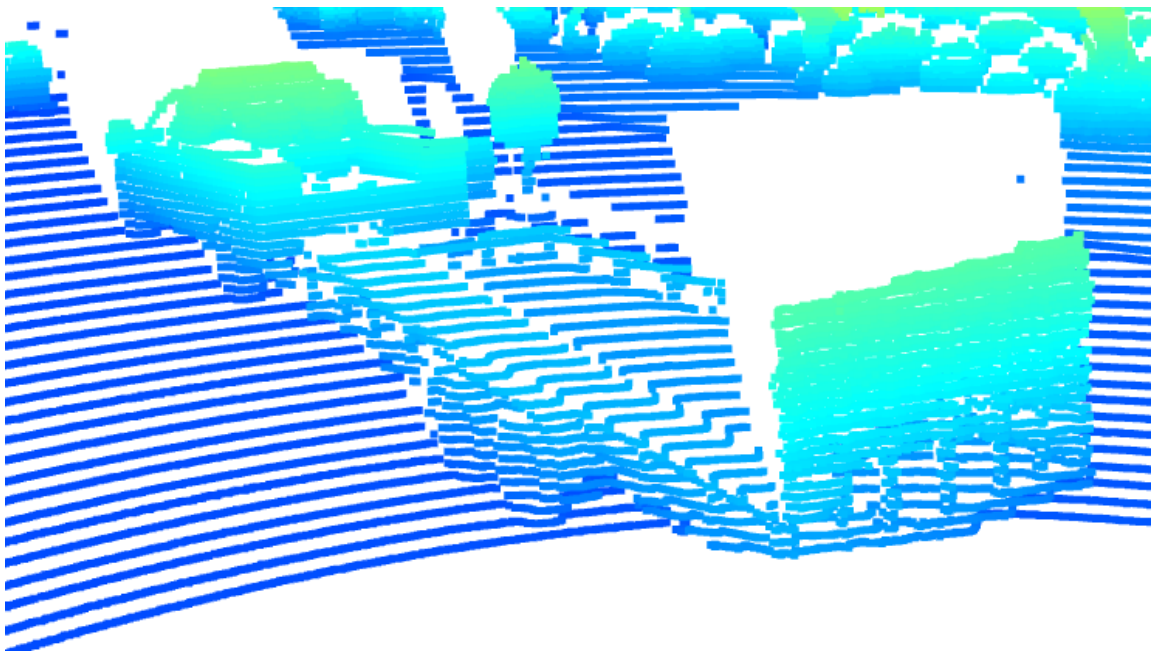# Mid-Term Project: Report

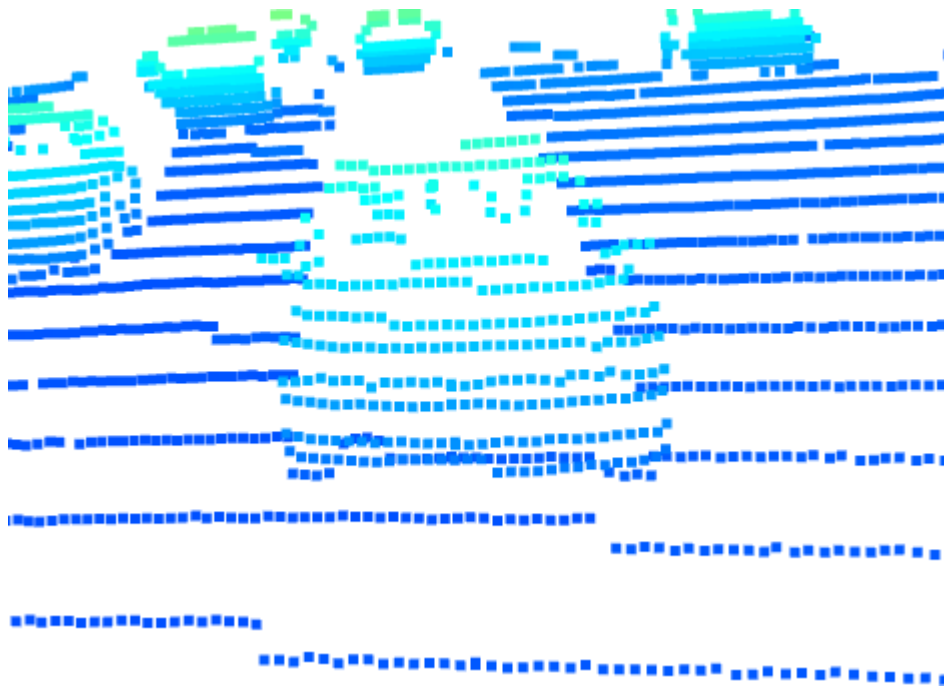## Visualize lidar point-cloud (ID_S1_EX2)

▼ 6 examples

For vehicles close to the ego vehicle, the shapes are well defined and can be very easily distinguished

Vehicle from the back as seen by the ego vehicle

**Vehicle from the front as seen by the ego vehicle**

Shadowed vehicles

The following two images were taken from the same scene. From the side it can be observed, that there are at least 3 vehicles parked one next to the other. Rotating the image slightly, the shadow that the vehicles closest to the ego vehicle cast over the vehicles behind it reduces significantly the possibility of discerning the type of object it might be
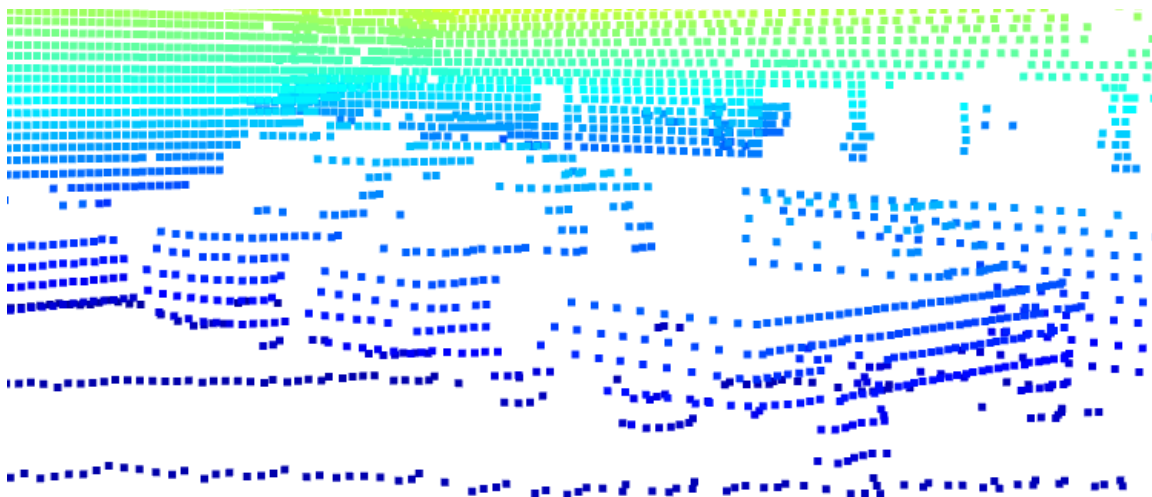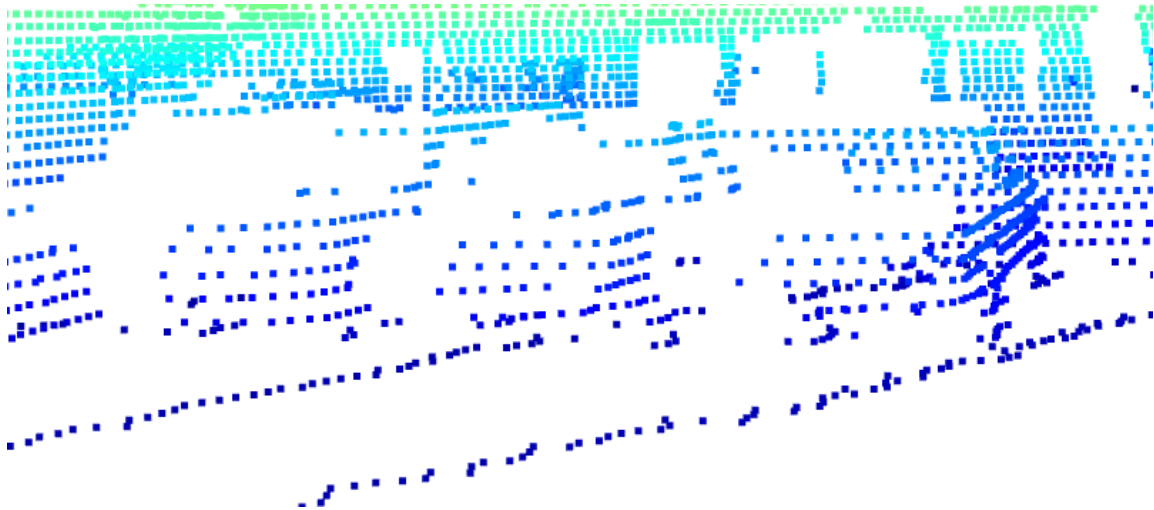
Vehicles located far away

For vehicles that are located very far away, they can hardly be recognized. The below image shows the back of a car, were the windshield can be recognized
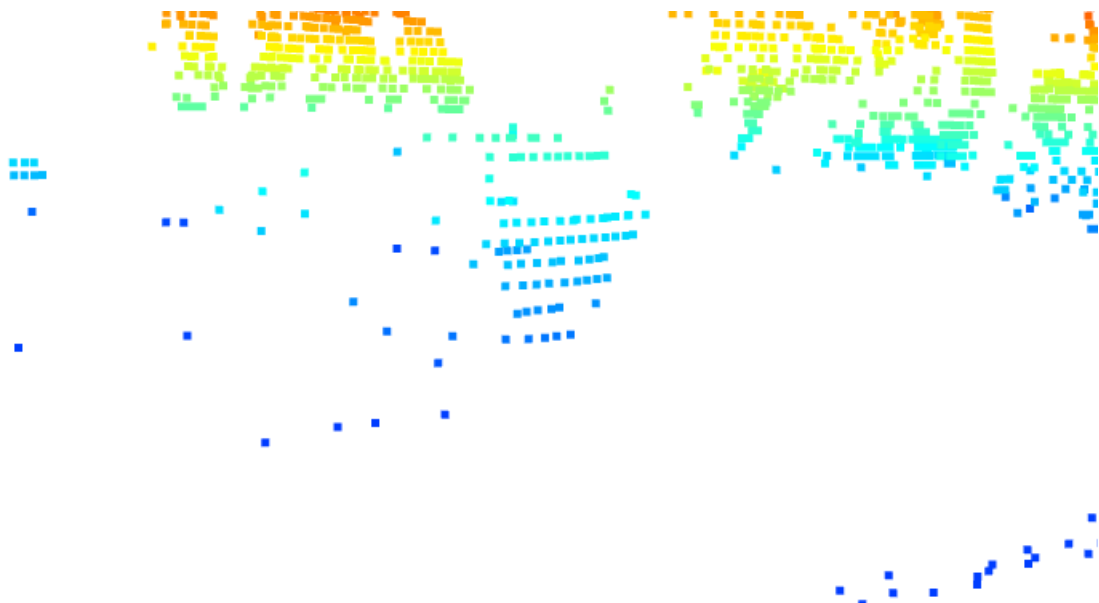
Vehicles that are very close to the ego vehicle

The vertical field of view of the lidar mounted on the top of the ego vehicle limits significantly the perception of the vehicles located next to it. In series applications, the ego vehicle requires additional sensors to cover the blind spots.
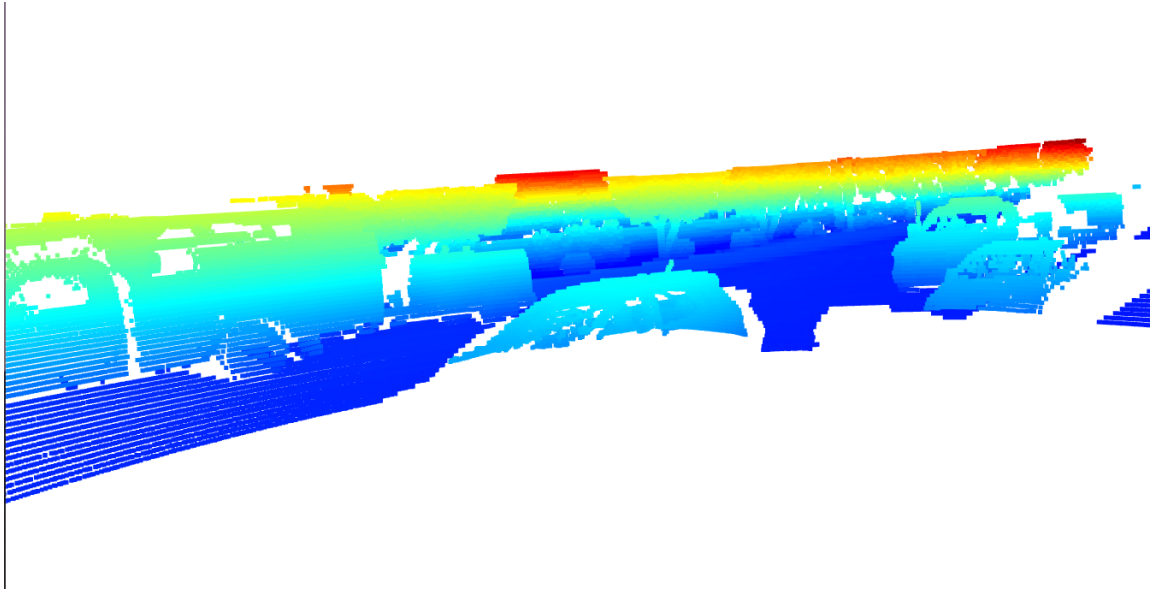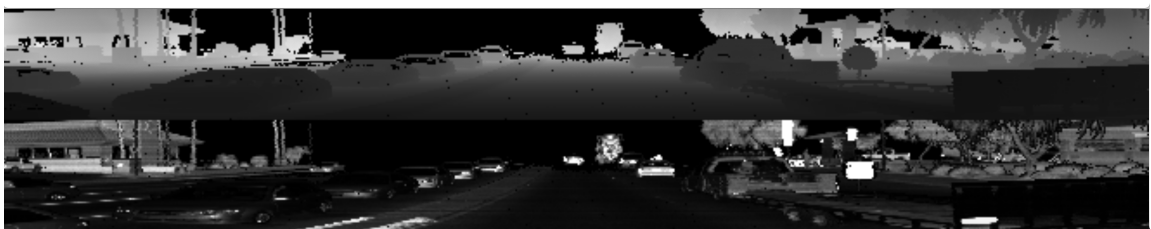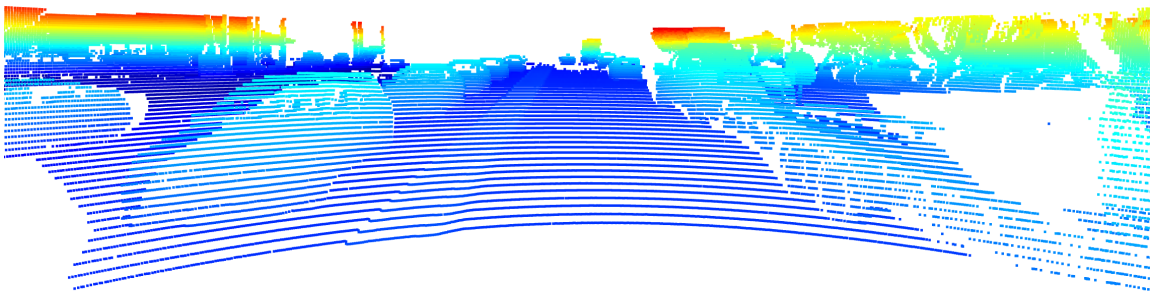
Summary

The degree of visibility mainly depends on two factors:

- the distance to the ego vehicle, showing an inverse correlation

- the oclussion caused by other objects

▼ Vehicle features

The vehicle shapes can very quickly be derived from the lidar point cloud, thanks to the high reflectivity that the metalic materials used for its construction.

For areas, such as the windshield and windows it can clearly be observe that the light beams simply pass through not giving any kind of energy back to the lindar sensor
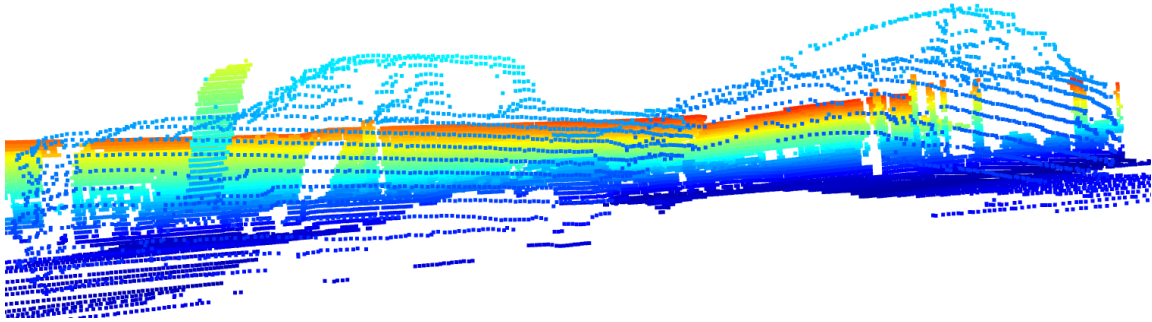
If we now make use of the intensity image, we can observed two parts of the vehicles that particularly stand out:

- The lights
- The number plate

This makes sense as these parts have been designed to reflect the light. Here two examples for the generated plots