# Thesis / Diploma outline

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| **Supervisor:** | **Gergely Gyebrószki**, *research assistant*, gyebro@mm.bme.hu |
| **Cím:** | **Control and parameter estimation problems of autonomous transport robots** |
| Recommended level: | MSc Final project ( 2 semesters ) |
| Languages: | English, Hungarian |

## DESCRIPTION

Introduction: The importance of automatization is continuously increasing nowadays and the field of application of autonomous robots grows wider and wider. Within the final project, some control and parameter estimation problems – suitable for the student's skills and field of interest – related to autonomous transport robots should be selected and solved.

Tasks:

1. Overview of literature on the design challenges of autonomous transport robots.
2. Mechanical modelling of a selected configuration, setting up simulation.
3. Possible control / parameter-estimation problems:
    a. Balancing
    b. Estimate the mass of the carried package / estimating the position of the new centre of gravity
    c. Optimization for energy consumption on a given path
    d. Preventing wheel-slip or tip-over
4. Building the selected robot configuration and carrying out measurements

*Fig. 1. Transwheel transport drone concept*


*Fig. 2. OTTO-100 warehouse robot*

Acquirable skills:

- Simulation of nonlinear mechanical systems (Matlab, Mathematica, Robot OS)
- Using filters capable of parameter estimation (eg.: Kálmán-filter)
- Applying learning and optimization algorithms
- Building a microcontroller-driven robot
- Getting familiar with various sensors
- Programming microcontrollers in C/C++