



# Garden Fairy

Deniz Gulbaharli, Ivy Reisner, Ishaan Sareen, Mina Freeman

Integrated Engineering - University of British Columbia



## Background

Automatic home gardening solutions in the market currently consist of luxurious hydroponic greenhouses or single plant pots that only take care of watering or lighting plants. These solutions are often too expensive, very small, and usually, only work for herbs or greens that do not produce enough for regular consumption.

## Objective

This project aims to create an automated smart garden with an easy-to-use comprehensive user interface and modular components that allow gardeners to customize a solution and increase their harvest. This product differs from existing solutions as it provides responsive automation of multiple gardening processes such as irrigation, lighting, and fertilization. Additionally, it allows users to monitor various important factors of their garden that determine the plant's health.

## Electrical System

Garden Fairy's sensor system measures soil nutrients, soil and ambient humidity and temperature and light levels. This data drives an environmental management system that includes irrigation, fertilization and lighting systems.

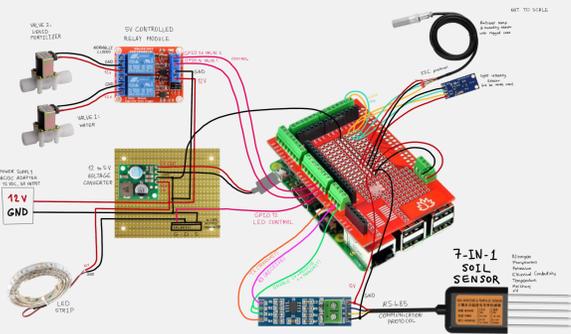


Fig 1: Circuit Diagram

## Future Development

- Complete Mobile App Development (iOS and Android)
- Test and adapt planter shape and irrigation system for even soil hydration and fertilisation
- Long term testing to determine system impact on plant success



Fig 2 : CAD Models

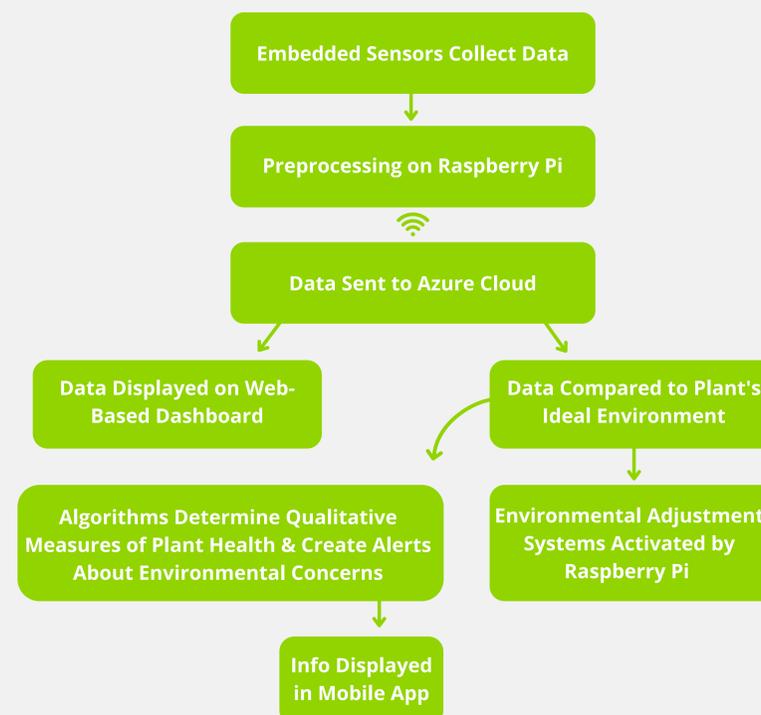


Fig 3: Process Diagram

## Software System

Data collected by the sensors is later sent to Azure Cloud Services for data processing and analytics. (see figure 4). Analyzed data is broadcast to a mobile app and a web app.

The user can interact with the system either through a web app that displays more detailed data with less processing or through a mobile app that provides alerts and qualitative descriptions about the plant's health and progress.

Additionally, to ensure that Garden Fairy is creating the right growth environment, the user inputs the type of plant they have chosen to grow into the mobile application, and the software selects target conditions accordingly

Fig 4: Software System Overview



Figure 5: Mobile App



Figure 6: Dashboard Mock-up

## Mechanical System

Garden Fairy's double walled planter design (Fig 2) conceals the electronic system (including sensors), the irrigation system, a fertilizer reservoir, and internal drainage tray. This design not only protects the components from water ingress during outdoor use, but creates a clean, modern look. For the prototype, the inner planter and drainage tray are made from Fibreglass (allowing for a curved shape) and the outer enclosure is sheet metal. This prototype will provide a basis for testing to improve the irrigation system, water flow through substrate and plant outcomes.

Supplementary lighting is provided by an LED light bar and water for irrigation can be provided by a hose or a separate reservoir.