Master Thesis - Remote Driving in 5G

Background
5G supports a wide range of new and challenging services. Remote Driving enables a remote driver to operate a remote vehicle such as a car, drone etc. To be able to operate the vehicle remotely the communication of control commands, sensor data and/or live video data must support short latency and be highly reliable.

Remote Driving is especially challenging for the radio network when live video data is required. The quality of the video stream from the terminal residing in the vehicle must be very good, e.g. 60 Hz frame update rate yielding 2 Mbps. This may not sound like much, but the acceptable latency of the (frame) packet is in order 3 ms and the probability of successful delivery (reliability) shall exceed 99.999%. The challenge is usually not to provide the service for one vehicle; the challenge is to provide the service for multiple vehicles at the same time and to not consume all resources just for this service. Hence, providing resource efficient services is the real challenge.

Any radio communication system suffers from the fact that the radio channel varies and the true state of the channel at the time of transmission can only be predicted. An often-used predictor of the state at time of transmission (predicted state) is just the same as the last observed state. A more resource efficient way is to predict the probability distribution function of the true state given the last observed state enabling the communication to be adjusted based on this function.

Thesis Description
The aim of this thesis is to further improve the performance of Ericsson's commercial product line, design and evaluate algorithms for adjusting the communication using a probabilistic predictor of the channel state. Evaluations of the proposed methods will be performed in Java-based radio network simulators and the results from those will inspire to further refine the proposed algorithms together with the advisor(s).

Qualifications
This project aims at Master of Science students in mathematics/statistics, computer science, or electrical engineering. Java and Matlab are our primary programming languages for simulation so a background in both is preferred.

Extent
1 student, 30hp

Location
Ericsson AB Mjärdevi, Linköping

Preferred Starting Date
Spring 2021

Contact Persons
Nicklas Johansson
+46 10 715 7145
nicklas.johansson@ericsson.com

Erik Eriksson
+ 46 10 7114137
erik.eriksson@ericsson.com
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Contact Persons
Nicklas Johansson
+46 10 715 7145
nicklas.johansson@ericsson.com

Erik Eriksson
+ 46 10 7114137
erik.eriksson@ericsson.com