

Milestone 1:

Introduction:

Make a car autonomous can be a very difficult task, but it's based on two main factors: sensors (like RADAR or LiDAR) that will collect data information and the processor, that will define a set of actions to take (like turn right or left or increase speed) based on that data.

Artificial Intelligence is used by the processor to learn the best actions to take with those cases. But how? Let's give an example: when we stop on a red light or speed down because of untypical meteorological conditions, we use our memory to take that quick actions. Our driving experience habituate us and our brain to look for that little pieces of information that encounter on the road. To make a car autonomous, we need that cognitive intelligence implemented on car's processor so the car can learn and execute those actions that a human would do on determinized cases.

The problem is the collection of massive data quantities (also called big data) that forces to have a vehicle fleet with top gear sensors. This slow and expensive approach don't cover all the cases like accidents, to collect data.

A more efficient and less expensive way to collect big data is to use a drive simulator, like the GTA V, because the cost is very low due to it is a virtual simulation and also we can collect all data types like accidents.

Objective Concept:

Our goal is to collect data from GTA V with different scenarios (like climate conditions) and use that to generate a dataset.

An advantage of collect data from a virtual simulation it is the possibility to collect ideal data without noise and the range is infinite because we can put the camera and also the LIDAR on the same position and the 3D Print cloud will perfectly coincide with the views from the camera. But the point is to be realistic, so we will handle the data to make it real as possible.

We will also use different real LIDARs specifications within the virtual LIDAR to generate more realistic data collection.

With the dataset successfully generated, we will be able to identify objects on the game based on our generated dataset with help from 3D object detection algorithms.

Personas:

Filipe, is a 25 year old Bosch Employee and he's working on autonomous driving. However he have an obstacle: this is a very expensive task as he needs a fleet of cars and sensors (especially LIDAR sensors). He needs to see if a LIDAR sensor is worth it on autonomous driving cars, so it may help him if there's a software that simulate close enough to what he would encounter if he tested with a real car and LIDAR Sensors with different scenarios and different LIDARs .



Motivations: Test LIDAR sensors for autonomous driving

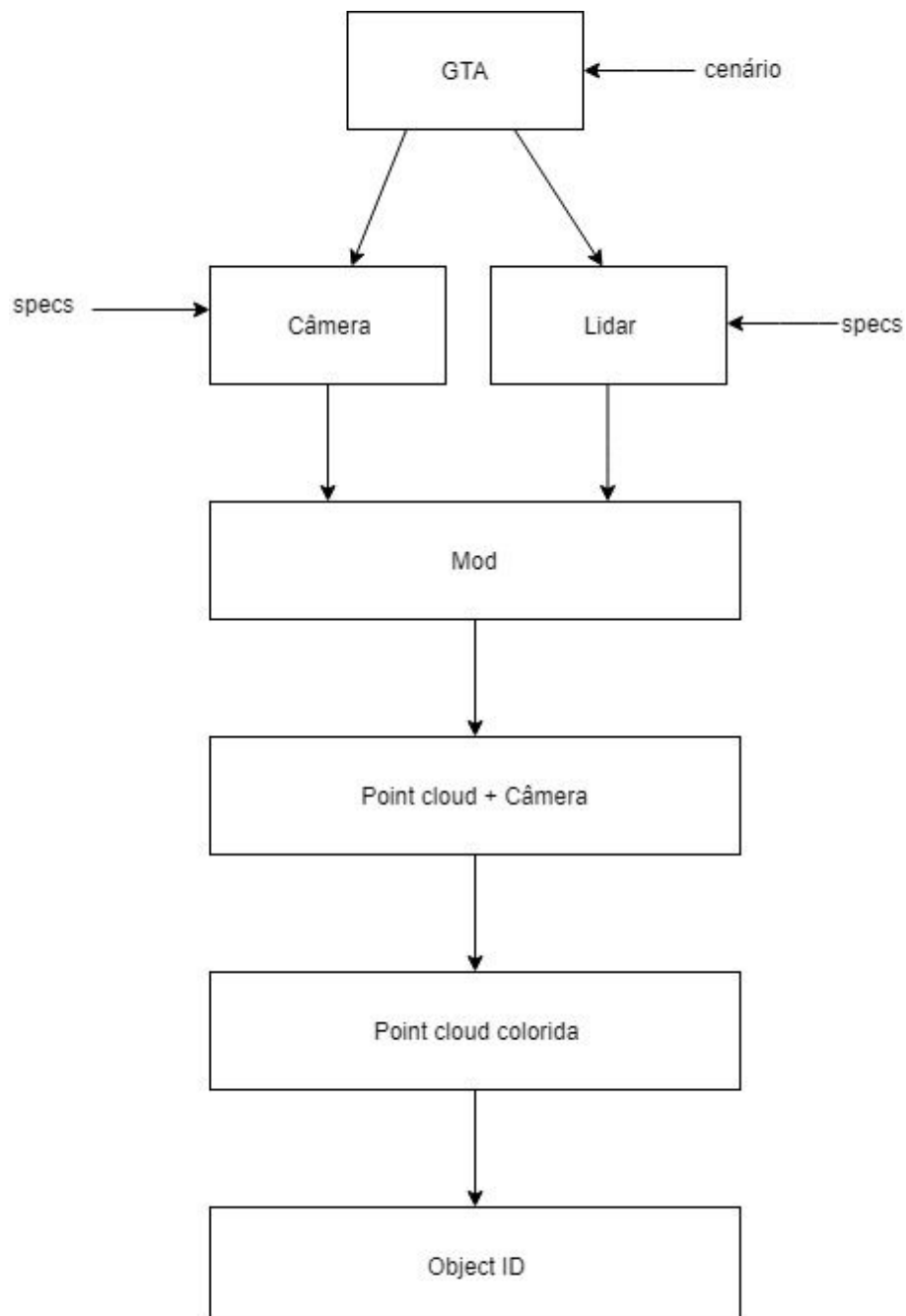
Scenarios:

1. Filipe want to test if LIDAR/car that can recognize an object with confidence under different type of atmospheric situations day, night, with rain, with snow or without.
2. Filipe want to test the LIDAR/car that can recognize an object with confidence with different densities of people, animal, objects or even without.
3. Filipe want to test the LIDAR/car under risky situations (like accidents).

Architecture:

Work flow for this project.

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Test and Validation:

In order for the project to be considered successful:

1. it has to be able to fuse a virtual LiDAR and camera and, under perfect circumstances
2. it has to be able to colorize the point cloud generated by the LiDAR with the in-game colors obtained by the camera.

Additionally, the project should be able

User manual:

Requirements:

1. GTA V
2. Required mods (ScriptHookV and
3. Our mod

How to use:

1. Run GTA V with conditions that you would like to test
2. press a key to generate a dataset
3. press a different key to the car start recognize the object that you want