Shared automation in control towers for automated vehicles

Control towers have been proposed as a solution for overcoming the high uncertainty of automated driving. There are many potential situations when an automated vehicle will reach a state from which it cannot proceed without human intervention. This might be due to limited authority (the vehicle may not be allowed to break a traffic rule, for example going in the lane of opposing traffic), or due to limited capacity (the algorithms may not be able to comprehend the scene, for example temporary lane markings), or due to limited information (the sensors might be occluded, or there are high uncertainty in the movement of other actors). With a control tower these situations can be mitigated by remote human interaction. However, this is a daunting task for a human; operating or in other ways commanding the vehicle based on the remotely available sensor data. In many cases, though, the vehicle’s automation system will still be functional and the task of remote operation might be enhanced by path following or obstacle avoidance algorithms. The visual interface to the human operator will also be very important, where for example augmented reality techniques can be applied.

**This aim of the thesis** is to analyse and design a shared automation system where a vehicle is operated remotely combined with onboard automation functions. The concepts should be implemented on our small vehicle platform SVEA and tested on human operators. Methods that could be useful include model predictive control and reinforcement learning techniques. The work will include theoretic work but also experimentation and implementation on real hardware.

**We seek two students that will collaborate;** one with a background in control systems or robotics, and one with background in visualization technologies or HMI design..

Integrated Transport Research Lab (ITRL) and the division of Decision and Control Systems at KTH are hosting the thesis work.

**Your application, including CV and a motivation letter, is welcome to** Jonas Mårtensson – [jonas1@kth.se](mailto:jonas1@kth.se)

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| Application deadline | 2019-11-25 |
| Selection process end | 2019-12-02 |
| Start period | January 2019 |
| End period | June 2019 |

**About Integrated Transport Research Lab - ITRL**

ITRL is a multidisciplinary and multi-stakeholder arena that brings together experts from various fields in order to contribute to the development of a sustainable transport system. The main research question is *How can new technology contribute to a sustainable transport system?ow How*

More information at: [www.itrl.kth.se](http://www.itrl.kth.se).