3D Object Detection from Point Clouds

1. **Product Mission:**

Developing an efficient and accurate 3D object detection system that can identify and locate objects in real time from point clouds, providing support for real-world applications such as 3D printers, robots and autonomous vehicles.

1. **Users/User stories:**

(1) Autonomous Vehicle Engineer

I want to accurately detect and classify objects from the point clouds in real time so that autonomous vehicles can navigate safely.

(2) Robotics Engineer

I want to utilize 3D object detection to enable robots to interact effectively with their surroundings, ensuring they can identify and manipulate objects and navigate without collisions.

(3) AR/VR Developer

I want to quickly generate 3D models from the real world through 3D point cloud object detection techniques in order to create more realistic and immersive virtual environments.

(4) 3D Modelers and Designers

I want to accurately detect 3D objects from point clouds in the real world and generate high-quality 3D models.

(5) Environmental Scientist

I want to apply 3D object detection from point clouds to study and analyze the natural environments.

(6) General People

I want to experience products that apply 3D object detection from point clouds, including 3D printers and autonomous cars, to enrich my life.

1. **MVP/MVP user stories**

The product can detect 3D objects from point clouds and support multiple object detection.

**User stories:**

I want to detect 3D objects from point clouds so that I can integrate them into my projects such as 3D printers, robots, and autonomous vehicles.

1. **Technologies to evaluate and reason for choosing them**
2. Programming Language: Python – supports a lot of third-party libraries and frameworks.
3. Packages/Frameworks: PyTorch, Open3D, PyTorch3D, Matplotlib, NumPy and so on – process and visualize point cloud data and construct deep learning detection models.
4. Testing Tools: CARLA or Video Streaming –is used to test the performance of models.
5. **Next Sprint goals**
6. Determine specific application scenarios for 3D object detection from point clouds, and get the corresponding dataset.
7. Complete preliminary system design and architecture definition.
8. Explore efficient point cloud data processing methods and 3D object detection algorithms from point clouds.
9. Reproduce the 3D object detection algorithms using collected point cloud data.