

AquaRoute



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Product Design

BSc (Hons)

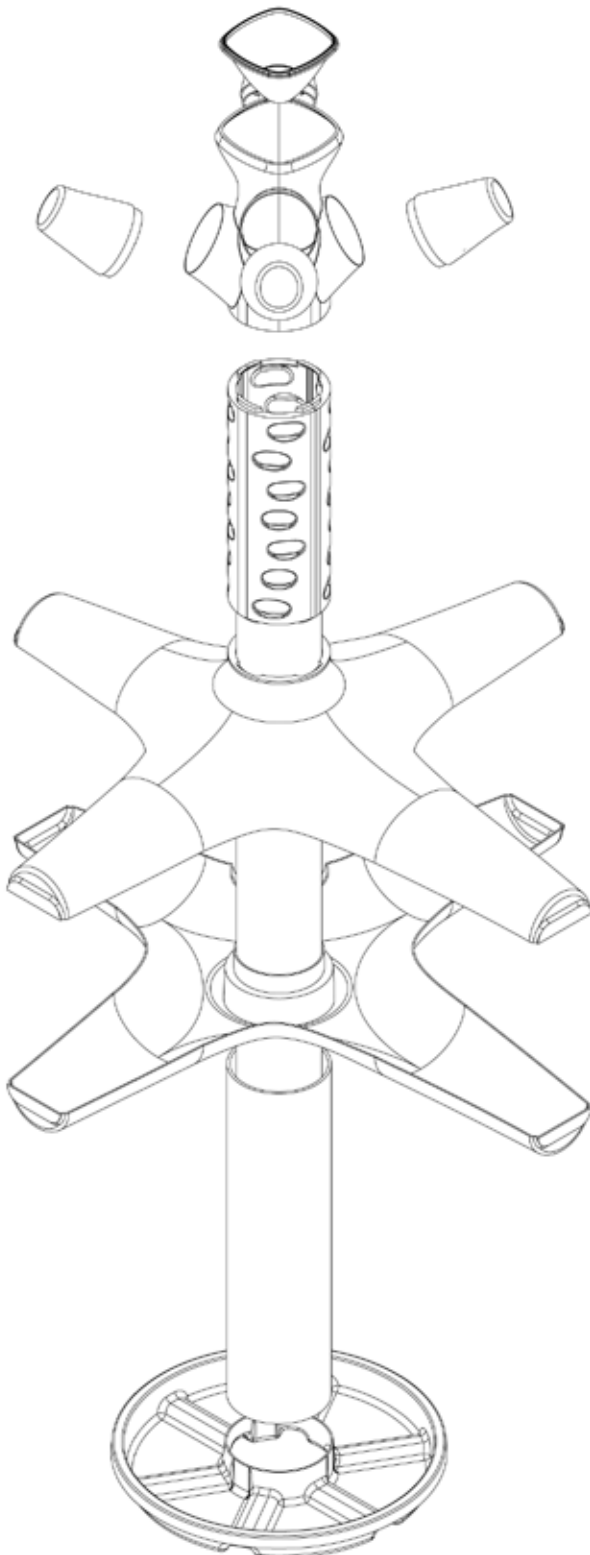


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Overview

An increasing number of middle earners are gaining an interest in eating less meat and more vegetables. A study by Counterpoint highlights the growth of veganism and food awareness across Europe. There is an increased desire for nutrient rich fresh food and home-grown produce. 'AquaRoute' has been designed to assist in tending to a vegetable patch in a moderately sized garden, by providing water directly to the roots of plants and monitoring soil moisture. By irrigating directly to the root, 'AquaRoute' uses significantly less water than drip irrigation or sprinkler systems.



Rain catcher measures the rainfall in the growing patch.

Light cones aluminate to indicate the condition of the section; green for healthy, pulsing red for error or dry soil.

Head can be extended to raise above the plants growing around it with additional sections of casework fixed around the PVC poll.

The base holds the control system and dictates where the water is routed to to ensure it is used to is maxim efficiency.

The base sits on top of the surrounding soil and gives the product stability

The ground anchor is buried into the soil and impedes theft of the product, contains the retracted extending poll and gives the structure added stability when the grow lights are fixed into place.

Research



Getting out and talking to growers to understand what they grow how and why.

This informed further desk research feed in to the concept generation and refinement process

Many discussed the importance of good watering but faced challenges about ensuring the ground remained watered well through the year.

Little technology was utilized with mostly basic techniques to monitor the plants and aid their growth.

Home Growing

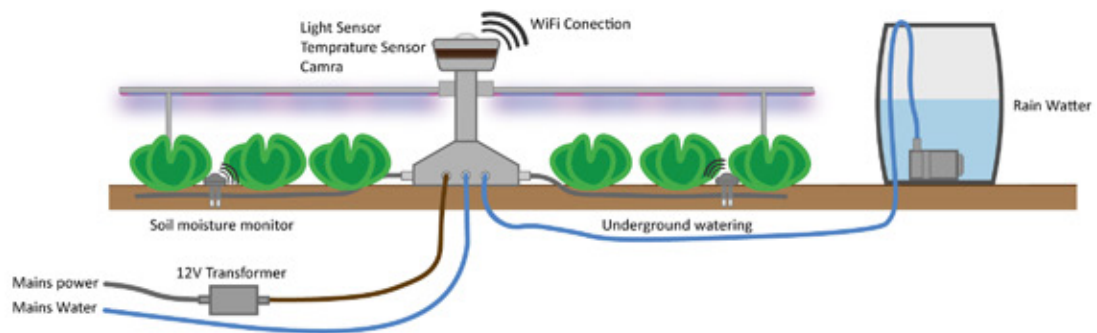
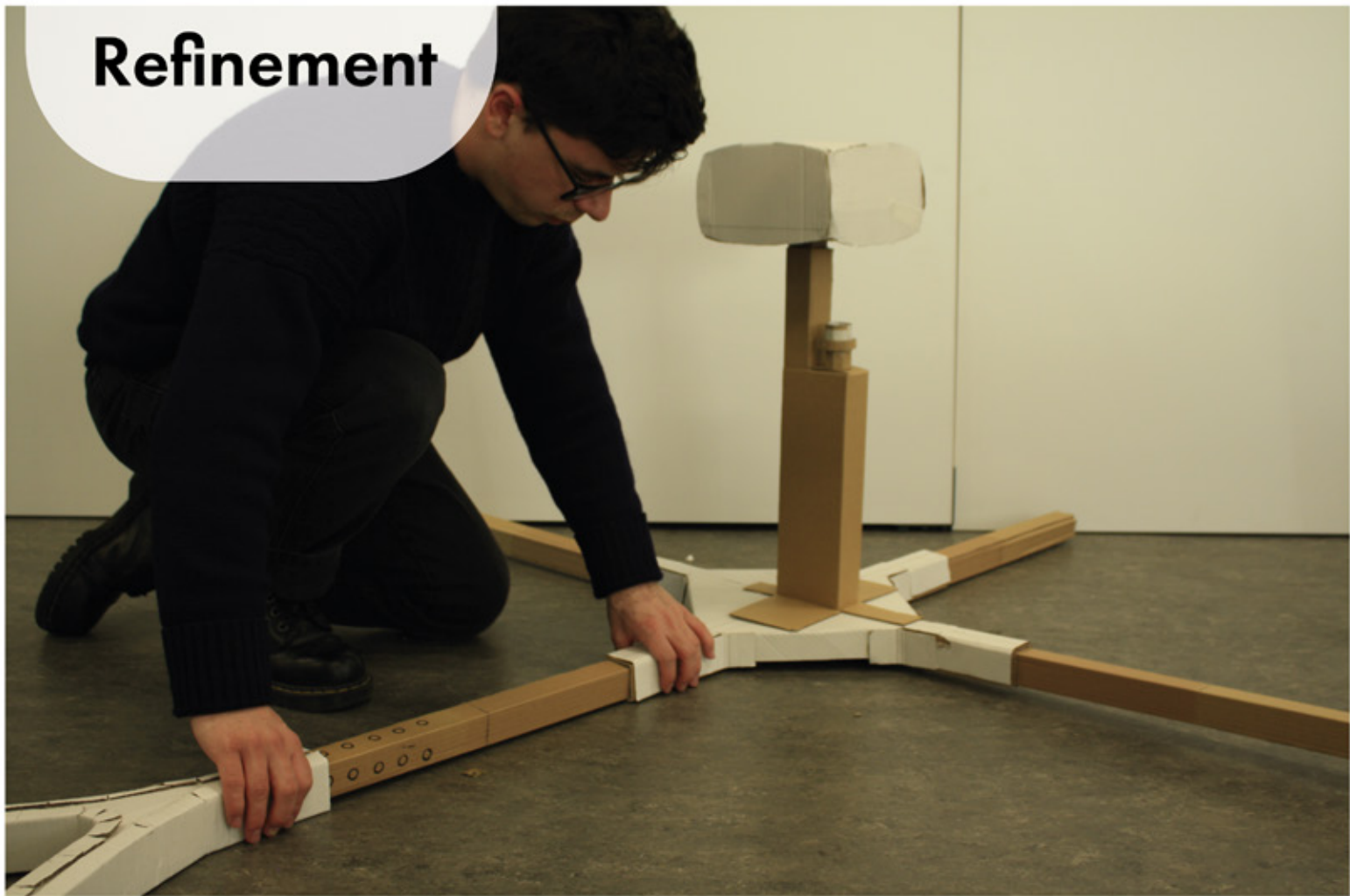
Rising interest in home growing with high waiting lists for allotments.



Vegan

Veganism is part of a general rise in food awareness in the UK meaning an increased number of people are looking to a plant based diet for all of the nutrients as part of this they are wanting fresh nutritious vegetables in large quantities.

Refinement

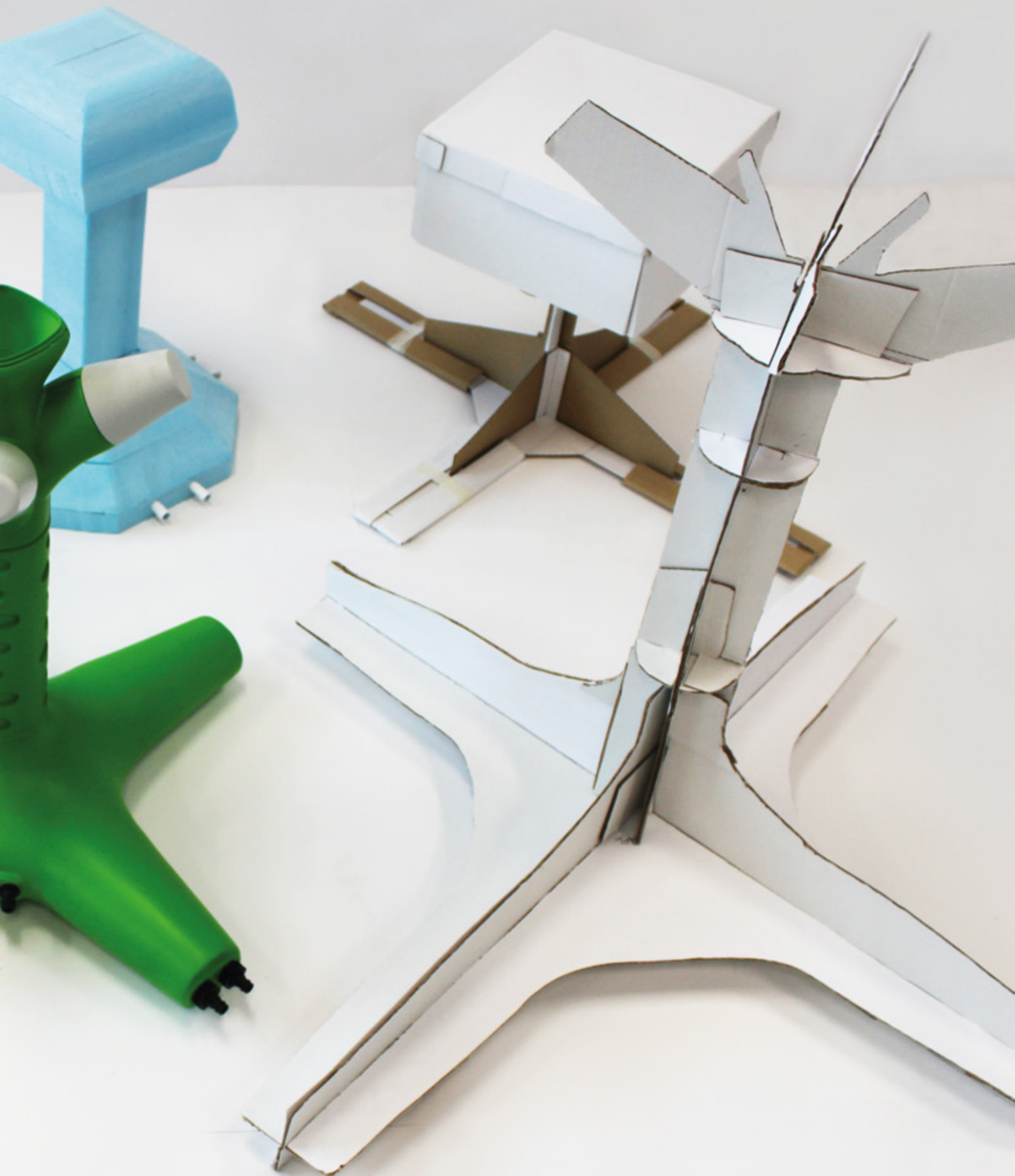


The concept developed along three key topics with two being chosen to progress; one was a smart hub and the other a home composter. Preliminary testing was undertaken to evaluate which concept would be better to take forward for development. The composting testing proved that this was not a preferred direction.

Development



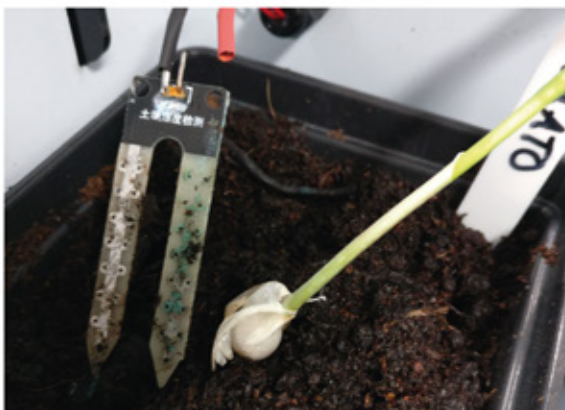
The development process of the product ran in parallel to the testing process there where five key designs for the product that were explored with the file from being reduced in scale until it was comfortable to use and interact with.



Cardboard and foam were used throughout with a majority of the models being made life size with features explored around expandability and function with each. The details around the form were completed with CAD in order to get the required detail.

Joint Testing

The importance of reminders testing was undertaken as a joint project as in conjunction with James Wright who was undertaking a similar project. The test rigs went out to a variety of homes and record the user's ability to tend to their given plants. Half of the rigs have a reminder system that will flash an LED and a small buzzer when the plants need watering and the other half do not. Both have an SD card inbuilt that the performance of the individual is recorded for later review.

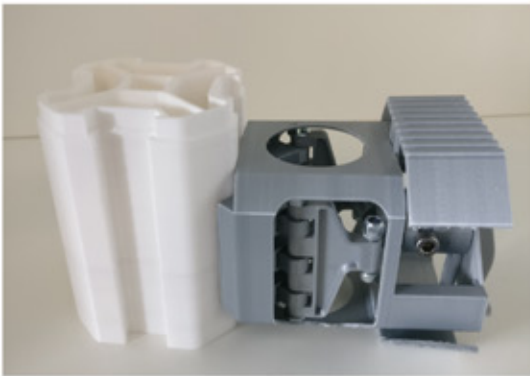


The Importance of reminders

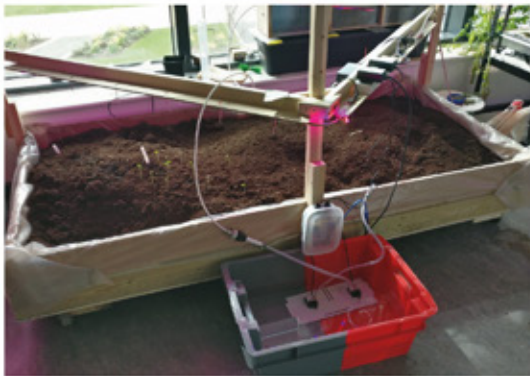
The result proved that the reminders were effective although problems around them becoming annoying were prevalent.

The soil probes used experienced electrolysis which meant that many of the results were affected although despite this data could be extracted. Much of the experience gained from these test rigs fed directly into the design process for [AquaRoute](#)

Testing



As the project developed multiple segments of the design were printed and exploded including the method of with the water would enter the soil. To this means two test rigs were built, the first worked to establish the optimum depth for laying the cable and the second was a full size working rig which behaved as a half of the product meaning it would water the ground as and when it was needed with aid of a computer control.



Underground irrigation testing



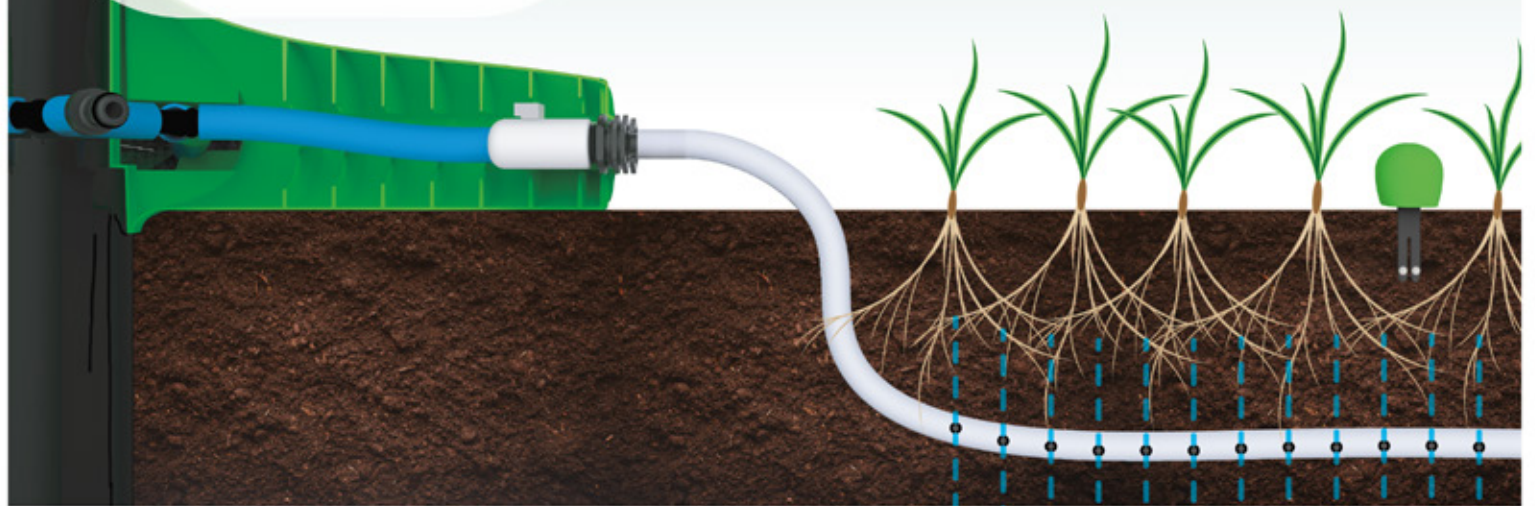
The testing established that the concept was feasible and possible reinforcing further work and development.

Prototype Making



Vac-forming
3D printing
CNC routing
Spray

Final solution



Soil probes measure the electronic resistance of the soil and talk to the main hub over (BLE) Bluetooth Low Energy. The soil probes possess one coin cell battery each which will last a whole year. The information is then used to determine where the water is routed to in the growing area.



PREPARATION
Ground dug over ready for crops

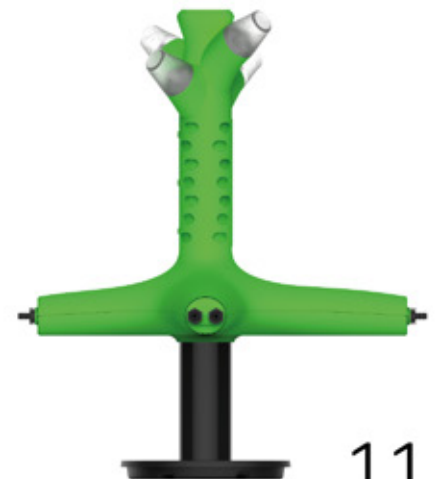
POSITIONING
Land anchor is buried into the ground

CONNECTION
Power and water attach to the base

IRRIGATION
Irrigation pipes are dug into soil

AQUAROUTE
Irrigation pipes connected to product

GERMINATION
Seeds sewn around base for growing



The design has scope for up to eight watering pipes meaning it can be expanded for growing areas from two metres to sixteen across.

Market positioning

The product has been designed to be accommodated into a medium size garden and importantly stand out. This makes it appealing to new growers from the younger generation that are more technologically aware and expected of technology in there day to day lives.

Who are thought would be interested in a show of type product that would illuminate there growing area and aid in the growing process as this would change some of the existing stigma

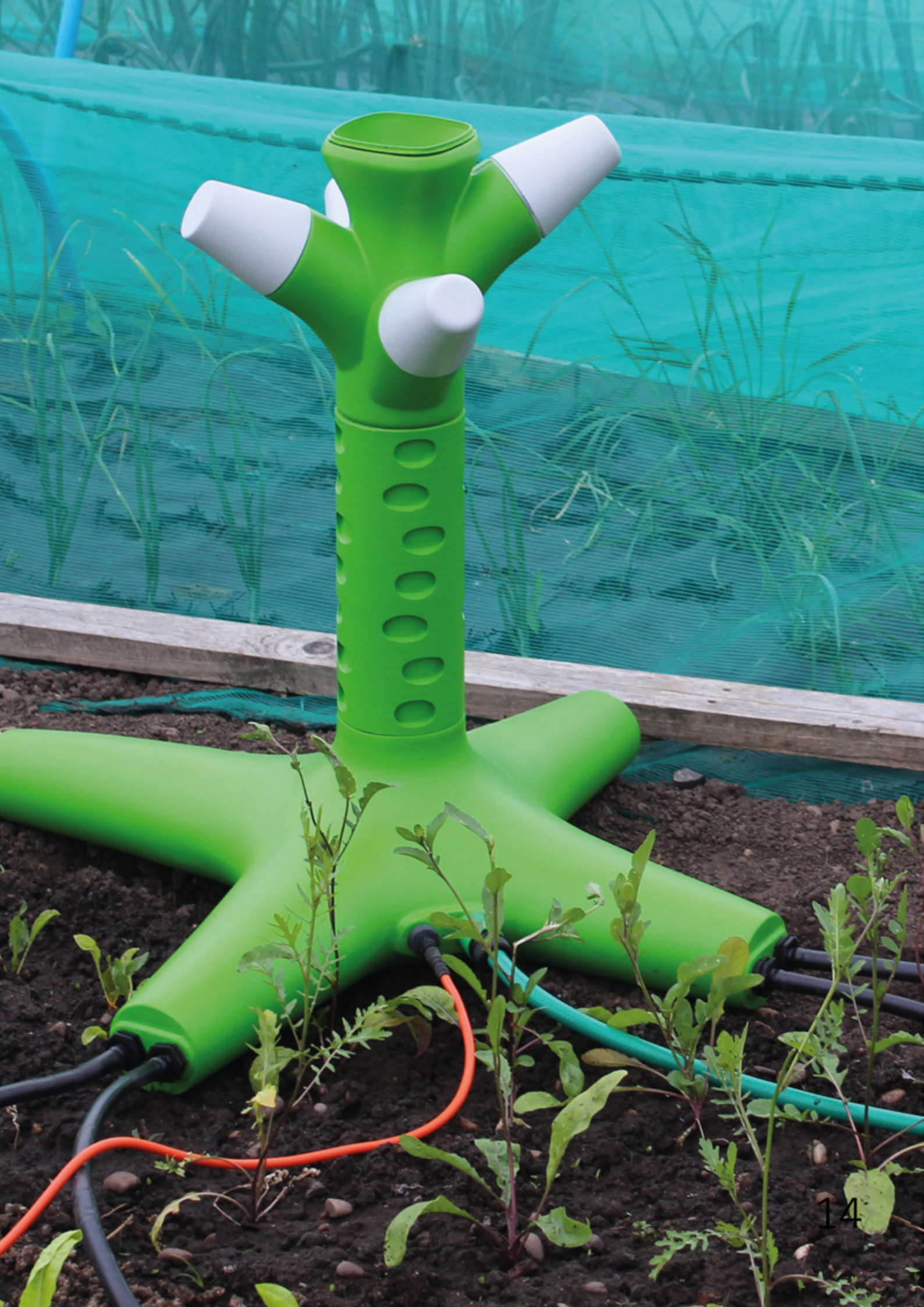


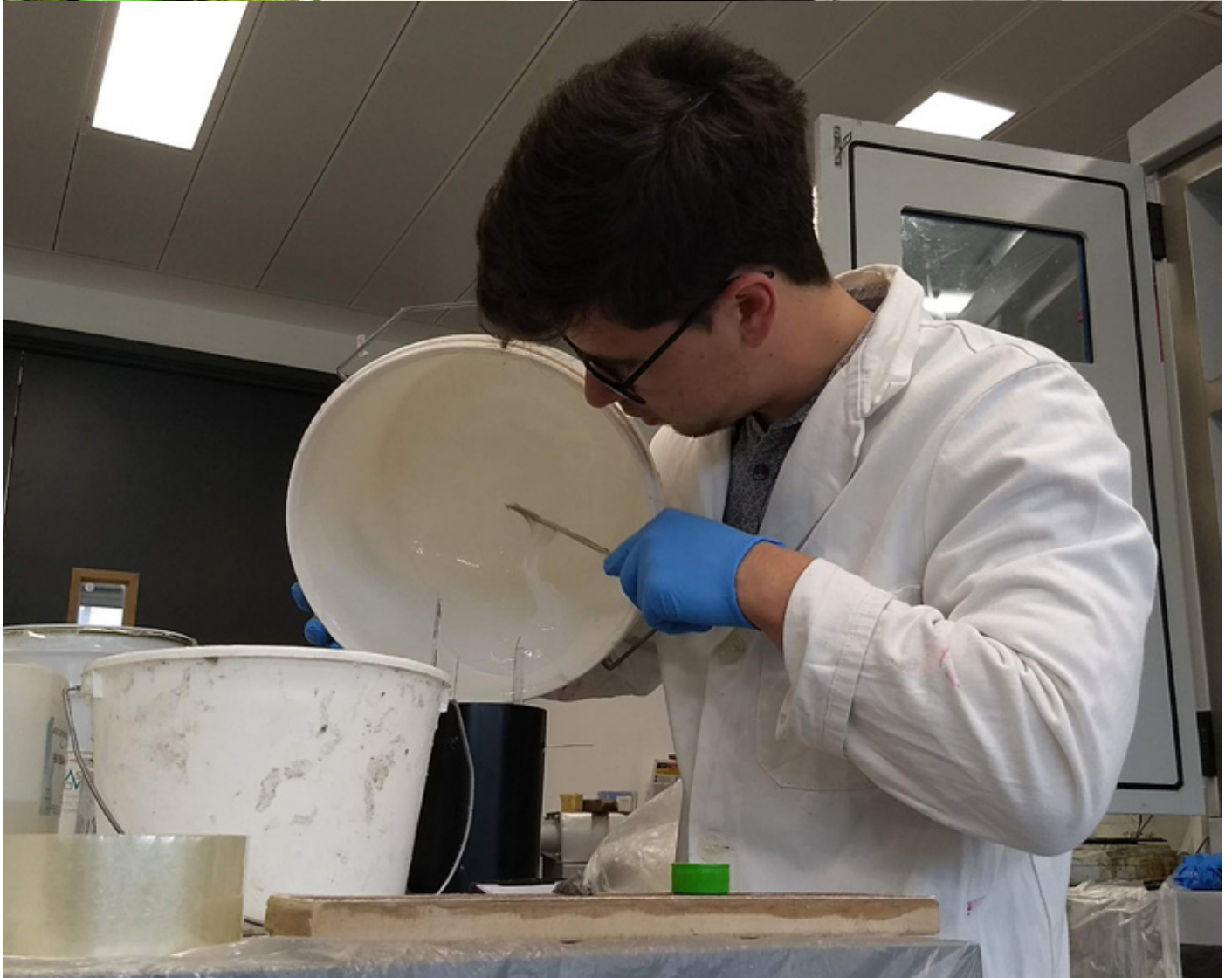
around “growing your own” and turn it into a hobby that the user would be proud and keen to talk about.

The rising number of food aware individuals from the millennial age are really aporching an age where they would wish to teach their children about growing plants and this product is designed to accentuate this to make the process easier and more appealing.

Aquaroute has great green credentials as it aids to reduce food miles, is highly power efficient and uses a fraction of the water consumption of conventional spray methods for irrigation.







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