

Snapshots: Autonomous Driving Without Lane Marks

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1. Snapshot 1

This snapshot outlines the essential tools and components used for developing our autonomous driving algorithm. The focus is on real-time navigation without lane markings, tested in both simulation and on a prototype vehicle.

1.1 Development Tools

- C++
- Visual Studio Code
- Open-source simulators (e.g., CARLA)

1.2 Hardware and Testing

- Raspberry Pi / Arduino (for prototype vehicle control)
- Camera sensors (visual input)
- Toy vehicle prototype

1.3 Communication and Collaboration

- GitHub (version control)
- Discord (team communication)

2. Snapshot 2

This snapshot focuses on the hardware design and real-world testing environment for the prototype vehicle.

2.1 Hardware Integration

- Camera positioning for forward visual capture
- Motor module to translate algorithm decisions into motion
- Power and wiring connections for sensors

2.2 Testing Goals

- Simulate various driving conditions without clear lane marks
- Capture data to evaluate accuracy and reaction of the vehicle

3. Snapshot 3

This snapshot describes the software logic and functionality.

3.1 Algorithm Components

- Processing Module (PM): handles raw input and feature detection
- Response Module (RM): generates steering and speed commands

3.2 Functional Implementation

- Image pre-processing
- Edge and obstacle detection
- Real-time path computation

4. Snapshot 4

4.1 Final Features and Future Work

Final touches were applied to improve stability and accuracy in both testing modes. Plans for expansion include support for night driving and irregular terrain.

4.2 Extra Features

- Logging system for sensor data
- Modular input for various sensor types
- Configurable response modes (aggressive/cautious driving)