1. Explain how a lane detection system works? How can it apply for curves and hills?

**Ans:**

By Deep Learning, the lane detection system can work even on curves and hills. There are two ways to solve such problem, one is semantic segmentation, and the other way is anchor-based lane detection algorithm. For semantic segmentation, it will cost a lots of time to handle the poly-fitting for the result from semantic segmentation, which is not suitable for autonomous driving or ADAS system. Hence, anchor-based lane detection is here, such as LineCNN, LaneAtt, SGNet, PolyLaneNet, LSTR, and CondLaneNet

1. How to handle the situation that your robot see an object but don’t know what it is?
2. What approach you will use if the various sensors you are using have different refresh rates?
3. How does feature from SIFT, SURF, and HOG differ? Explain how they works and how will you apply them in perception pipeline.
4. What is voxel? And what is the process behind this algorithm? And why we do this for our point cloud data?

**Ans:**

Voxel grid is like the 3D pixel with fixed resolution. In each voxel, it is only represented as empty or non-empty. For the algorithm, we need to define the voxel grid space and then use the given resolution to determine if a grid contains some points. For the reasons why we use voxel grids instead of point cloud, it should be the efficient computation since we operate on discrete 3D data. Also, voxel grid can transform the point cloud from unstructured data to structured data, which is useful for transformer. And also it can include some information like face and connection.