

MASTER THESIS

Simultaneous state and disturbance estimation of a refrigerated vehicle: Design, implementation, and experimental evaluation

Refrigerated transport by road accounts for a significant proportion of global greenhouse gas emissions. Therefore, much is being done to increase the energy efficiency of refrigerated vehicles and their cooling units. Model-based control methods promise to meet these goals and are relatively inexpensive to implement compared to other measures. However, implementing such controllers in practice often fails due to unavailable measurements and unknown disturbances acting on the system. Therefore, an observer estimating simultaneously the system states and disturbances should be developed in this work. This observer can then be tested on a self-built test bench for experimental evaluation (see Fig. 1).

If you are interested in control systems and experimental investigations, this work is the right choice. You will learn advanced methods of control engineering and how to apply them to real-world systems.

Feel free to contact us if you are interested in this topic. You will benefit from a detailed specification sheet, ensuring a reasonable workload right away from the beginning. We will prepare it together to fit your interests and skills perfectly.



Figure 1: Refrigeration test bed with (a) cooling chamber, (b) inside view of the cooling chamber, and (c,d) cooling units.

Tasks:

- Literature research on simultaneous state and disturbance estimation methods for linear and nonlinear systems
- Observer design and implementation in Matlab simulations
- Implementing the observer on the test bench (Expanding the already existing software of the test bed)
- Evaluating the observer in experiments

Previous knowledge:

- Solid background in control theory
- Experience with Matlab/Simulink
- Knowledge of predictive control techniques is advantageous

Language:

English or German

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