

Assistant (Student)

# Duckietown - Computer Vision Based Measurements for Performance Analyzes

At LIS, we want to use the Duckietown hardware and software ecosystem for experimenting with our reinforcement learning based learning classifier tables (LCTs) as part of the control system of the Duckiebots: <https://www.ce.cit.tum.de/lis/forschung/aktuelle-projekte/duckietown-lab/>

More information on Duckietown can be found on <https://www.duckietown.org/>.

Currently, we are developing the infrastructure for our LCT experiments.

While several students are improving on the autonomous driving abilities of the Duckiebots, this work's goal is to develop a system which provides insights into the bots' driving performance. Therefore, we need objective measurements by a third party which allow us to compare the driving performance (average speed, deviation from optimal line, ...) between bots which might run different SW.

To compare specific scenarios, these measurements shouldn't only be a time series, but be enhanced by the position of the respective bot at this point in time. Similar to the modern sports apps:

<https://www.outdooractive.com/de/route/wanderung/tegernsee-schliersee/auf-dem-prinzenweg-vom-sch>

Towards this goal it's required to develop a camera-based mechanism, which identifies bots in the field, extracts their concrete position and calculates certain metrics like direction, velocity, on / off lane, spinning, deviation from ideal line, ....

This data then should be logged to be analyzed + visualized later.

Depending on the type of work (BA/FP vs MA) this work might include to enhance these measurements with internal data of the bots to compare internal and external perception, and to develop tools for easy analysis.

## Prerequisites

- independent work style
- problem solving skills
- computer vision knowledge (openCV)
- programming skills (we are open which framework is used - Python, C++ (Qt), Matlab, ...)
- Linux basics (permissions)

## Contact

flo.maurer@tum.de

## Advisors

Florian Maurer