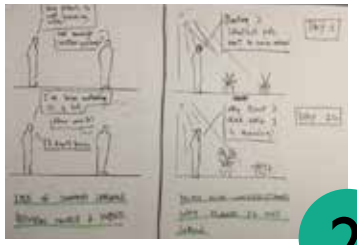
How can we connect and engage growers of different expertise in a community garden?

Design Process

REQUIREMENTS



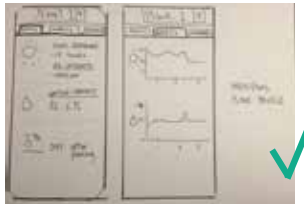
2

USER RESEARCH

1

This illustrative diagram shows different stages of the design processes, with parallel and alternative designs at each stage. More information about each of the stages can be found in the below pages.

SKETCHES



WIREFRAMES

STORYBOARD

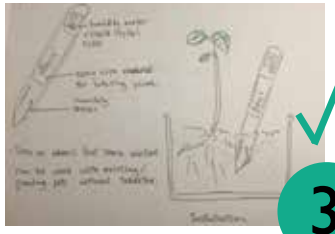
6

PHYSICAL PROTOTYPE

7

VIDEO PROTOTYPE

8



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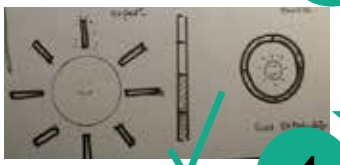
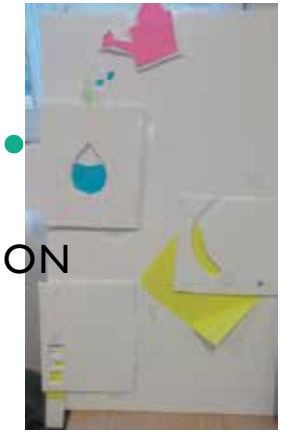


4

USER EVALUATION



USER TESTING

GROUP DECISION

Establishing Requirements

Step 1: Collect data about users

Aim: explore user requirements across a combination of methods
What was good about this: Rich first-hand data was obtained.
What could be done better: More data collection techniques could be used.

Contextual Enquiry

Interview at Jubilee House

What techniques I have used:
- Semi-structured interviews
- Observations on-site

Two community gardens:
- Bentham's Farm
  (UCL Student accomodation)
- Jubilee House
  (Older adult accomodation)

Participatory Design

Participants making mock-up

What I have done:
- Co-facilitator
- Observations
- Photographer

Participatory design workshop?
- Participants get to voice out what technology they want to see in gardens.
- Get fresh idea from gardening community in UK

Participants writing user requirements on sticky notes

Participants investigating avaliable technology

Participants working in groups in developing their idea and making a mock-up

Autoethnography

I am gardening

What I have done:
I have been a gardener for a year. Gardening routines was noted as diary everyday.

What is noted down:
- Motivations for me to grow
- Difficulties I faced
- Limitations to my current gardening activity

Establishing Requirements

Step 2:

Analyse Data collected

What I have done: Analysing data collected from a combination of methods

Aim: Triangulate on common requirements across different user groups

Result:

- User requirements are dissected.
- User group is segmented into novice, expert gardeners and abusers (theft/vadalism)

Step 3:

Establish Requirements

What I have done:

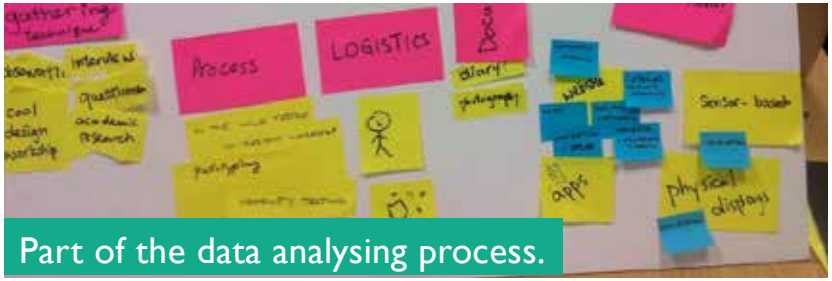
- Created the expert gardener persona
- Created two key difficulty scenario

Aims:

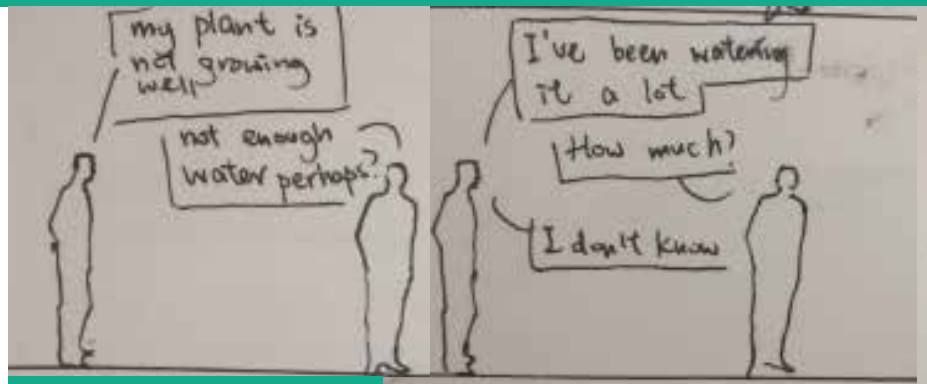
Creating persona and scenario based on quantitive data so resulting persona is more aligned to real user data

What could be done better:

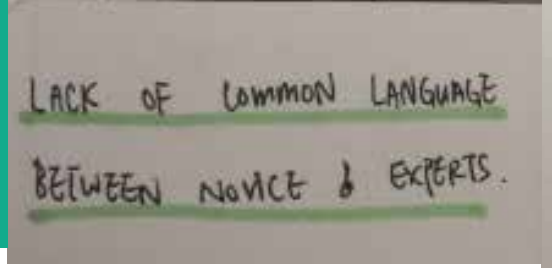
- As a team we could have written the user requirements more explicitly on the personas, in point form to allow easy communication across the teams



Part of the data analysing process.



(Right) Two scenarios frequently mentioned by gardeners: Lack of common language and no way to find out why some plants don't grow



Laura - Expert Gardener

Laura has retired and manages her gardens on a daily basis. She plants flowers in her front garden and vegetables and fruits in her back garden.

Laura picked up most of her gardening and growing knowledge from her parents since childhood, and has been gardening for the most of her life. She has a detailed growing log for tracking growing progress, including date, time, sun exposure, weather conditions, etc, and she goes back to it whenever there's a condition in her garden to find out the cause.

She has a 'gardening bible', given by her parents and full of notes, a go-to book when she encounters any new conditions in her garden. She also have a wide range of gardening books, which she sometimes shares with gardeners in her local community. Laura is experienced in gardening but she's catching up on wider environmental issues and sustainability around community gardening, and organic home farming.

Personal information
Gender: Female Age: 73
Ethnicity: Chinese Native Language: English
Profession: Retired midwife
Interest: Gardening, breadmaking, reading

Technical abilities
- Has a basic function mobile phone, which allows her to receive texts and calls
- Has a TV at home.
- Does not have internet access at home

Fears
- Social stigmatism: Feel uncomfortable when using novel digital devices in the public
- Doubts on durability of technology: Not comfortable with the use of technology in the garden, worrying that the devices would be damaged by rain and dirt

Motivations
- Keen sociable member at her local community farm
- Loves sharing her knowledge on how to grow vegetables

Limiting factors
- Anthropometric and biomechanical restrictions
- Presbyopia: Wears reading glasses
- Restricted movement range, shake hands

Expert gardner persona, including her fears, motivations, limiting factors

Sketching

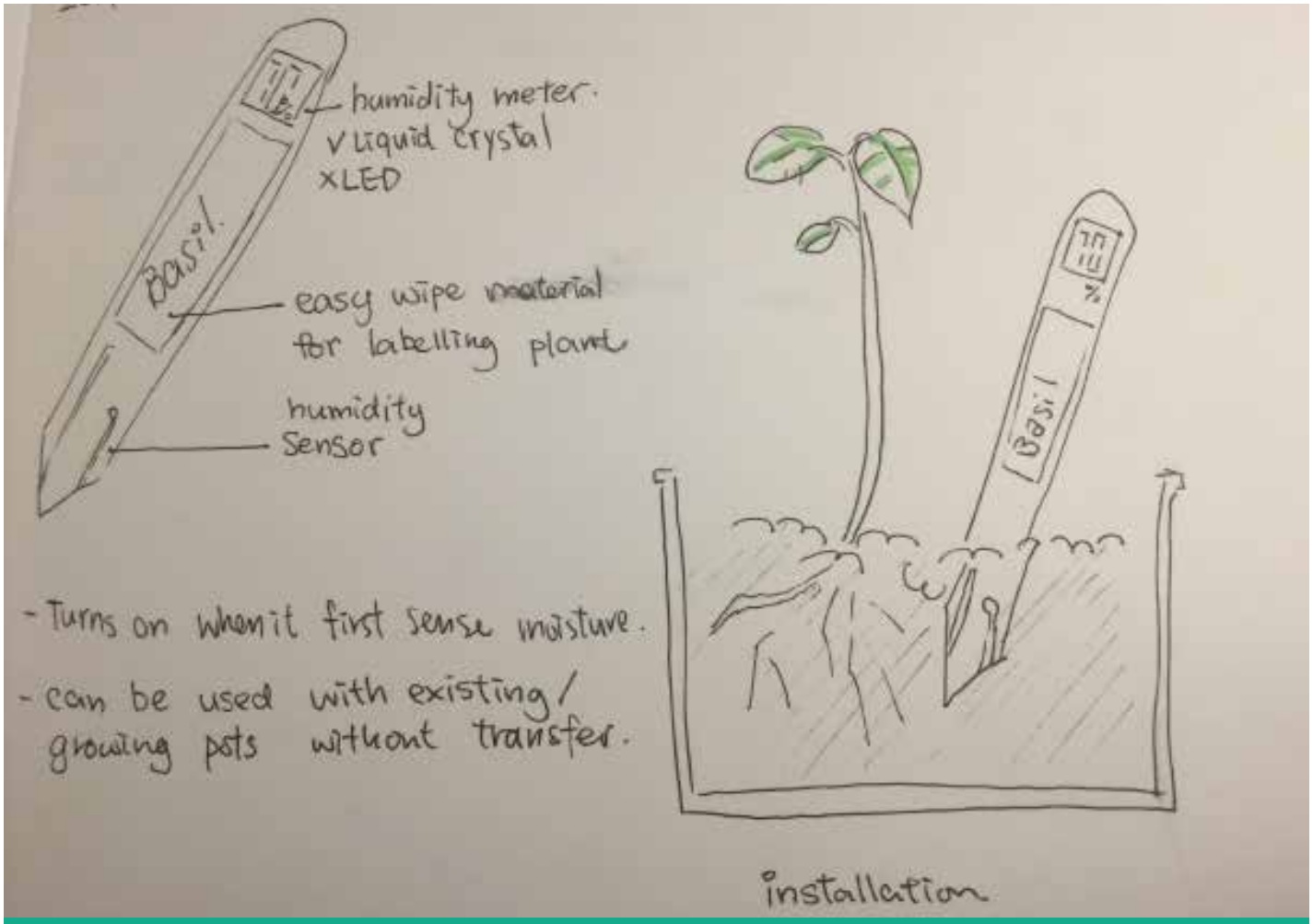
Participant looking at a humidity sensor in workshop

The tangible, visualised data would support learning and communication opportunities in the community by providing a common set of gardening vocabulary.

Having only one measurement on each stick would allow gardeners to freely install the relevant stick(s) in the problematic plant, without having to transfer the plant from one pot to another. The sticks would sync collected data to an online platform, but the sticks on its own provides enough data for both novice and expert gardeners. Those who have been keeping a growing log can record the trends in their own way in pen and paper. This would allow flexibility, hence a better fit into the gardeners' well established routines.

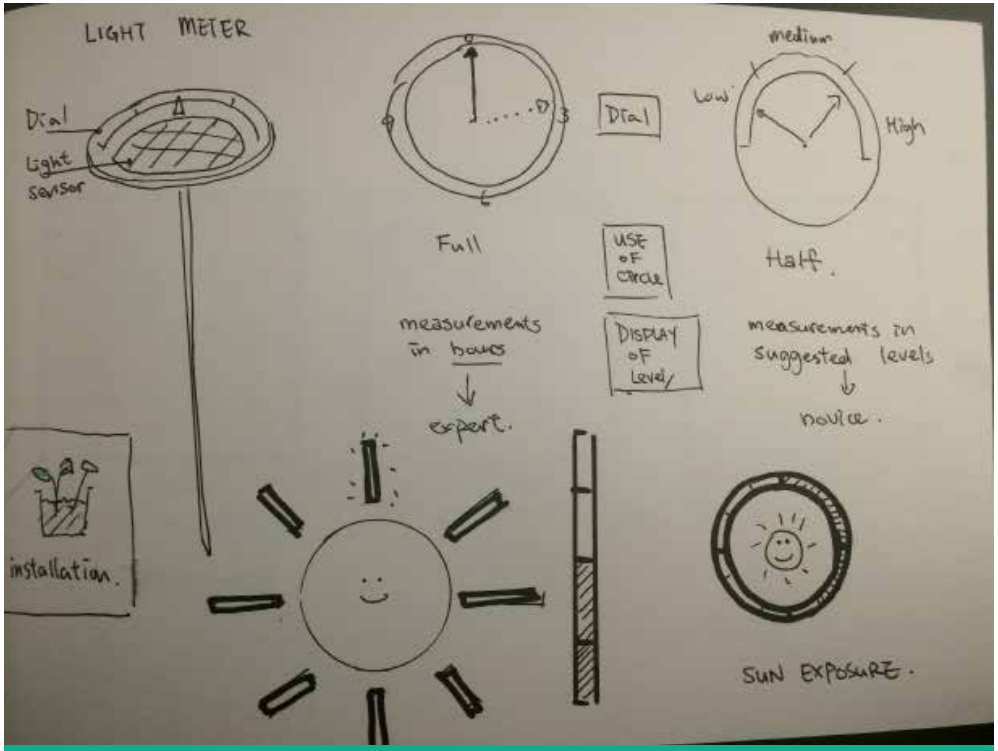
The stick was designed to look like a garden tag (where people can tag their plants with markers), without LED, to produce a low tech look-and-feel. This is to avoid thefts who are usually attracted to apparent digital devices.

From the user research we found that the gardening community is reluctant to adopt technology - particularly that might disrupt their approaches to gardening and the sense of community amongst gardeners. However we also found that far being from being technophobes, a majority of our gardeners (especially the younger ones) were open to the use of technology if it supported their general approach to gardening and learning, such as in finding out why some of their plants grow but not the others, even they're plnated at the same time next to each other. Sketches were done on "smart" sensor-meter sticks that measure and shows sunlight, soil moisture and time since planting.

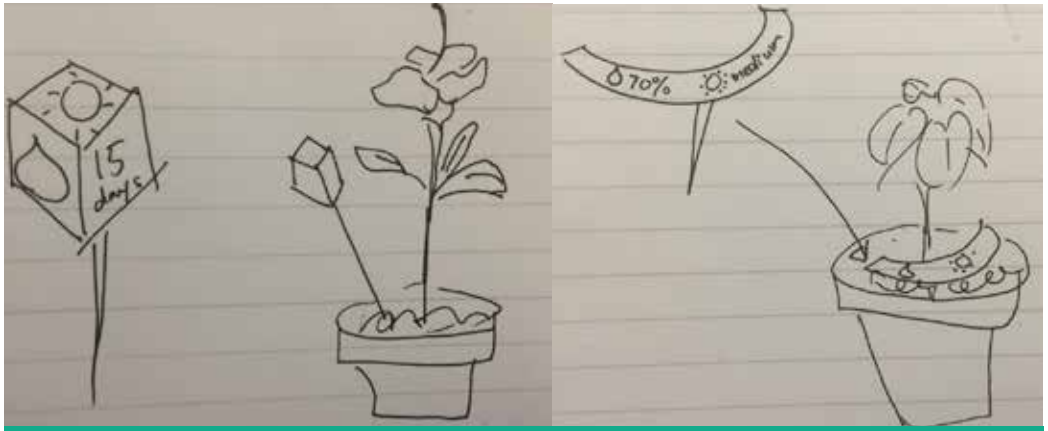


A sketch of the "smart" sensor-meter stick that measures soil moisture.

Sketching

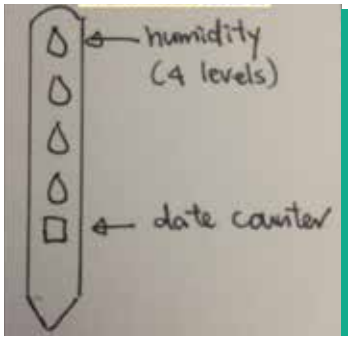


Further explore into the idea of sensor sticks, with sketches of how the sun light exposure can be expressed in graphics.



Alternative designs of how the sensors can be combined on the same stick.

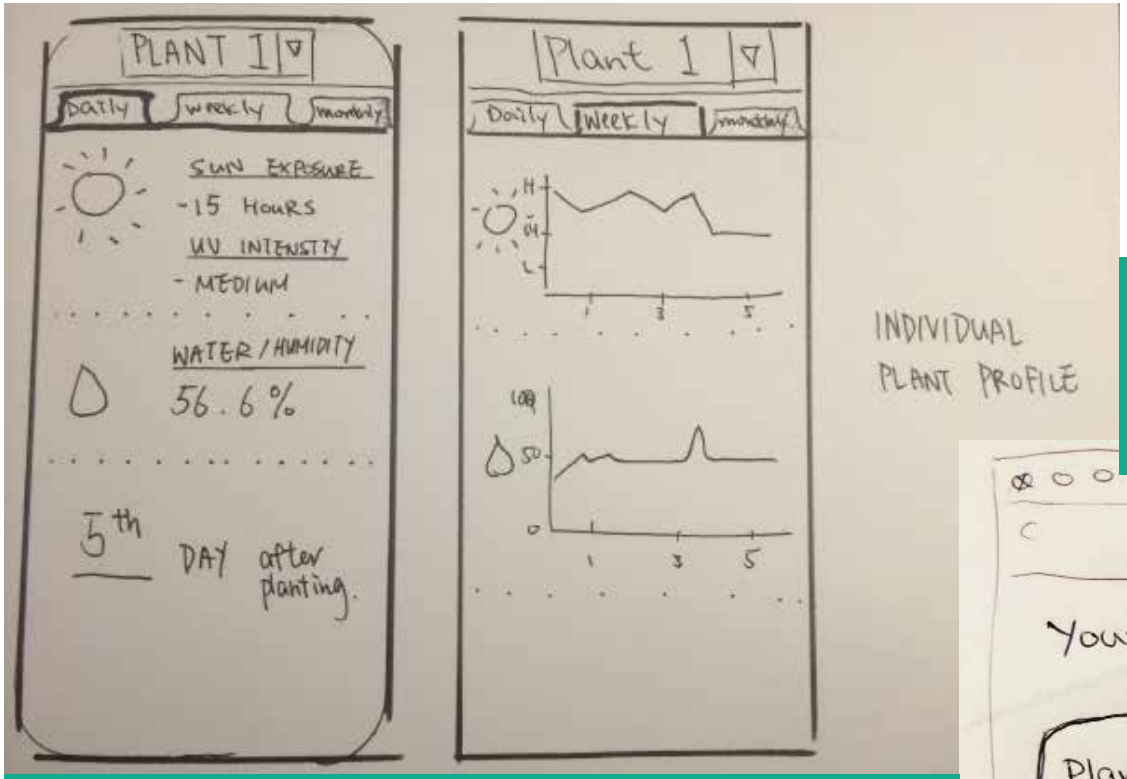
A test was carried out to see users' response towards different graphical representations of environmental variables. This is vital for a data visualisation tool.



Based on the user responses, water dropet was adapted as a understandable representation of humidity.

A rough storyline of how the sensor sticks can be used

Wireframes



(Above) Wireframing of the online system in mobile layout. Each plant has a daily, weekly and monthly view. In the weekly tab, data was plotted into a line graph to show the trend of environmental variables. Water icon was adapted from user evaluation.

What was good about this:

- Making a physical prototype based on a scenario (in this case, checking the plant data) can help checking if there are any holes in the existing storyboard

What could be done better:

- More alternative designs of the interface on how different plants can be compared in terms of their growth.

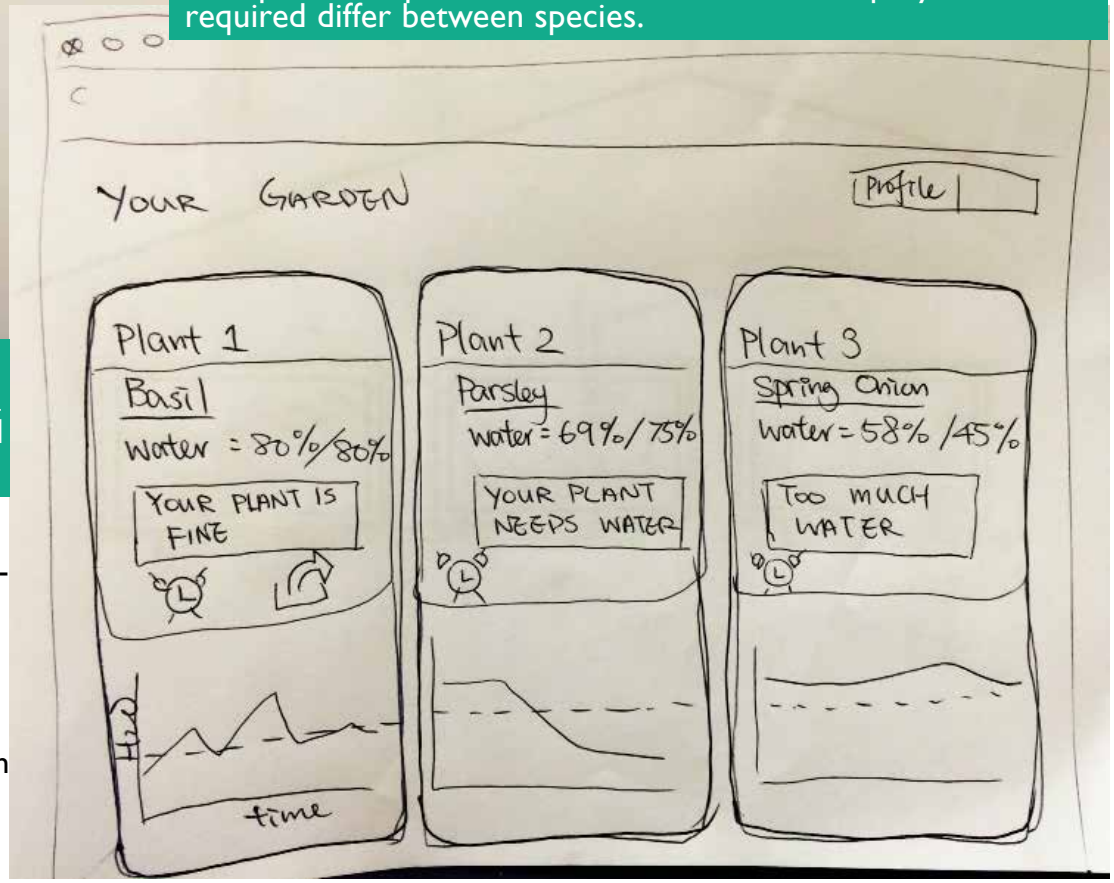
What I have done:

- Made a low-fidelity paper prototype of the interactive interface of the online system

Aims:

- As an interactive design mechanism

(Below) Wireframing of the online system in web layout. Three of the plants in the garden are arranged in a side-to-side view in order to compare their humidity level. The system also suggests whether the humidity level is suitable for the type of plant, as experts had pointed out in the contexual enquiry that water required differ between species.



Storyboard

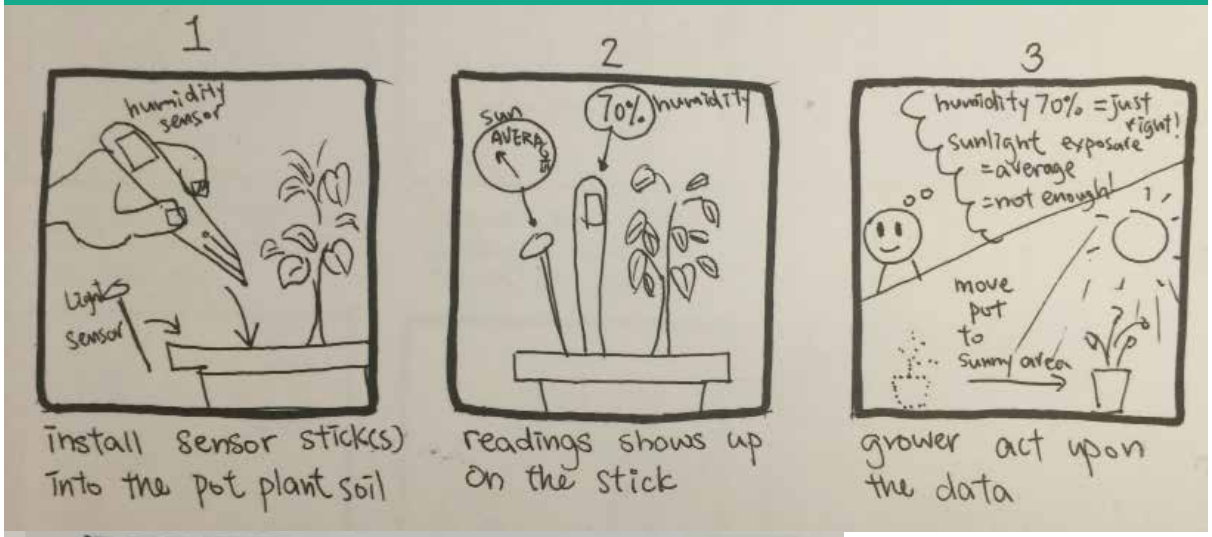
What I have done:

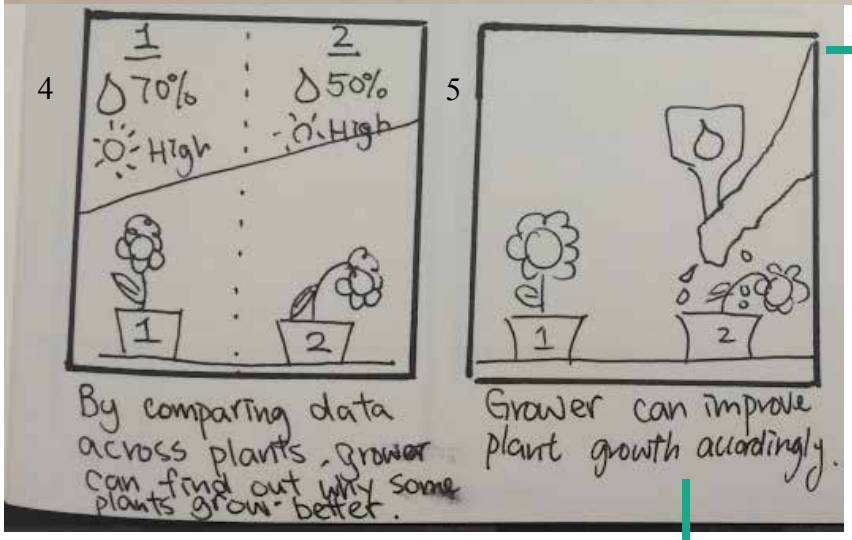
- Created a storyboard for the key interaction of a gardener with the sensor & meter sticks and the tracking system.

Aims:

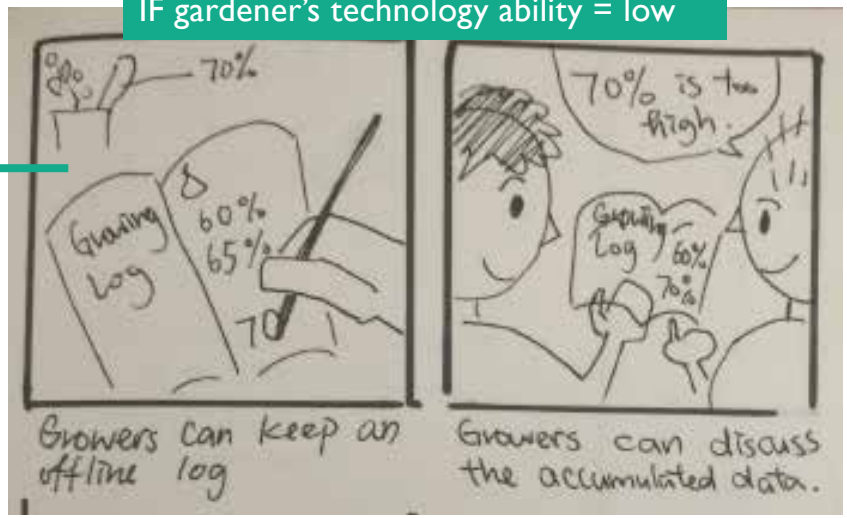
- Forms a visual narrative of how this technology works
- Sequential frames focused on the changes during use and the necessary transitions

Branching storyboard: The below shows the initial steps which are common across users with different technology abilities.

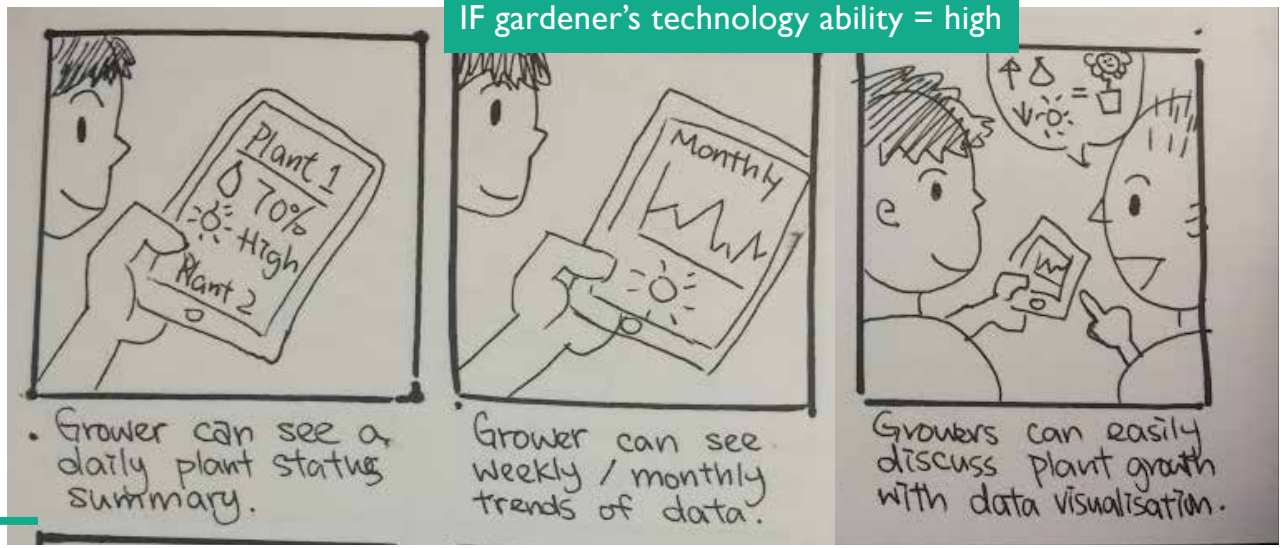




IF gardener's technology ability = low



IF gardener's technology ability = high



Low-Fidelity Prototype

Paper prototype of the three sensor & meter sticks, made from juice carton cut outs

How a sun exposure sensor & meter can be inserted into the soil of a parsley plant

What I have done:

- Made a low-fi prototype based on previously sketched idea to test feasibility with physical objects
- User testing with the prototype

Aims:

- Idea actualisation
- Get initial feedback by simulating actual product

What was good about this:

- Fast and cheap way to produce a mock-up to test the look and feel, roles and implementation of actual product
- Act as interactive design mechanism; design was modified during the building of the mock-up to fit the scenario better

What could be done better:

- Iterations could be done after the user test
- Limited usefulness for user testing

Prototype installed in two separate plants in an indoor garden

How a humidity stick and a day counter can be inserted into a salad cress plant

In the user testing, user appreciated that:

- He had the choice to put in only the relevant sensors in any one plant
- He could freely use the sensors on other plants with minimal effort, without touching the soil

Video Prototype

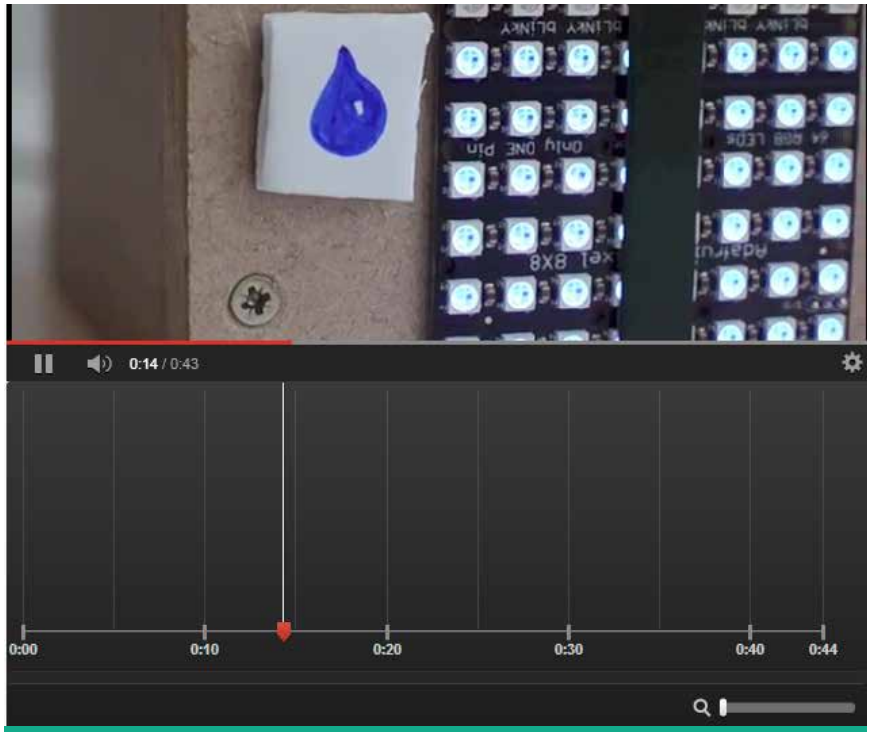
My role: Initiator, Producer, Director, Video editor

What I have done:

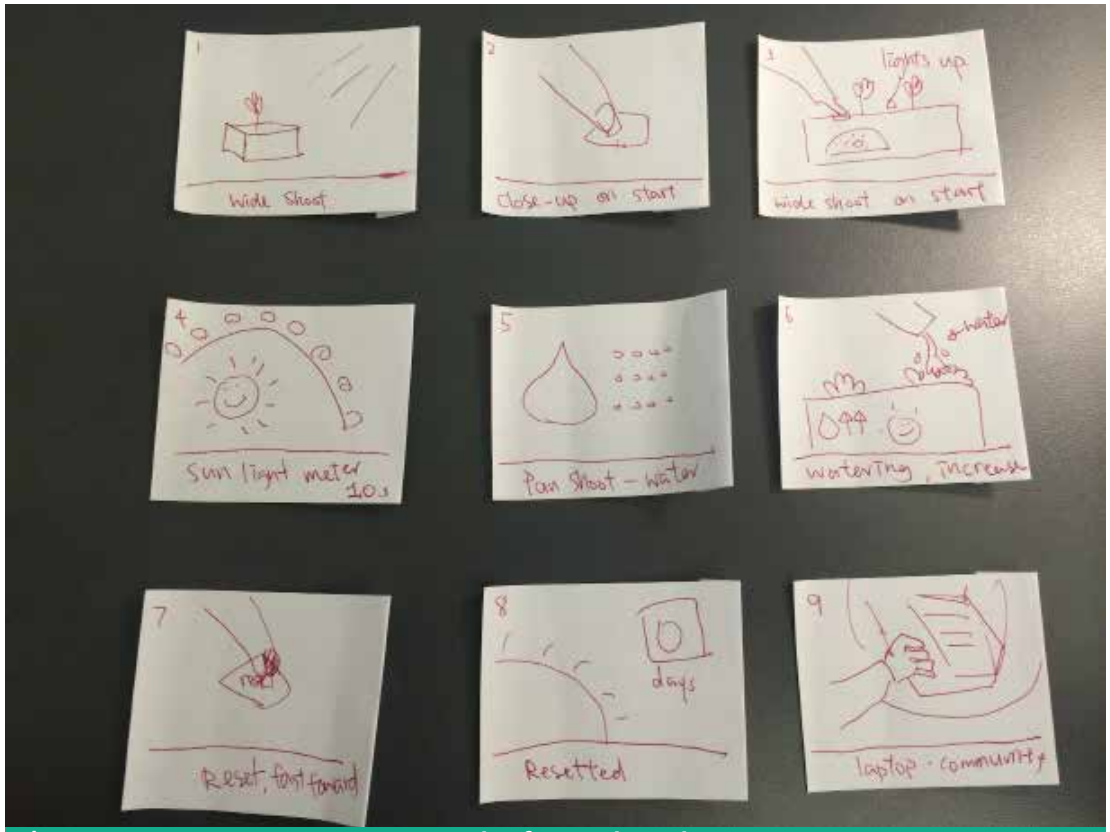
- Persuading team members of why we need a video prototype
- Video storyboard creation
- In sole charge of filming and editing
- Sourced the materials needed for the shoot
- Directed team members to produce Wizard of Oz effect

Aims:

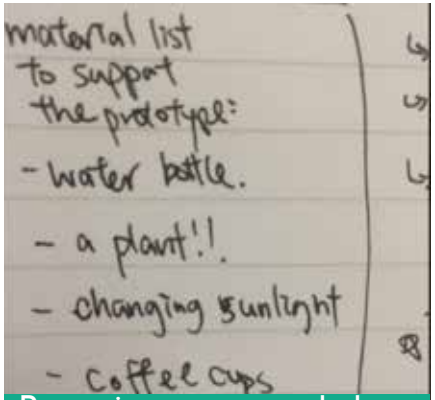
- Supplment the high-fidelity prototype
- Communication tool: showcase of storyboard and features
- Demonstrate use of technology in action
- User testing to provide a more realistic experience



Editing the speed of a pan shoot in iMovie to showcase the humidity meter feature on the physical prototype



Arranging scene sequences before the shoot



Preparing props needed to create a realistic video prototype

This is me behind the scenes during Wizard of Oz set up

Video Prototype

Iteration 1: http://youtu.be/INcIe5uRO38

Iteration 2 (Used in presentation):

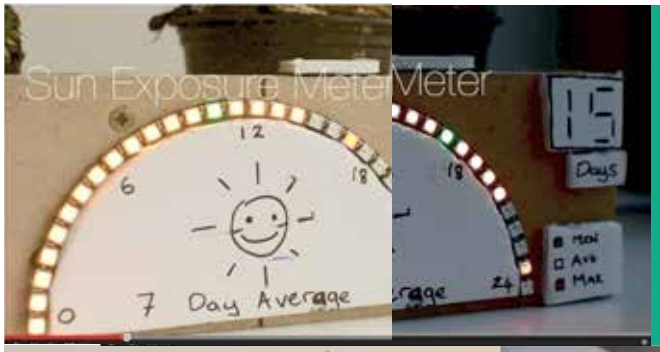
http://youtu.be/vputAGgagrwing

What was good about this:

- Effective visuals and effects to showcase scenario of THE POT with approperiate sequence
- By thinking through and preparing for most of the details prior the shoot, eg venue & weather condition, time and resources management was optimised on the set.
- Iteration 1 was used in user testings to check how well gardeners of different expertise level understand THE POT solely from the information provided in the video. The feedback was used in re-programme the prototype and making iteration 2 for presentation purpose.

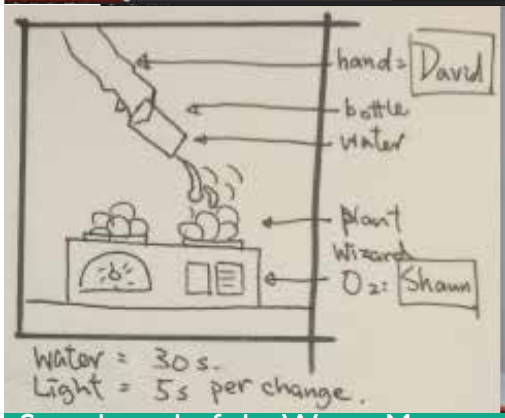
What could be done better:

- With a more developed wireframe, we could have showcase how the online tracking works
- Not enough depth in explaining how gardeners can make better judgements with data visualisation

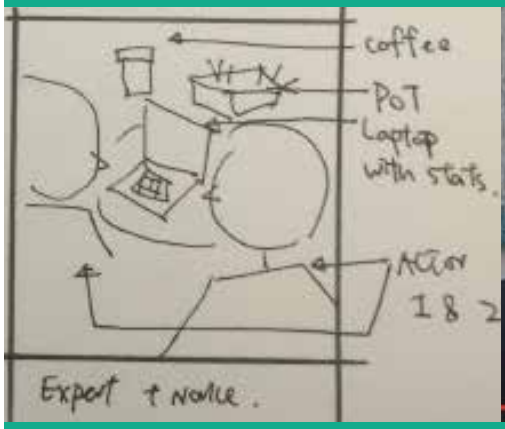


Screen shoots of the Sun Exposure Meter scene, with changes in ambient lighting to showcase how the sensors measure the average amount of light exposure, thoughout day and night.

In Iteration 1 it was commented that this change was not obvious, so in Iteration 2 the lighting was improved using iMovie.



Storyboard of the Water Meter scene and a screen shoot of the scene in the video. Roles of team members were assigned prior the shoot and the speed of water pouring was controlled to match the lights in Wizard of Oz prototype.



Storyboard and screen shoot of the Expert talking to Novice gardener scene.

How can I support the curation process in sensory photography?

Research

I am a Participatory photographer + facilitator at PhotoVoice, and I read about sensory photography - photography for visually impaired people.

Why would anyone who cannot see would wish to create photographs?

1. Because they can
2. To express and communicate

Seeing Beyond Sight: How what we see and don't see changes the world
http://www.photovoice.org/Resources

3D printing let blind pregnant women ‘sees’ her baby.

Afflicted with numerous eye conditions, Hall retains highly limited sight. For him, cameras and other optical devices are a means of better perceiving the world around him. “It’s beyond being in love with cameras,” he says. “I need cameras.”
https://rossrosfmp.wordpress.com/blind-photographers/

Central to any response to this question must be an understanding that photography is not just the creation of a visual product, but a communicative process that involves all the senses.
Photography is a tool that enables us to talk to each other and allows us to experience the world from different perspectives.

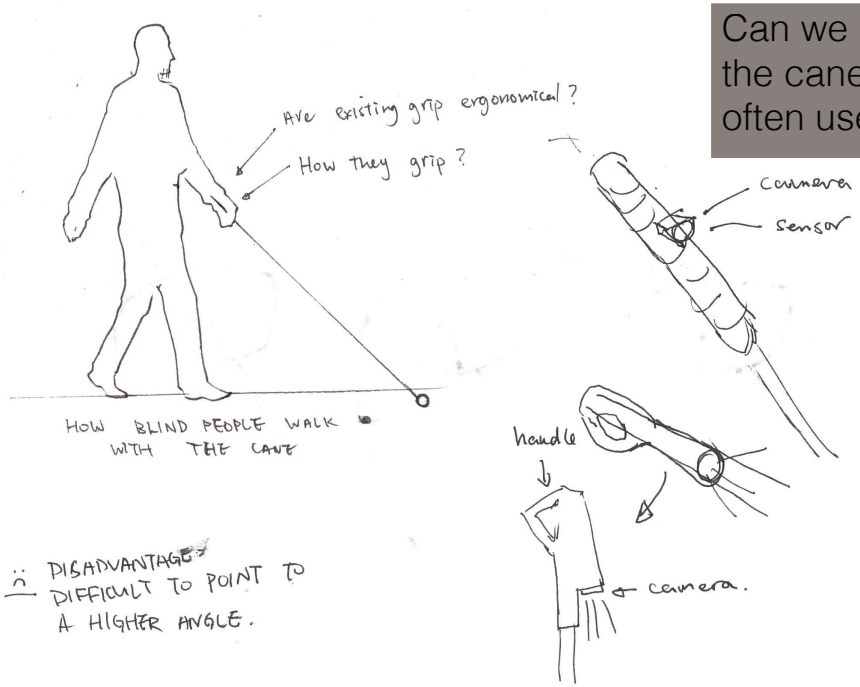
Existing cameras have many functions and are complicated even for a novice to use, and photographers with reduced visual abilities often cannot make full use of.
The proposed design is an attempt to simplify the photography process, and streamline the documentation / captioning process. In this way, photographers do not need to rely on a sighted assistant in the photo curation process.

The camera for the blind takes this a step further. Not only is this camera made for people who are blind to take photos, (that connect to sound clips recorded at the same time, very cool!), it’s also possible to link this to the vectorization and 3D printers of today and tomorrow and print the images back out so that the blind may “see.”

User Journey

Ideation through Sketches

Exploration into button design

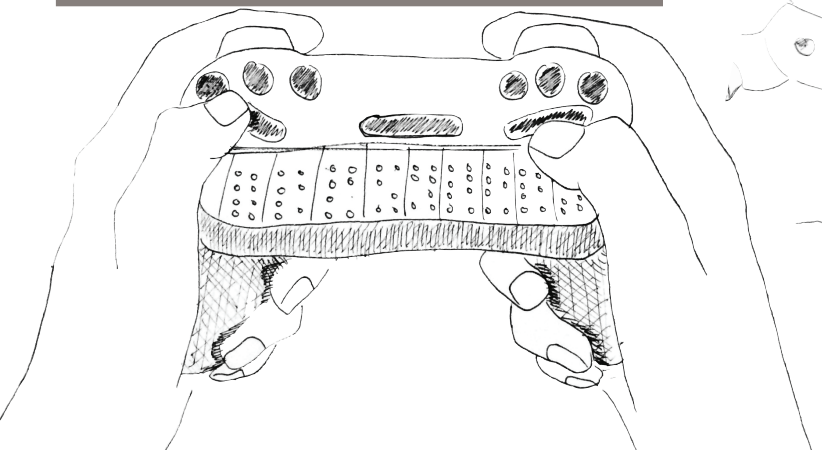


Can we combine the camera with the cane? Visually impaired users often use canes to navigate.

Wearables - head gear or hand gear

Single-hand use options

Can we combine the picture taking process with caption creation?



Left hand or right hand use?

Form Factor Exploration

Various low-fidelity prototypes are used to test different aspects of the form factor.

Disposable camera

Weight

Playdol

Grip

Paper prototype

Button Layout

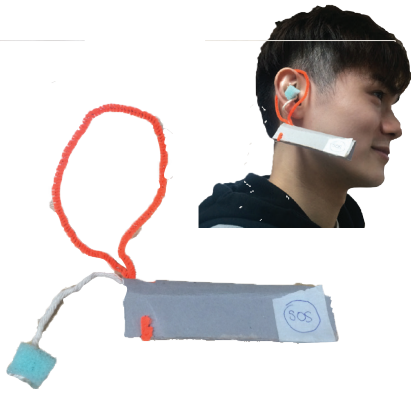
Bubble wrap

Size

Glove

Texture

Head piece



Comfort

Verdict

Left hand grip is better because a majority of useres are right-handed. Right hand can be spared for more important tasks.

Everyone has a different hand size. Customisable camera size can help users to hold the camera better and increase stability.

Gloves pairing up with head piece is not ideal as gloves reduce sensitivity of finger tips and it's difficult to put on/take off. Potential social stigmatism.

Hand-held design is better as users can put the device back to their pocket/bag easily when they're not taking pictures. It has to be small for portability.

Features

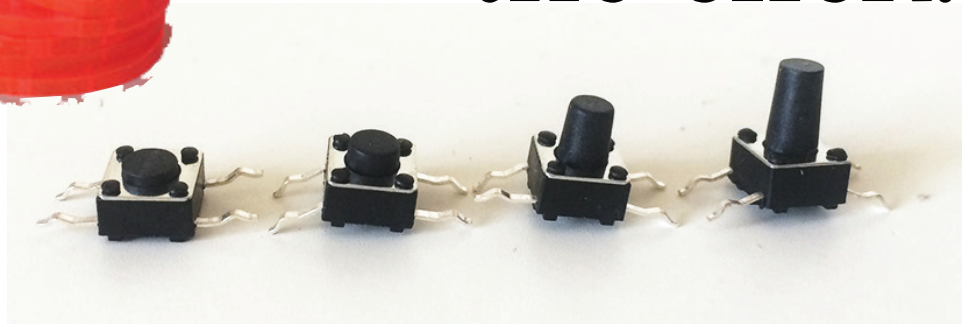
The camera and the system can become meaningful and add long-term value if it integrates with our environment, our lifestyle and the technology and tools that we already use. For that to happen we need to design a seamless user experience that works across the device, software and service

The 8 megapixel camera lets users quickly capture images. A single button captures an image and instantly sorts it into one of the the predetermined categories. There's no specific 'On' button - every button activates the camera.

Always-On
It preserves battery life since it does not have a display, and instead it only draws power to capture and sort the image so you can use the camera when you need it.

Four button sizes
Easy to distinguish.
Tactile feedback when pressed.

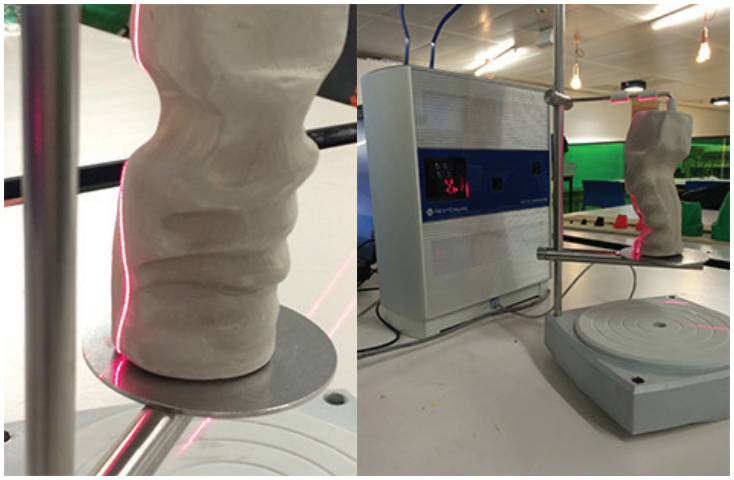
Photos are sorted into categories at the moment of the click.



Digital Fabrication

3D scanning

Comes very useful for personalising a camera for individual visually impaired photographer.



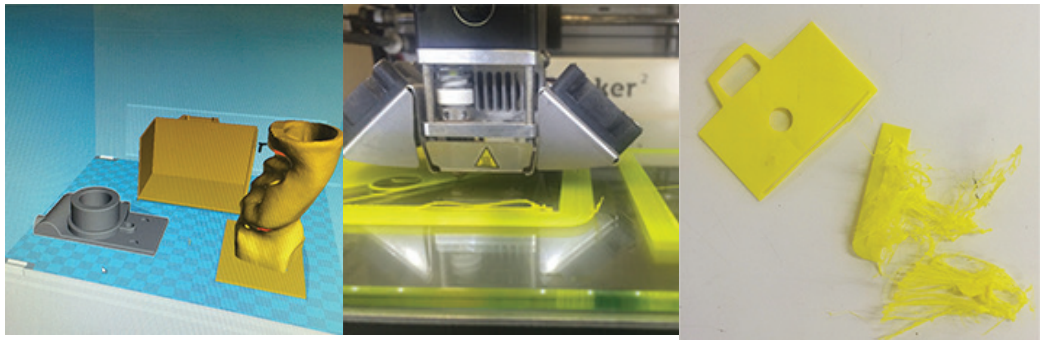
3D printing

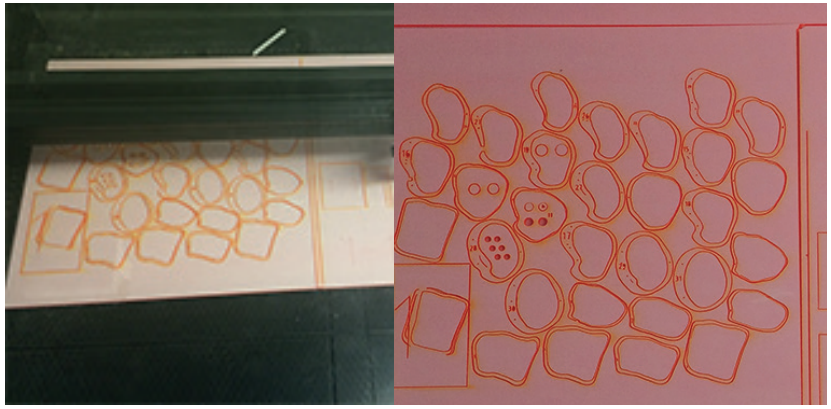
Long printing time (23 hrs)
Success rate varies
(eg nozzle wasn't working - hence the failed product on the right.)

Difficult to put electronics into the complicated form factor once the shell is printed.

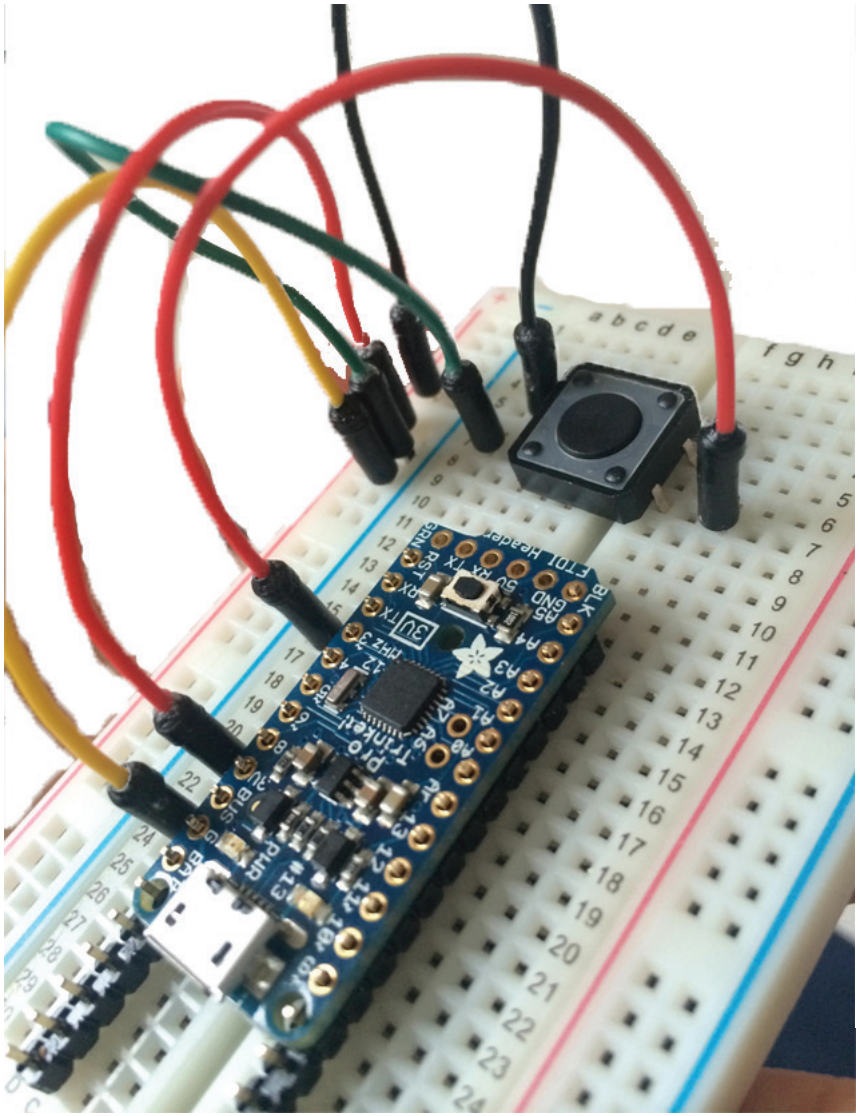
Laser Cutting

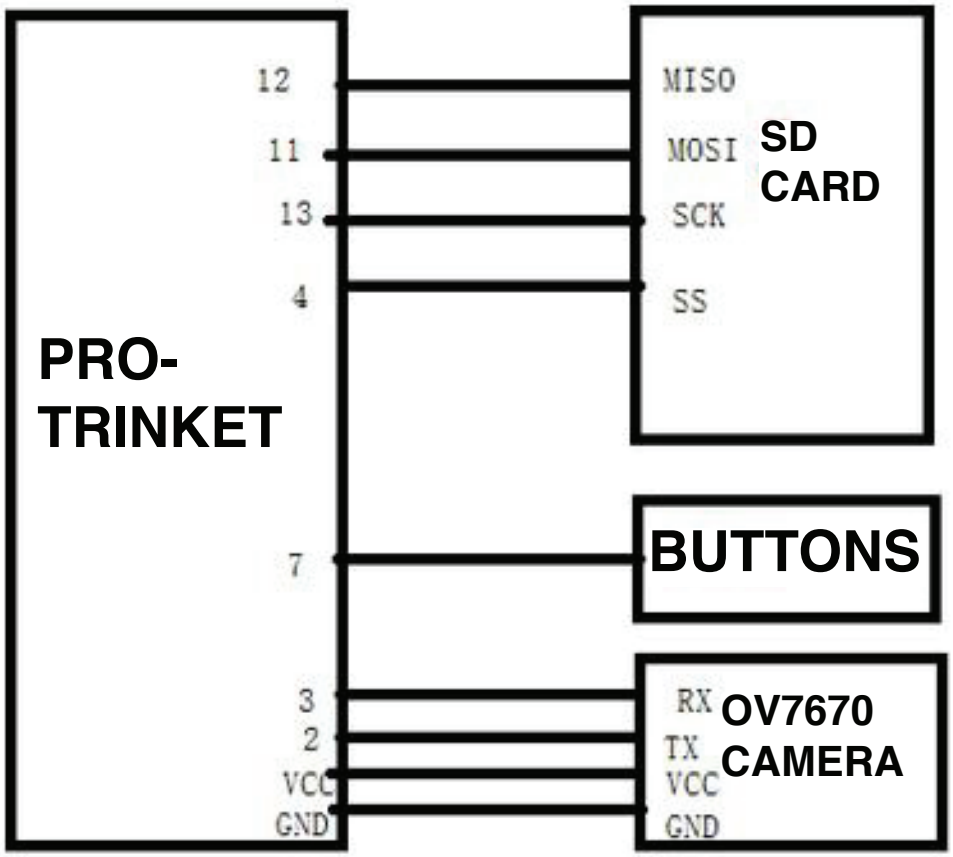
Short cutting time
Easy to put electronics into the form factor during the assemble / gluing process





Physical Computing





Future Plans

User testing with PhotoVoice

I have already contacted Matt Daw and Tanvir Bush, sensory photgraphers and facilitators, to further explore the user requirements

Transcribing Function

Recorded autio will be transcribed and form the name/ comment of the .jpg file for the VoiceOver applications to read out the caption later in the curation process.

Camera quality

Sourcing good wide angle cameras for the next prototype.

Nothing can stop a visually impaired photographer from creating images, just like nothing could stop Beethoven from composing music.

https://youtu.be/3nAqPFjTBkg

- END -