AI controller for Semi-active suspension system

Target group: Systems, Control and Mechatronics, Communication Engineering, Machine learning, Vehicle Engineering, Automotive Engineering

At Product & Quality you will be a key contributor to the next generation outstanding premium cars from Volvo. Together with other engineers around the world, you and your team will create innovative human-centric car technology that makes life less complicated and more enjoyable for people. Are you interested in design and connected car technology? Do you share our passion for people, the environment and our urge to create a superior driving experience? Product and quality is the place for you to prosper.

This thesis work will be carried out within the Wheel Suspension Mechatronics group, which is a part of VCC’s Product & Quality organization.

Background

Recently, Volvo investigated the possibility to use MPC and camera (for road preview, see Figure 1) for control of the semi-active dampers. The thesis showed that MPC can offer good performance but at a high computational cost. AI controllers and in particular neural networks offer a computationally efficient control strategy with many simple operations that are highly parallelizable. Hence, an AI controller can offer both good performance while maintaining a reasonable computational load on the CPU (or GPU). This thesis investigates if an AI controller can be trained to have similar (or improved) performance as a MPC with a lower computational load.

Figure 1, Illustration of preview camera

Scope

- Literature study of suitable AI control methods
- Implement a AI controller using a suitable framework, train and verify the controller in IPG Carmaker
- Design a proof of concept for how to incorporate feedback to the AI to have good learning capabilities
- Implement the controller in IPG Carmaker (and as a stretched target, in a real vehicle) and evaluate performance and computational load compared to MPC
**Profile**
- We are looking for students that are highly motivated and have genuine interest in cars and signal processing.
- Master’s degree students in Systems, Control and Mechatronics, Vehicle Engineering, Automotive Engineering.
- Knowledge in Machine learning and classic control theory.

**Duration**
- Period: 1 semester, 30 ECTS points
- Starting date: January 2019
- Number of students: Suitable for 1-2 students

**Application**
- Attach your resume and cover letter stating your interests within the given area and your thoughts and credentials.
- Please note that applications arriving later than the last application date will not be taken in consideration.
- Selection will be ongoing during the application period.

**In case of questions, please contact:**

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**Apply at www.volvocars.com/career**

We want your application as soon as possible, but no later than 2018-11-30

**About Volvo Car Group**

The future belongs to those who are empowered by a great idea and have the ability to carry it out. At Volvo Car Group, our vision is clear: "To be the world's most progressive and desired premium car brand" by simplifying people's lives. We have bold targets when it comes to innovation, sales and customer satisfaction and to make this happen, we need talented people on-board. People with passion, energy, business sense and the drive to innovate. People that want to create the next generation Volvo cars in a global, dynamic and respectful environment. We will support you to reach your full potential. Join us on this exciting journey into the future.