

Collaborative Control of Autonomous Cars

Students:

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Client

Thomas Eskridge, affil. Florida Institute of Technology

Meetings with client:

8/22/2023:

This meeting was the introduction to the entire team. Everyone became familiar with one another and the general idea of the project was given. We were introduced to the CARLA program, which is the main driver program that the research will be conducted on. Along with that, the simulator was shown and started up so we could get an idea of how to test on our own. We also sent an email to Dr. Wood with our student IDs to gain access to the lab.

The overall goal for this project is to improve the quality of autonomous car software through research into how it functions. Our focus is specifically on the interaction between the human and the AI, and more clearly communicating the AI's intent to the human to make choices such as braking, turning, or in some cases, changing lanes.

To begin with, the software will require an interface for displaying all of the information the car uses to make its decisions. Speed, gas or charge, and location data will be displayed on this interface, among other things.

The software will then use this interface to indicate to the user when it is going to make a decision that the user might not expect. For example, if the car is at an intersection and plans to turn left, it will indicate to the user that it plans to turn left. If the user does not want it to turn left, they can take over manually.

In the interest of improving the interaction between the human and the AI, our software will also combine the input of the human and the AI. The combination of inputs will be dynamically interpreted; the level of human input versus AI input will be changed depending on how the input would affect the car's trajectory, to allow for smooth transition and to prevent accidents.

The avenue of communication and cooperation from the AI to the user is one that has yet to be pursued to this degree in testing for autonomous vehicles. As such, this set of features we're attempting to implement are likely to be novel to most users, with the exception of the interface which will simply be presenting existing information in a novel manner.

The possible issues present with the plan stem from a lack of knowledge. We aren't familiar with the CARLA tool, and will have to spend some time learning how to use it. Once we know how to use it, we will also need to spend some time learning how to make programs for CARLA, something that we will also need to spend some time learning. Additionally, although programs for making self-driving cars already exist, and that is useful for us, it also brings additional complications because existing code is often difficult to iterate upon.

Milestone 1:

- Spend time with CARLA to learn its ins and outs
- Examine existing CARLA programs to figure out how to make our own
- Create small "hello world" programs that work in CARLA
- Program a dashboard light that turns on when the car is braking
 - Possible additional task: add an image of a dashboard to the first person view

Milestone 2:

- Test existing AI for self-driving car, learn to understand its actions
- Program, test, and implement improvements to existing AI for self-driving car

Milestone 3:

- Program, test, and implement information communication for the car's intended actions

Task	John	Brennan	Isaya
Learn CARLA software	Should be done by all members		
Learn CARLA programming	Should be done by all members		
"Hello world" programs	Test work with GUI	Test work with AI actions	Test work with signal/slot connection
Program dashboard light	Implement dashboard POV	Implement braking signal	Connect braking signal to dashboard light

Approval from faculty advisor:

"I have discussed with the team and approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones."

Signature: _____ Date: _____