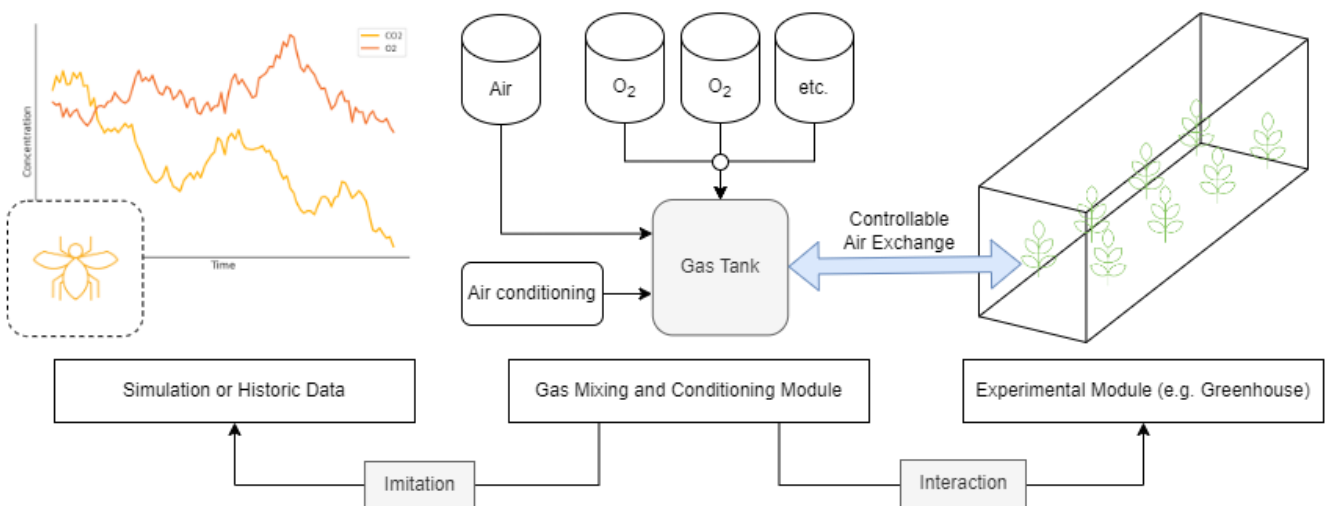


Master / Bachelor / Research Project *

Development of a Gas Mixing and Conditioning Module to Dynamically Imitate Indoor Air Composition in CEA units

Controlled-environment agriculture (CEA) is becoming increasingly important as a part of the global food chain. It can significantly contribute to a more sustainable and resilient food production by optimizing growing conditions and controlling energy and mass flows, while also reducing the need for pesticides. Plants, insects, mushrooms and more are grown in enclosed modules, where the growing conditions can be optimally controlled. This additional degree of freedom compared to traditional agriculture enables more elaborate production and control strategies. For example, when coupling insect and plant production, CO₂ emitted by insects could be beneficial in plant cultivation. As the CO₂ output is not constant but instead changes dynamically, suitable controllers need to be developed and tested in experiments to realize such concepts.

However, biological experiments are complex and time consuming. In order to test advanced control algorithms step by step, in this project a gas mixing and conditioning module should be developed which can be used to replace one side of a coupled production system by following expected behavior from simulation or historic data. Depending on the student's preferences, the conceptualization phase can be followed by simulations and controller design or design and construction of an experimental unit. The task description will be developed collaboratively after an initial discussion.



Requirements: Background in Control Engineering, Embedded Systems, Mechatronics or similar
Start: as soon as possible

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What to expect: During your research you can expect close guidance, while also maintaining freedom in how you approach the tasks. Through intermediate presentations you can prepare for your final defense and gather feedback from multiple team members throughout your project. The thesis can be written and supervised both in English or German, if your study regulations allow.

* Depending on your background and interests, the task can be adapted to fit master, bachelor or research project.