# Open Thesis (BA, MA)

## State Estimation for Shared Autonomous E-Scooters

**Description:**

Shared micromobility solutions like e-scooters have the potential to serve as a sustainable and convenient response to the increasing number of short-distance commutes. As part of the MobiLab initiative, the IST develops an autonomous e-scooter that allows for optimal redistribution, autonomous charging and flexible demand satisfaction. A crucial requirement for the final application are precise estimates of the system states. The goal of this thesis is to develop an estimator by fusing several sensor measurements, e.g., IMU, encoders, etc. to get a better estimate of the

- roll (leaning) angle of the e-scooter to improve the performance of the stabilizing controller.
- ground slope to improve the driving behavior.

The thesis consists of developing a state estimation concept, implementing it in simulation (and potentially on the hardware), and evaluating the performance of the state estimator.

**Prerequisites:**

- Programming experience, e.g., MATLAB or C is helpful
- Interest in topics related to state estimators and observers

**Supervisor:**

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**Area:**

State Estimation  
Autonomous Vehicles

**Properties:**

- **Type:** BA, MA  
- 20% literature  
- 30% concept development  
- 30% implementation  
- 20% evaluation

**Beginning:**

as soon as possible

More information: [www.ist.uni-stuttgart.de/lehre/bama](http://www.ist.uni-stuttgart.de/lehre/bama)

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