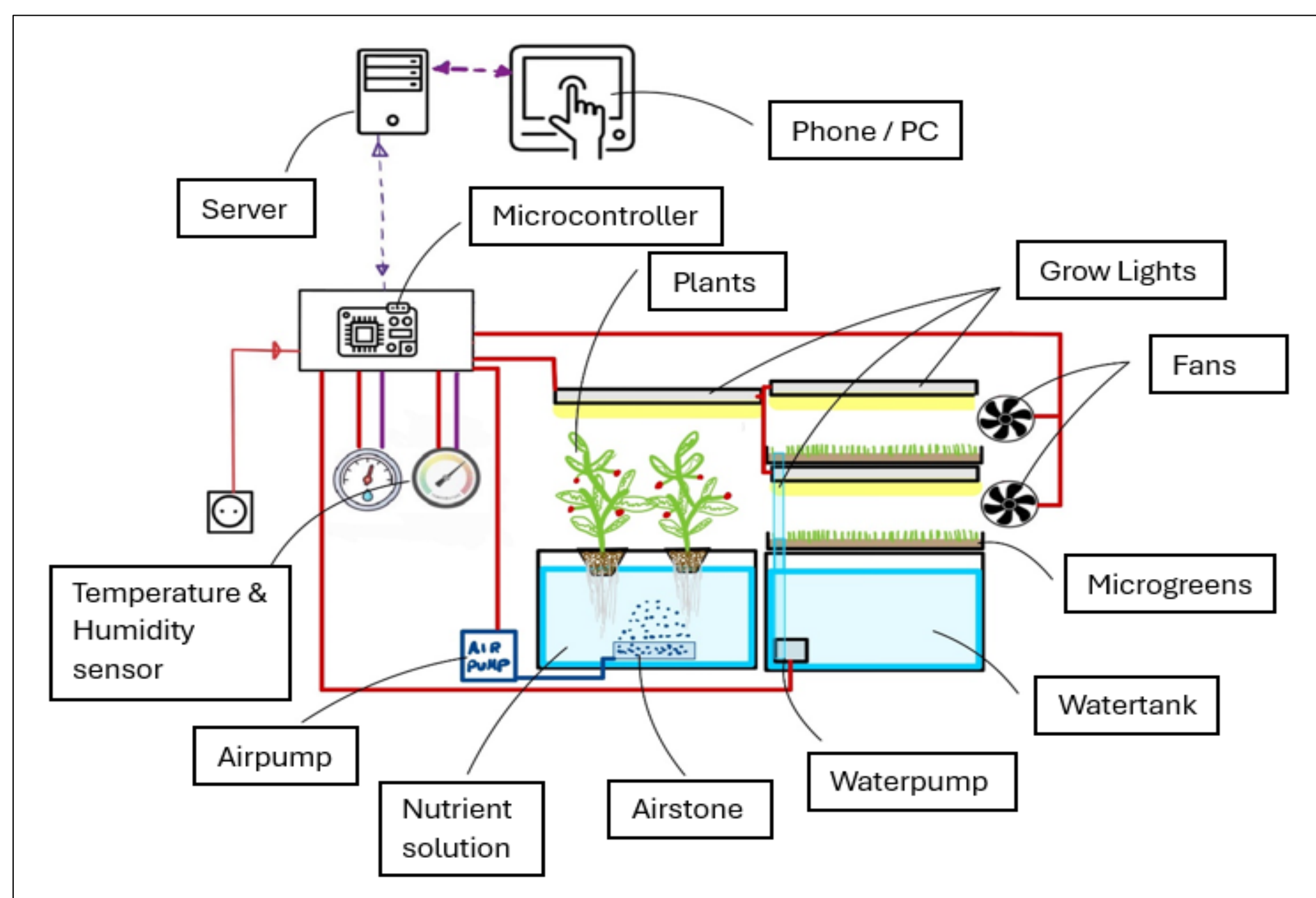
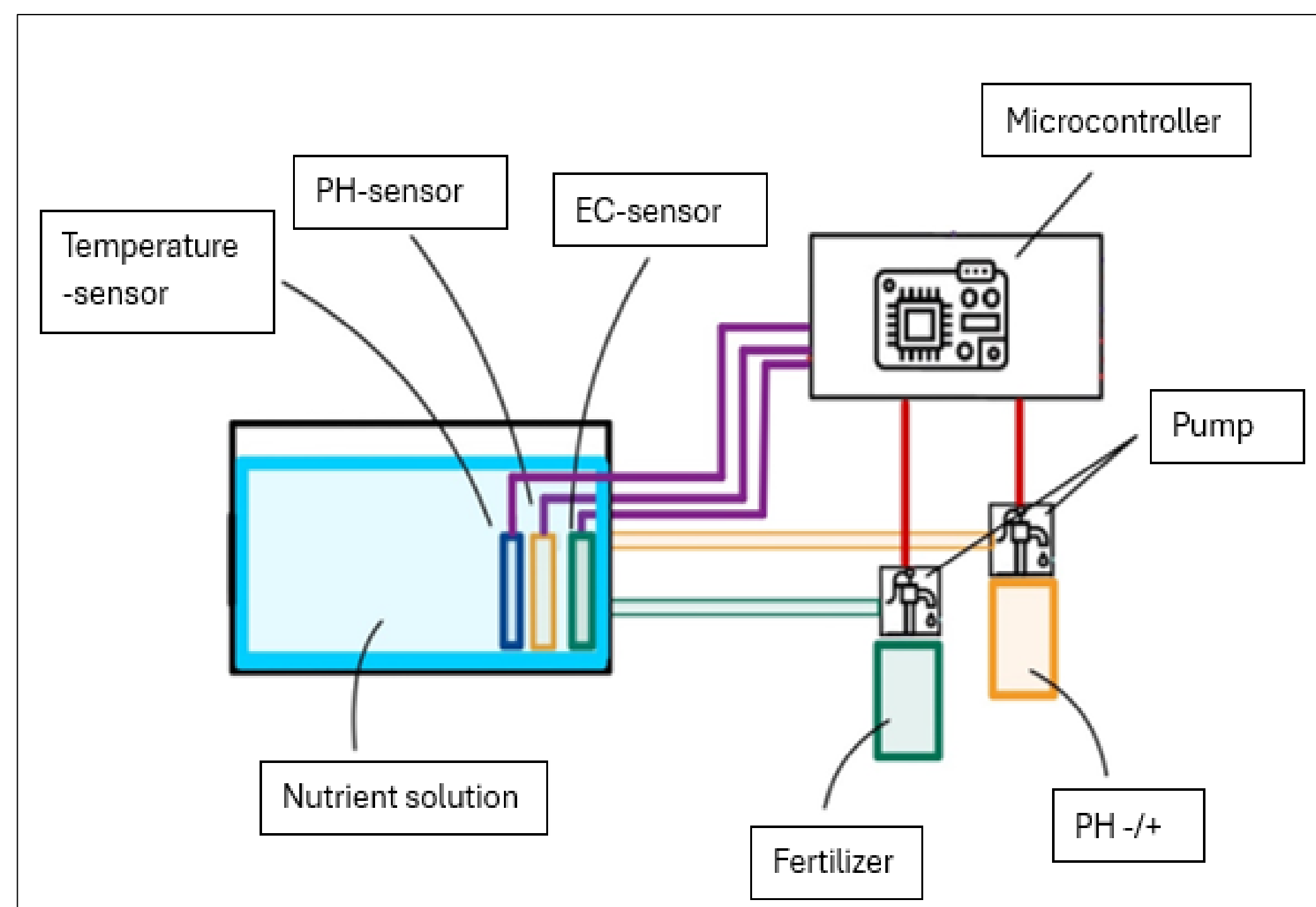


## Master-Thesis Business Engineering

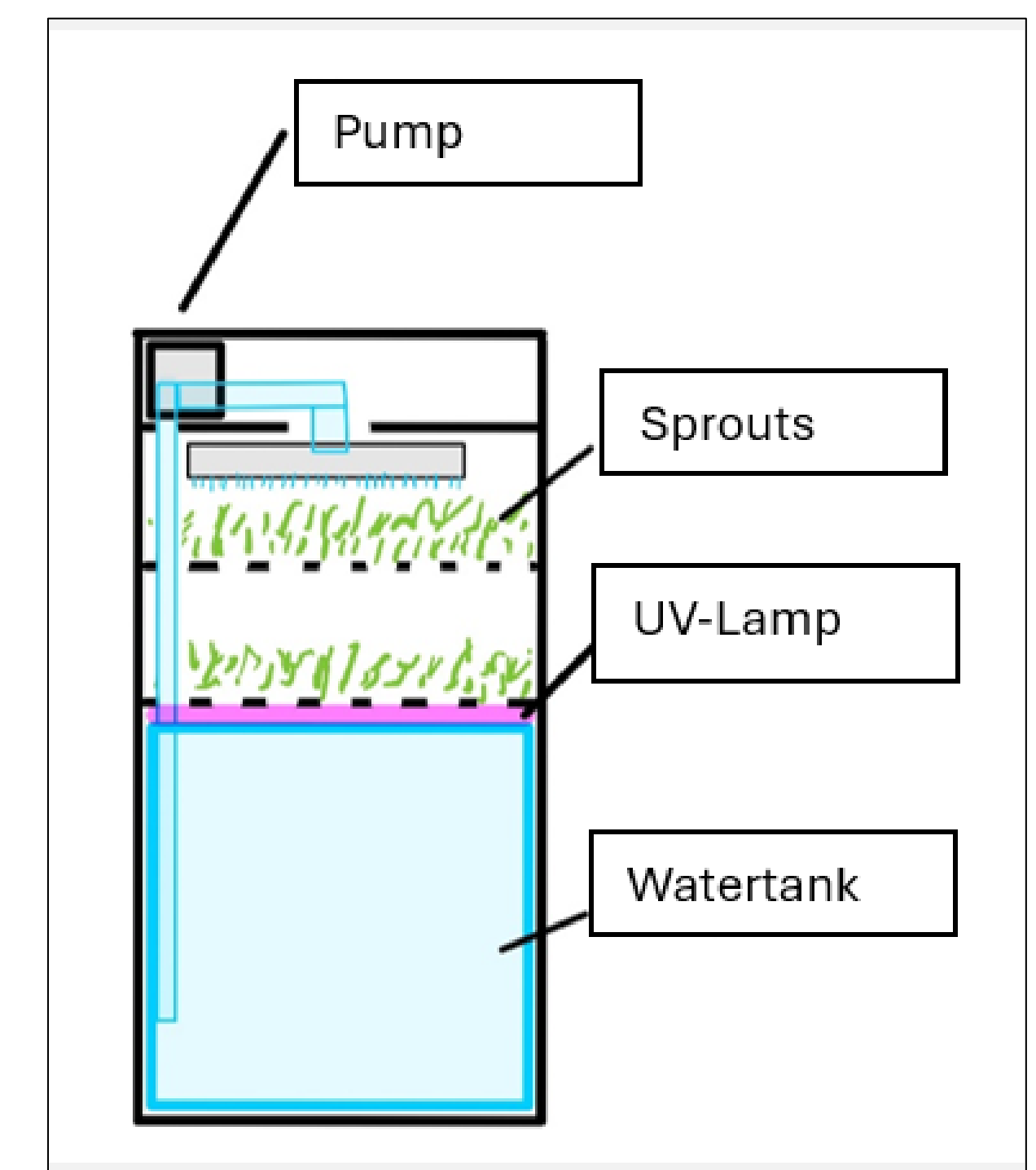
# Plantsitter: Development of a modular smart hydroponic system



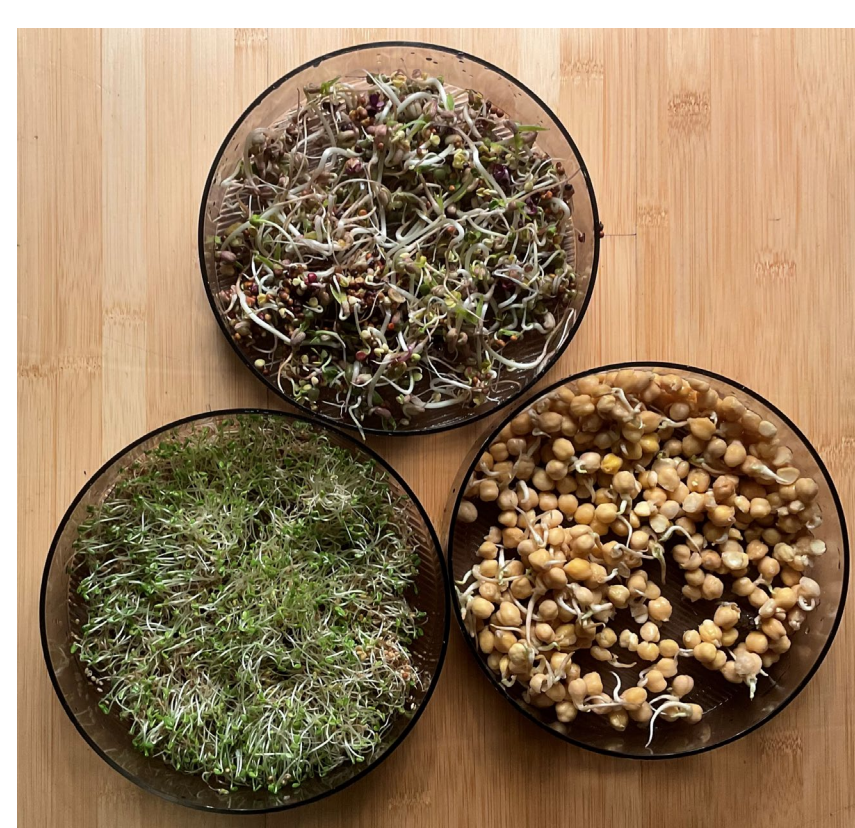
Basic Module



Nutrient Module



Sprout Module



Sprouts



Nutrient Bottles



Developed Proof of Concept



Lettuce



### Problem Description

With the increased interest in a healthier lifestyle and a pleasant, green living environment, more and more people are becoming interested in growing vegetables and herbs in their own homes, a phenomenon known as indoor gardening. However, this type of gardening requires a certain amount of expertise in handling plants, and regular maintenance can be a time commitment that many people are unable or unwilling to make. For this reason, automated planting systems are becoming increasingly popular.

The aim of this project is to develop a modular hydroponic system for the cultivation of edible plants in different growth stages. These include sprouts, microgreens and fully grown plants such as lettuce, herbs, tomatoes, chillies and strawberries. The system is also intended to be integrated into a smart home system. A proof of concept (PoC) created in a previous project for the cultivation of microgreens is used as a basis and developed further.

### Solution Concept

A market analysis and a survey (standardised online questionnaire) are used to analyse favourable market developments and identify customer requirements. Product requirements are derived from this, and it is analysed how the existing PoC needs to be expanded in order to meet the new requirements. New modules are then built and tested for their functionality.

### Results

The device is modular in size and function and can therefore be customised to personal requirements and integrated into existing living environments. The base module (formerly the control unit of the old PoC) is now suitable for growing not only microgreens, but also enables the cultivation of plants such as herbs, lettuce, chillies, strawberries and many more in a deep-water-culture hydroponic system. The temperature and humidity are measured and the plants are automatically provided with light and water. Air circulation fans prevent mould and rot and promote stable stem growth in the plants.

An extension module, which is connected to the basic module, also makes it possible to grow sprouts automatically. This is a unique selling point and sets it apart from other products available on the market. An independent module for automatic monitoring and control of pH value and nutrient content has also been built. User comfort and ease of use are the main focus. It is operated via smartphone or PC.

Growth tests were carried out and showed that the cultivation of microgreens and plants in the hydroponic system works. Only the cultivation of sprouts requires further adjustments, as they tend to rot.

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