Project proposal for MSc thesis within Systems and Control:

**Optimal control of a hybrid electric heavy-duty vehicle for real-driving emission compliance**

![Diagram](image-url)


**Background**

In order to reduce the amount of harmful emissions, Euro VI legislations have been imposed to limit the total amount of emitted hydrocarbons (THC), particulate matter (PM), CO, NOx and NH3 slip of vehicles. The limits are so strict and difficult to fulfill that vehicle manufacturers are introducing several solutions that entail both hardware and software improvements. Some of the hardware improvements include 1) hybridizing the vehicle, by equipping it with a battery and electric machines, 2) including a sophisticated exhaust gas aftertreatment system (EATS) and 3) including a waste recovery system. Some of the software solutions include replacing the existing control architecture with a novel multi-layered model predictive control (MPC) architecture. Such a control solution has been proposed recently for Volvo’s heavy duty applications [1]. This controller has currently being tested with conventional vehicles.

**Problem description**

We are seeking 1-2 students to propose an MPC as in [1], but for a hybrid electric vehicle. The controller is to be implemented within an existing Simulink model of a hybrid electric truck and should ensure that NOx constraints are fulfilled while fuel economy is improved.

**Prerequisites:** Matlab, Simulink. Knowledge in optimal control is meritorious.

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