aeroponics

Toolkit

Biotopia Eat Festival 2019

We're starting the story off from seed, to leaf. However, this is not the conventional sprouting seed which will develop into something tasty, not yet. This starts with our epoch of evolution - a celebration of everything we have done, let's say. If we had not made all of our actions in the past which have led to irreversible changes, we would not be standing on the feet we are right now. We could speculate about whether we're going to be killed by nuclear war, climate change, or through following Trump's greasy dietary habits. However, we're picking the shoes which are seeking for new potential and opportunity in the rather-close 'future' boom of immersive technologies. We're also looking for the design world which takes responsibility for actions.

content

Description

Our ancestry has taught us to be foragers, hunter-gatherers, farmers and consumers. What is next for our generation in munching, nibbling and tasting?

This is aeroponics, a rather alien looking system which provides the same ingredients we buy plastic-wrapped from a supermarket shelf. Yet this is not plastic-wrapped, it contains a lot more nutrients and is a heck of a lot tastier. Aeroponics systems are a step away from the immediacy of the supermarket shelf. Aeroponics is a hybrid combination of old methodologies with modern technology.

We're on a mission to re-learn our love for real food, and share this with others along the way. Everyone has a right to education, therefore why do we not have the right to knowledge about what we are consuming every day? An aeroponics system can be placed in a school, university, or home. The future of food relies on a return to our roots and a little imagination. Aeroponics offers the opportunity to implement impactful change through the basic communication of food. Introduction of aeroponic systems into our everyday lives disturbs our eating routines and rhythms, questioning and inviting the user to grow, experiment and taste. We believe it's going to change the future of food, we invite you on the journey.

This will be an installation of an aeroponics system, offering interactive activities each day which cover the topics which we feel are most important regarding future food production. The activities will be accessible for all ages - the little ones to the elderly. Each day will address alternative food systems. The exercises and installation are aimed at probing the public's knowledge around the potential of food production, hoping they will leave with a greater awareness of the possible implementation of systems such as aeroponics, its health and ecosystemic benefits and motivation to start experimenting with new growing techniques.

Skills

If you are electronic-minded, there are some very cool things that can be done with aeroponics: either ask us in the exhibition, or if you're reading this at home, check out the recommended manuals! If you're green-fingered, then you're reading the right booklet. If you've had no experience with plants, fear not. Plants in aeroponics usually let you know if they're sad: their leaves droop, they look dry, their roots are not white or even they have discoloration of the leaves. This may mean they need watering, nutrients, more or less light. This is learnt through experiementation - each plant needs different hours of light and water.

Stuff

For the specific parts and components, check the bill of materials on the next page. First of all you'll need space, the system components and electronics and also some seeds.

Space

We recommend aeroponics to be the size we have made it, if you want something smaller, we'd recommend looking into a hydroponics or aqauponics system. Aeroponics generally can be grown in many spaces - especially spaces which are considered obsolete at the moment.

Bill of materials

High pressure water system

01	**Reverse osmosis tubing (ROT)**
02	**Quick connection fittings**
03	**Filter**
04	**Booster pump**
05	**Booster pump power transformer**
06	**Pressure accumulator**
07	**Pressure sensor/ switch**
08	**Solenoid valve**
09	**Mister nozzles**

Grow unit

01	**Grow light**
02	**Grow box: tub, box, commodity tray + lid**
03	**Mister nozzle constellation**

Communication/ control

01	**Raspberry Pi communication, control and sequencing**
02	**HP electrical solenoid communication/ control with Arduino**
03	**Grow light electric solenoid communication/ control with Arduino+relay module**
04	**HP pump pressure regulation communication/ control with Arduino+relay module**
05	**Pressure sensor with Arduino**

Media/ water reservoir

01	**Reservoir**
02	**Pure or carbonate corrected water**
03	**Nutrient solutions**
04	**pH down**
05	**pH up**
06	**pH monitoring**
07	**Electrical conductivity (EC) monitoring**

Plant supplies

01	**Seeds**
02	**Substrate (rockwool)**
03	**Netpots**

BUILD

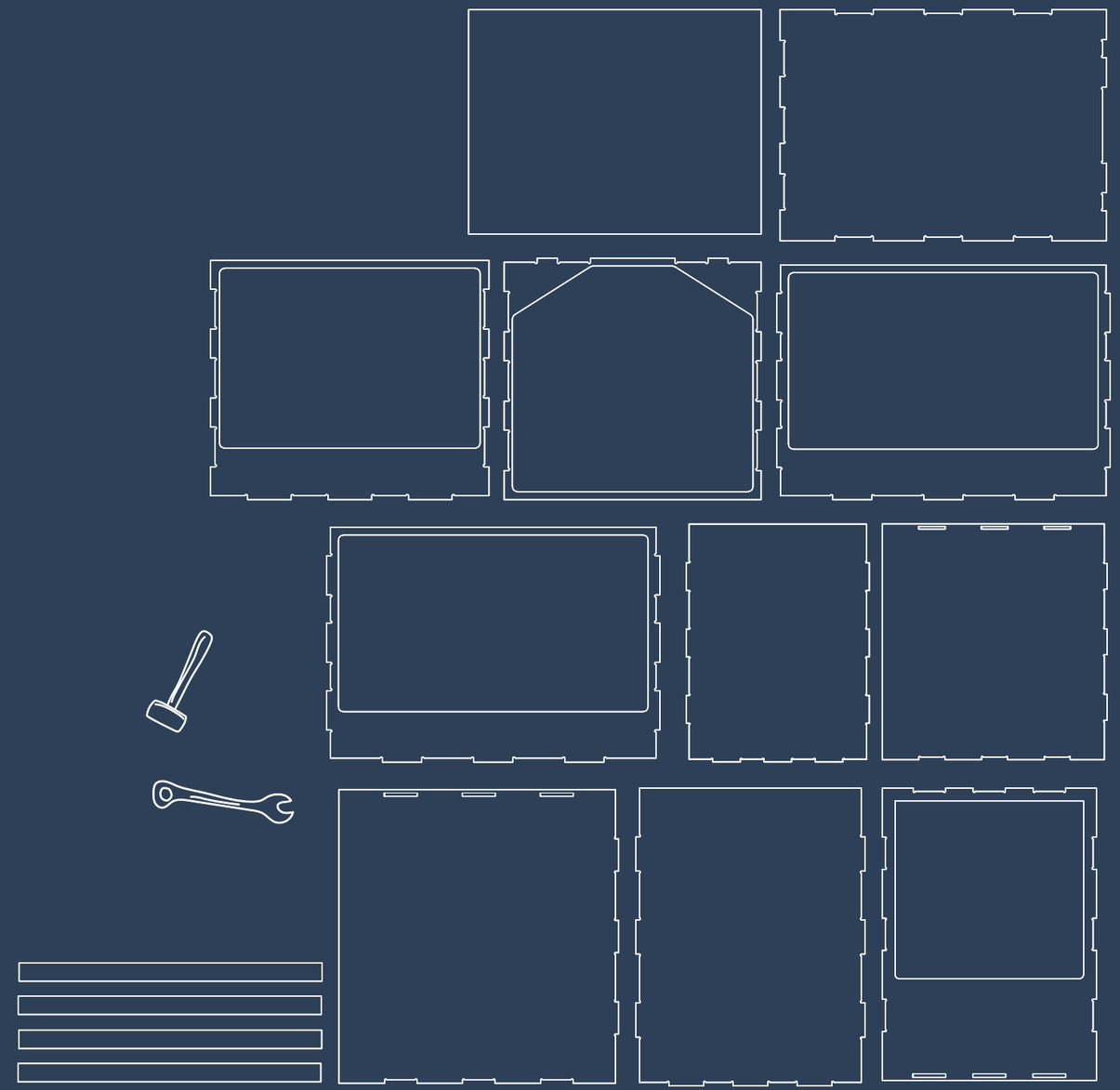
This will describe how to make the version which we have displayed today. There are bigger and more industrial versions of aeroponics which can be built.

For the electronics, follow the growstack guide (QR code) as we unfortunately do not have enough space in this booklet to write it all down!

To assemble the maker-ponics, ensure you have all the system components (QR code below). We created a wooden structure which would enclose the aeroponics for aesthetic purposes, you can also develop your own structure - we encourage this!

Building aeroponics systems requires patience as there are often problems that have to be troubleshooted, but have patience - you will soon have beautiful leafy greens growing before you know it!

Wikifactory open-source maker aeroponics

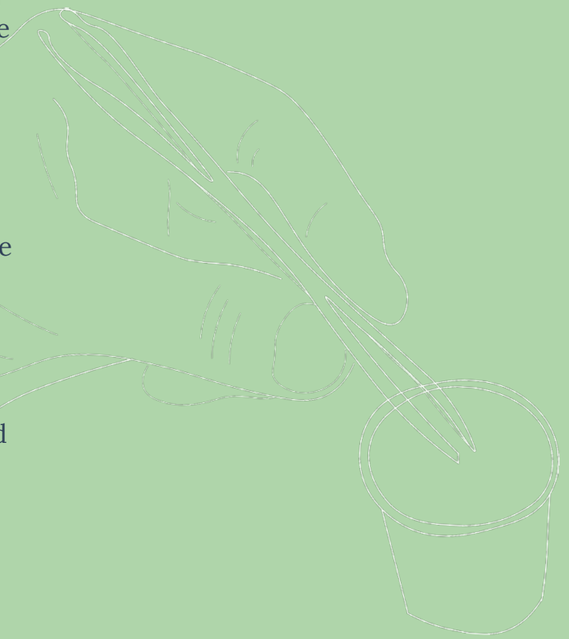


PLANT

Planting seeds for aeroponics is a little in-between traditional methods and something new.

To plant seeds in the rockwool:

- Trim the rockwool (if needed) to the size of the plastic net pot.
- Poke a small hole in the centre of the rockwool with the end of the tweezers around 2x the size in depth of the seed.
- Place rockwool in plastic net pot.
- Picking up 2-3 seeds with the tweezers, bury the seeds in the rockwool. 2-3 seeds for each pot allows maximum potential for growth in the case that one seed may not sprout.
- Once the desired amount of seeds have been planted, water the rockwool.
- Place in a germination container if possible and water every time the rockwool feels dry.
- Seeds should germinate in around 1-2 weeks depending on their atmospheric conditions.



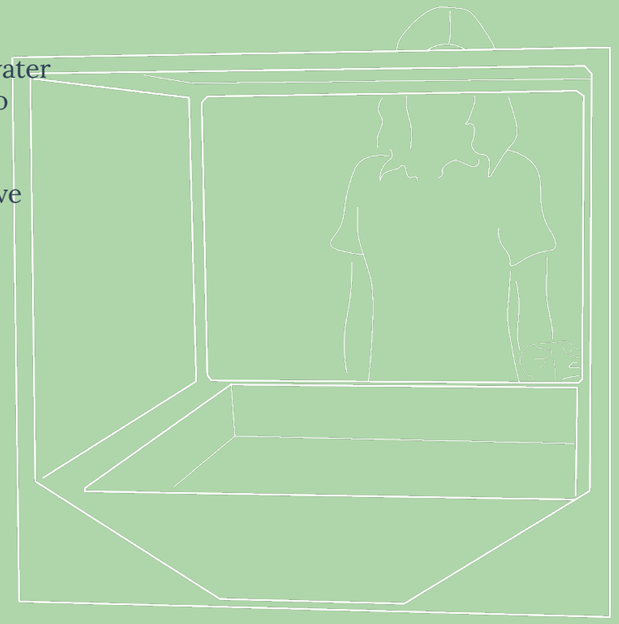
MAINTAIN

One of the most common problems with aeroponic systems is clogging of the nozzles meaning that water cannot be misted onto the roots. This is due to precipitation within the pipes and different added components in in the water - most common with hard water. We recommend using a (reverse osmosis) water filter.

Other problems come from algea growth in pipes and water containers which are not opaque.

Ensure to feed your plants nutrients via the water and not to let the water run out - this can also cause nozzle clogging!

On the more leafy side of maintenance, remove any dry, discoloured or dead leaves from the plant.



Hungry for more?

Thank you for taking the time to leaf through this booklet.

If you've found it interesting, or perhaps you want to know a little more, we've put our QR codes which link to our websites so you can chat to us or have a browse at what other projects we've been working on.

We've also put the websites which we find interesting and useful in guiding you.

Website from
Emily Whyman

Website from
Jessica Guy

Emily Whyman | Jessica Guy | In cooperation with Next Food