

Master Thesis

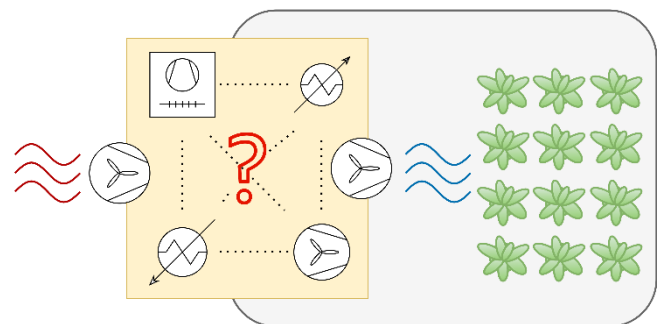
Design of a Controllable HVAC System for Growth Boxes

Controlled-environment agriculture (CEA) 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. In the research around CEA, growth boxes help to characterize how biomass (plants, insects, mushrooms) develops under well observable conditions. Due to their small scale, the conditions can be accurately controlled through actuators like LEDs, water pumps and the heating, ventilation and air conditioning (HVAC) system.

In this thesis a new, controllable HVAC system is to be developed and integrated into an already existing growth box. It must not only bear the thermal load but must also function under persistently humid conditions as evaporation from biomass causes a consistently high level of humidity. The outcome of this thesis will facilitate further important research in the field and will have a real scientific impact.

Task description

- Literature research on HVAC systems for biological trials in growth boxes,
- Analysis of problems with previous designs
- Estimation of operating loads & conceptualization
- Mechanical design, dimensioning & selection of components
- Assembly and testing of functionality



Requirements: Student of “Nachhaltige Energieversorgungstechnik”, Mechanical Engineering or similar; firm knowledge of thermo-dynamical calculations

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.