BGRacing Autonomous Department Home Assignment

1. Introduction

Welcome to the BGRacing Autonomous department challenge. This assignment is designed to evaluate your practical software development skills, theoretical knowledge, creativity and ability to learn new things quickly, the must haves of great engineering!

The core task involves building your own toy data processing pipeline, based on Docker containers and ROS2 nodes as building blocks. The pipeline should acquire data from some source like a dataset or a simulation, process it through and present something at the end. What data, what process and what results are up to you!

All tools are valid as long as you understand your work and can answer for it.

We are looking to recruit both junior and senior students. We expect all candidates to meet the core technical requirements, while we encourage and reward **creativity and technical depth**—the ability to innovate and solve problems efficiently. Seniors are expected to push the boundaries of the assignment to showcase advanced problem-solving and design skills. You are free to choose a different (but relevant) dataset, and solve different problems, as long as you stay withing the given framework or ROS2 + docker containers.

If you're unsure where to start, we have provided a basic project for example, accompanied by some example datasets.

Make sure to check submission requirement below.

Assignment is due 12/11/26.

Good luck!

2. Core assignment & requirements

Your project must establish a data processing pipeline using **two Docker containers** and **ROS 2 nodes** as the core of your system such that one container will be responsible for acquiring data and publishing it, while the other will be responsible for reading the data and processing it for results. The data you chose to work with is up to you.

System requirements:

- Containers running Ubuntu 24.04
- ROS2 Jazzy

- Python 3.12 or C++ 17

Assignment goals:

- A GitHub repo holding all project filles and code.
- GitHub readme showcasing chosen dataset properties and statistics and your project (chosen task, pipeline blocks, results and how to run).
- Project should be reproducible by us (meaning that we can download project files, run containers and reproduce your results).

3. Example Project

The following example project uses to accompanied dataset BrandsHatchLayout.csv. Project goal is to calculate a path following the middle of the road. The architecture:

1. A container runniтng Ubuntu 24.04 with ROS2 jazzy node which:
    a. Reads all points form the csv file.
    b. Publishes it to a points topic.
2. A container running ubuntu 24.04 with ROS2 jazzy node which:
    a. Subscribes to the points topic.
    b. Pulls the points in.
    c. Calculates the path.
    d. Generates a plot and saves it a .png file.

4. Example datasets

1. BrandsHatchLayout.csv provided here link
2. LiDAR point cloud data provided here link
3. https://fsoco.github.io/fsoco-dataset
4. https://www.cvlibs.net/datasets/kitti

5. Assignment submission

You can submit your assignment by filling out the following form:
https://forms.gle/q4teuV2GQBwLSESB8

Contact Information

If you have further questions, you can contact us at:

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