



B R E A T H I N G
T R E E

D E S I G N D O C U M E N T A T I O N

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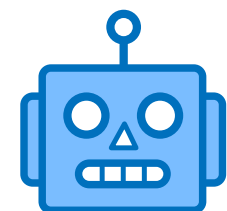
INTRODUCTION

The Breathing Tree is an adaptable display system, designed for urban green spaces or suitable public areas, intended to convey information about air quality within its locality. The Breathing Tree's main purpose is to raise public awareness about air quality.

VISION STATEMENT

"We seek to visualise air pollution data through daily interaction in order to raise public awareness about air quality in local areas and the greater environment"

OUR TEAM



IAN

Lead Product
Designer



HAMISH

Documentation,
Brand Assets



EDMOND

Lead Interaction
designer



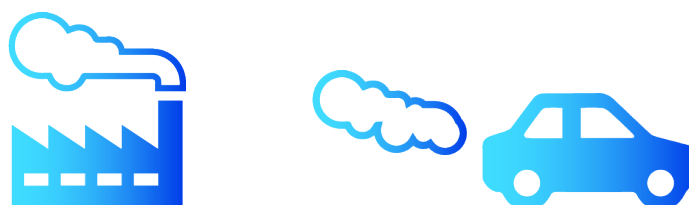
MAYA

Video Lead



THE BACKGROUND

So why did we choose air pollution? Simply this project began as a way to attempt to raise awareness about environmental impact through day to day interactions in public spaces. After numerous ideas and concepts we eventually narrowed down our field to air quality. This was also inspired by severe air pollution issues of recent, in particular the ongoing air quality crisis in Delhi and unusual air conditions in Sydney.



LOCATION

The Breathing Tree is designed for public areas with an emphasis on green space. The idea is that the installation blends in with its surrounding environment or looks independently pleasing from an aesthetic aspect. The Breathing Tree is not attempting to create a highly intrusive addition to public spaces, nor be completely ambient either. The purpose of the Breathing Tree is to be an interactive addition that blends well into an environment and provides insightful information.



URBAN



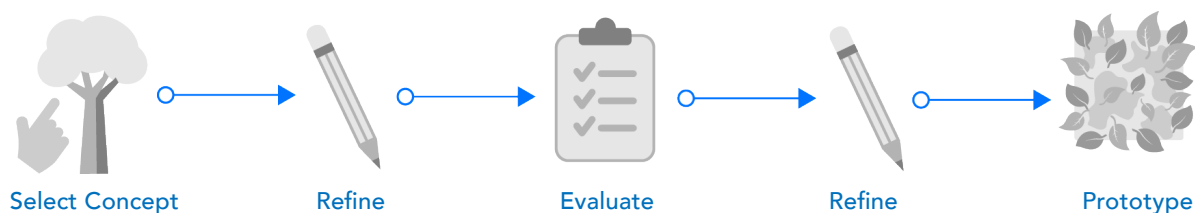
GREEN SPACE



PUBLIC



DESIGN PROCESS



The Breathing Tree concept came to life after deciding to pursue a concept that was heavily focused on air quality rather than other environmental concerns we designed concepts for. The selection of this concept was achieved through a rigorous series of user tests and evaluations, using both quantitative and qualitative methods. Key findings from this initial round of prototype testing revealed that the Breathing Tree was by far the superior concept, however there were issues around the purpose not being clear and data visualisation. This initial testing involved:

Think Aloud: Users expressed a general interest with the idea and thought it was visually impressive, but there were underlying issues with purpose and data visualisation.



Observation: By observing user behavior as they interacted with the prototype we were able to ascertain that users would spend varying amounts of time using the product.



Survey: A survey comprised of direct closed questions, numerical responses and brief comments allowed us to get substantial and insightful responses.



REFINING THE DESIGN

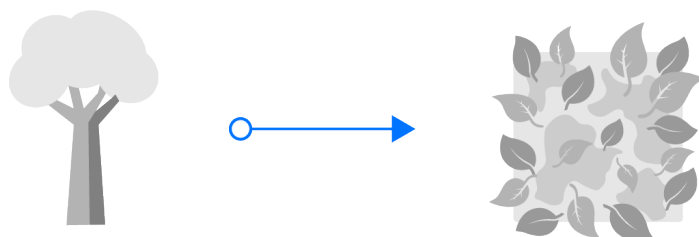
Based on feedback following our concept selection we refined the basic design. We adjusted the types of interactions that were occurring. Beginning at only an ambient lighting feature, the Breathing Tree was adjusted to include a proximity sensor, responsive lighting and a display panel. We made a visualisation to convey these concept changes so that we could get some feedback.



FEEDBACK AND CHANGES

After getting general feedback on the current design on the concept, we realised the interactions needed to be a bit stronger. As a result we added control options to the display panel and conceptualised an app/web digital interaction to extend the experience for a user after they left the Breathing Tree. Based on our initial user testing we also kept in mind that excessive interaction options for the sake of interaction actually detracted from our design and purpose.

One of the biggest changes we had to make was shifting the installation to a plant wall instead of a tree. This was due primarily to feasibility factors (hardware, cost, weather), but also because we determined the product could be more adaptable as a vertical plant wall. This new design would allow for implementation across many more public locations and interiors too. This would also allow the design to be a scalable experience, where different installations locations could have different sized products based on the area.



USER TEST

Our summative user testing allowed us to gain insights into what changes needed to be made before our projected could be deemed complete. We engaged a wide range of participants and asked them to interact with the product, using methods such as observation, think aloud and a post-experience survey. On this round users were much more receptive of the concept, partly because the higher fidelity design made it much more clear what the concept actually was. Users received the plant wall quite well also, in particular how it was very easy to interpret the lighting design. Although one problem that continued to be of issue, was users not being immediately able to interpret what the colour scale meant (what the colours mean). To address this we provided a tool on the digital UI control panel.



BRAND DEVELOPMENT

For our concept to be successful it required us to develop a brand identity beyond just a name. We iterated extensively to find the perfect logo for the Breathing Tree.

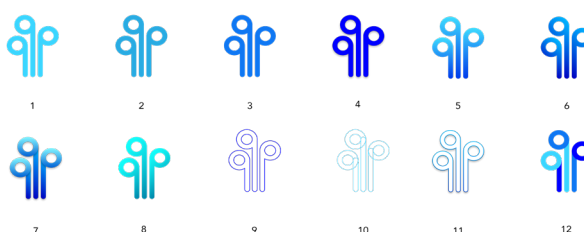
Round 1



Round 2



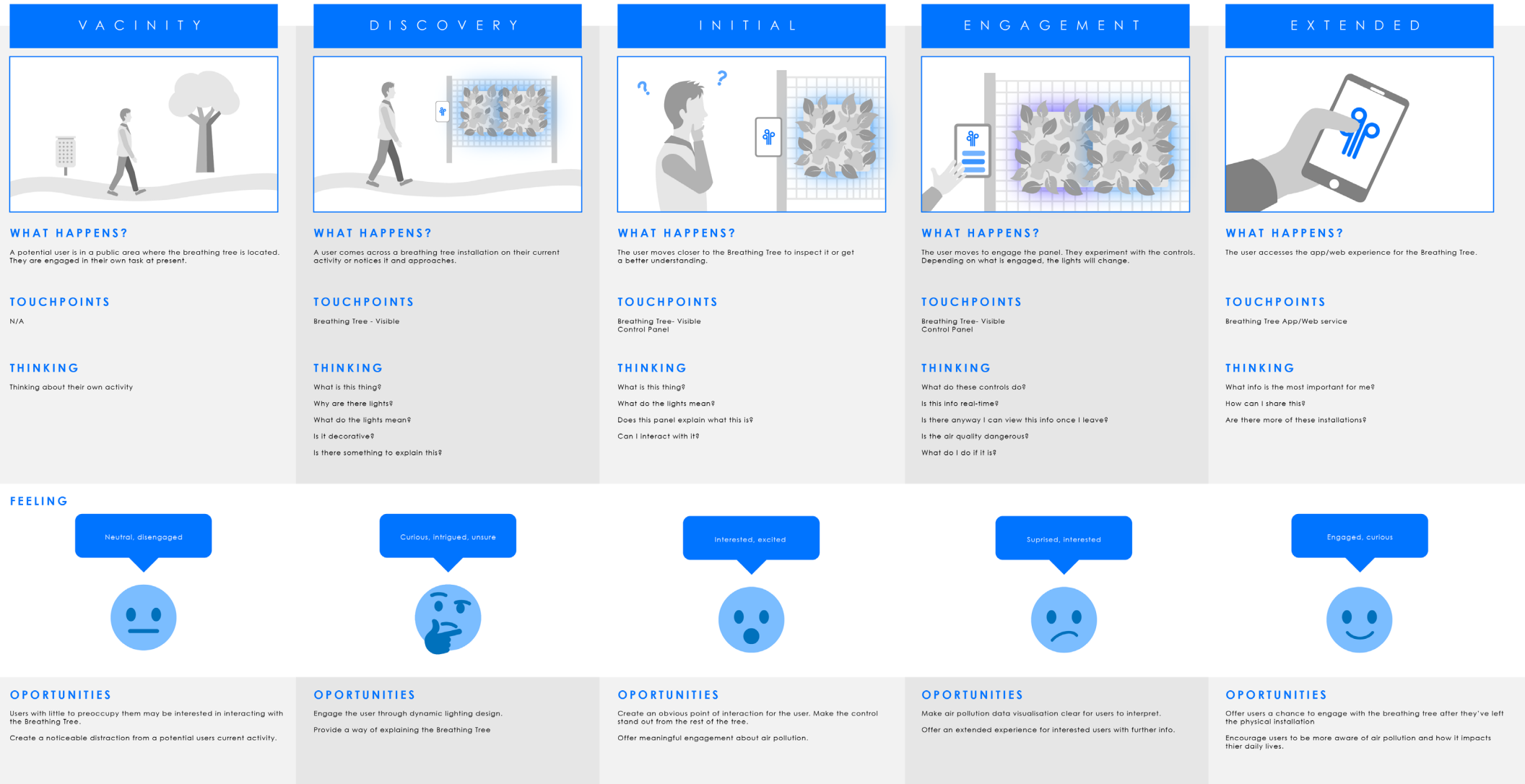
Round 3



Round 4



USER JOURNEY



BREATHING
TREE



CORE FUNCTIONALITY

The breathing tree is primarily an ambient display, but is both reactive and interactive to people. The data being displayed on the breathing tree is air quality, measured by the AQI (air quality index). The breathing tree uses air quality data both from sensors on the installation (for live data) and stored data from larger periods (e.g 7 day AQI or other locations), which is intended to be received from an API.

Data is visualised through light and has a number of vectors to communicate other elements such as pulse rate, colour and brightness. Each panel consists of a mapped lighting array and a plant surface. The control panel features a display and also houses the controlling hardware units. The panels are physically linked to the control panel. Part of this concept is also a digital app/web experience, which functions independently of the installation, but receives some of the data it visualises from the breathing tree sensors.

Inputs



Buttons



Proximity



Pollution



Digital

Intermediary



Arduino

Outputs



Colour



Pulse



Brightness



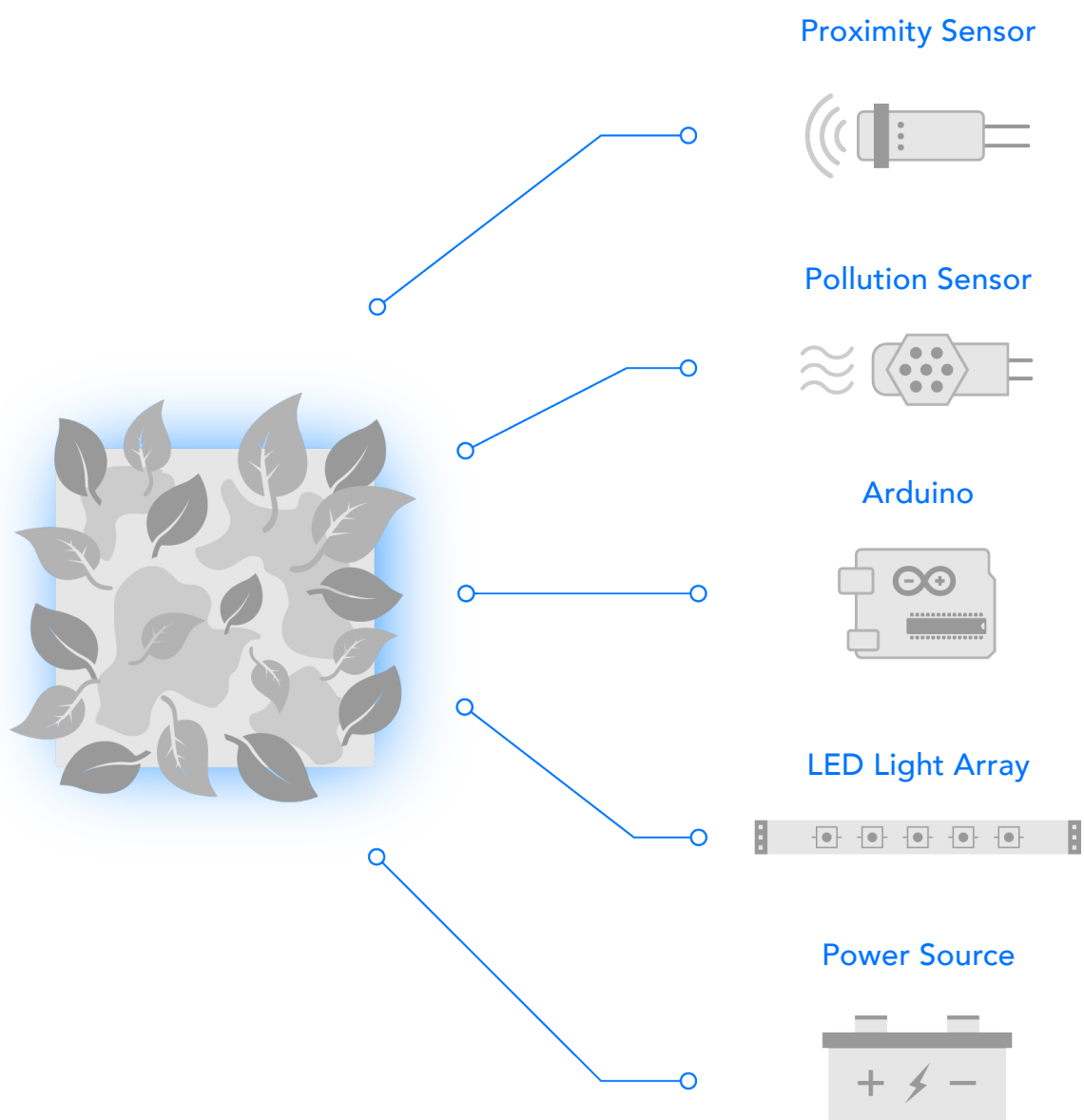
Digital



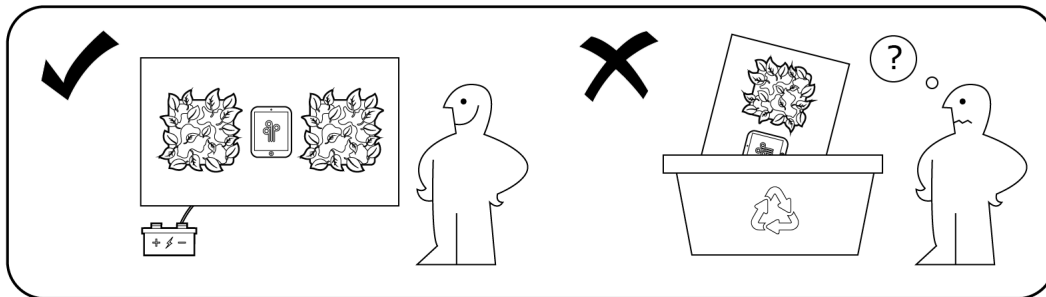
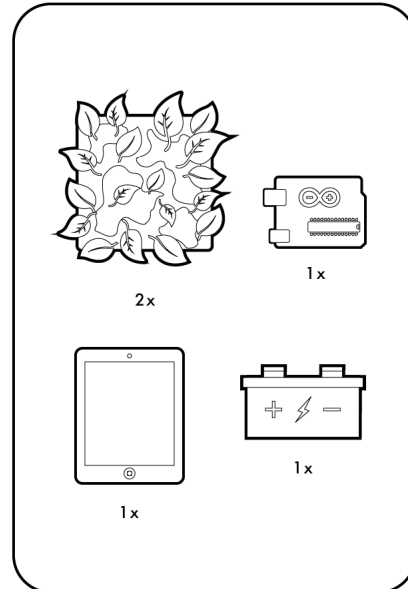
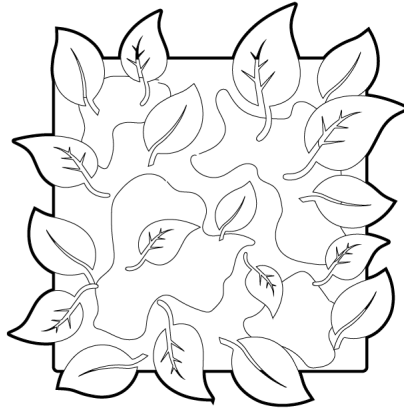
TECHNICAL REQUIREMENTS

Hardware: Arduino, LED's, wiring, proximity sensor, pollution sensor

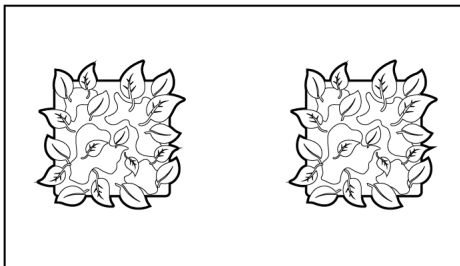
Software: API, arduino code, Custom Application (UI)



BREÄTHING TREE

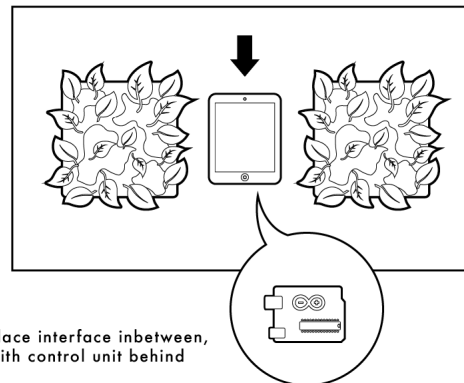


1.



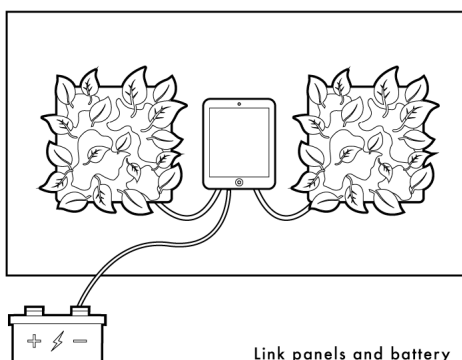
Hang on suitable surface

2.



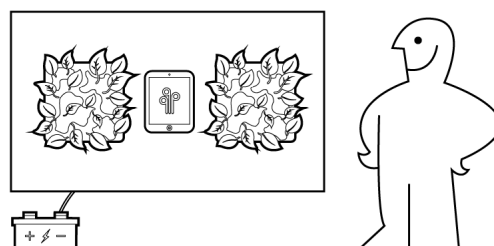
Place interface inbetween,
with control unit behind

3.



Link panels and battery
to control unit

4.



Turn on and enjoy



KNOWN ISSUES

While there were no outstanding issues with the Breathing Tree prototype, there were a number of small issues we noticed that may persist if not set-up correctly.

Proximity Accuracy: The proximity sensor struggles a little with highly busy areas, which is a problem since our design is for public spaces. Each panel has its own sensor to be responsive to a users presence. To overcome this as best we could, we programmed the product to use an average of both sensors readings rather than them separately. Going forward the best option would be to invest in multiple higher quality sensors for each panel. This was unachievable for this prototype due to excessive financial constraints.

Air Pollution Accuracy: One issue we noticed with the pollution sensors is that while they function properly, sometimes the readings they take aren't representative of their larger environment only the very immediate area around the sensor. While this concern doesn't interfere with functionality, biased or unrepresentative data visualization might be of some concern. Similar to the proximity sensor issue, the solution for this is higher quality sensors.

Power Supply: Our final prototype was originally independently powered and could function without an external power source. However, we quickly realised that the lights were drawing extremely high amps and resulted in the failure of the first power source. We were able to operate the prototype, but required an external source to power it. Moving forward we will ensure the circuit has an adequate power supply for its requirements.

Security: On a physical note, since the product is highly adaptable and interchangeable there is some risk for its security. Without any security features to secure the product to its environment, there is always the risk of it being removed or displaced, intentional or not. This is something we failed to consider in our initial design, but moving forward we would include a measure to ensure the product can be secured to its environment.



FUTURE POTENTIAL

Our overarching goal for the breathing tree is to create a fully synchronised city-wide system. The breathing tree was designed to be an adaptable product that could be situated across a range of public spaces. What we envisioned was numerous units across the city, each recording data in their own location, and feeding that back into a central system which users can access via the digital app/web service.

In terms of next steps, our objective is to polish the prototype and really ensure that it can function without oversight. Enhancing the sensors and coding the lighting patterns based on feedback we might receive is another change we would like to do in the near future. Being able to visualise data that is exclusively sourced from the breathing tree sensors is also a goal we would like to achieve. As it stands the data is a mix from externally captured data from other air monitoring sources and live data from its own sensors.

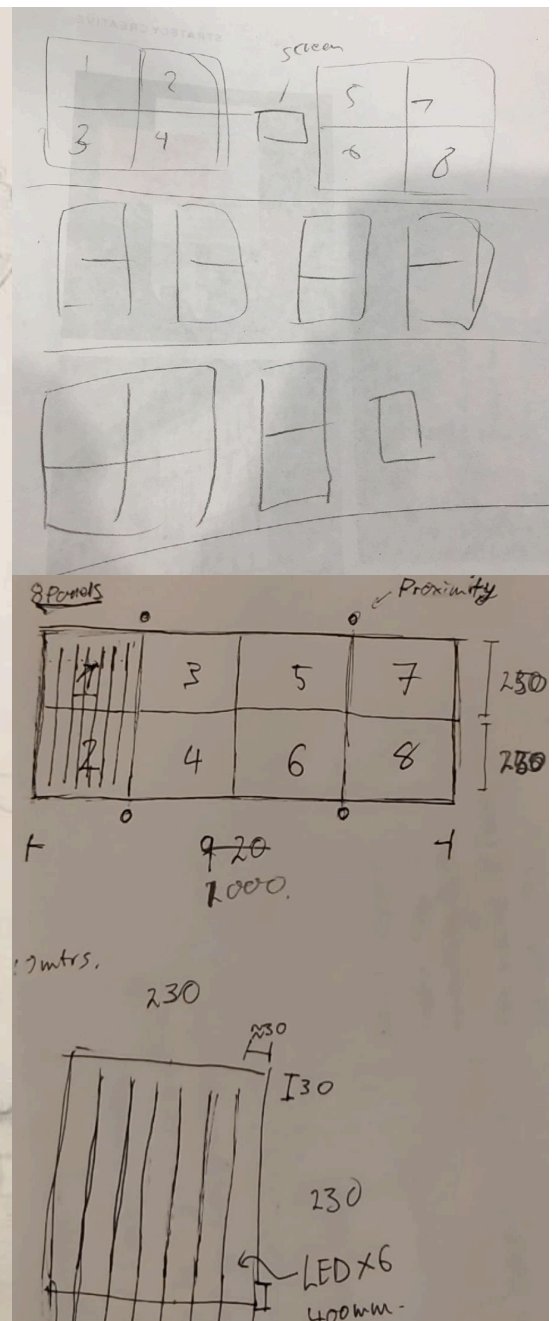
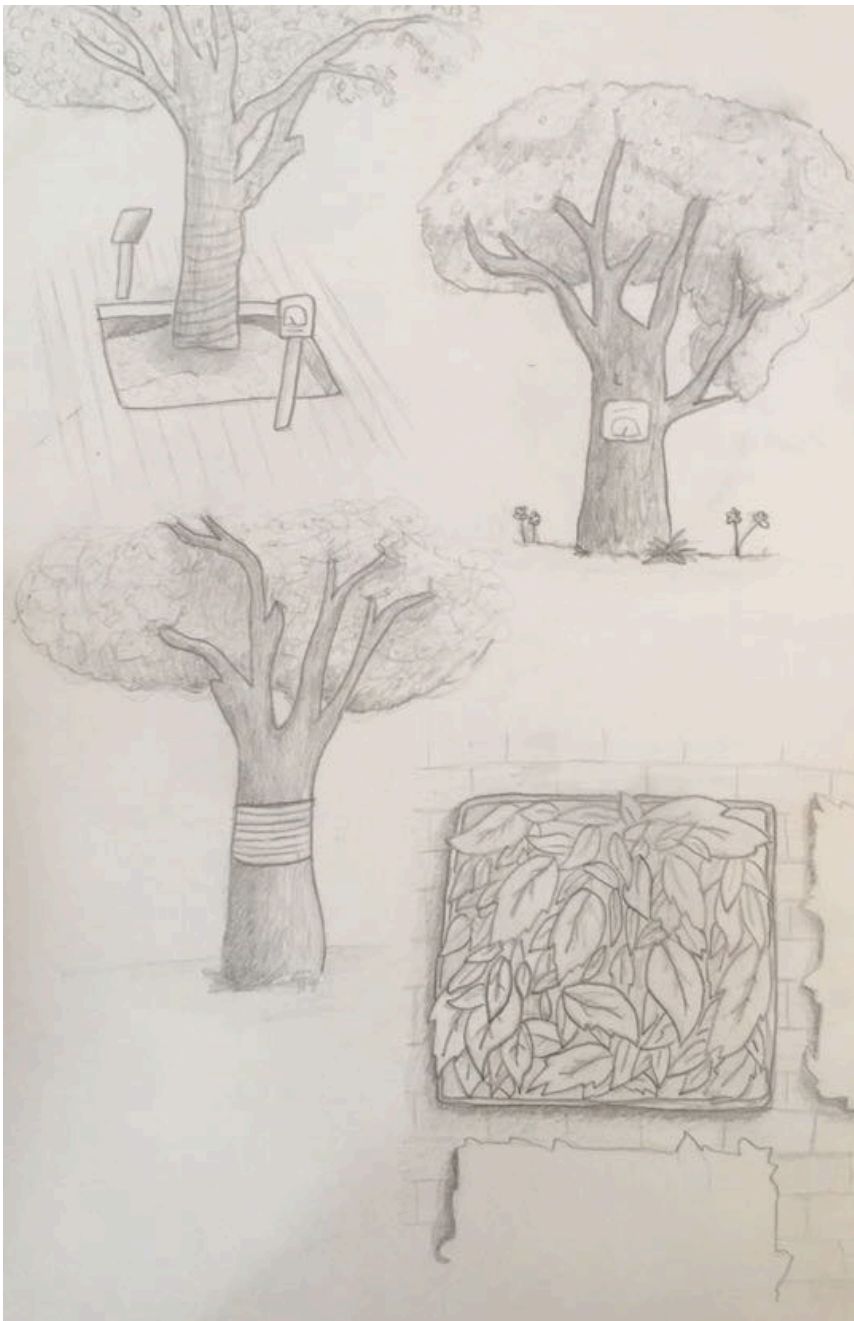
Ideally we would like to remove as much of the physical wiring between the different components as possible. For example we would like for each panel to have its own power supply and control unit so that it can be wirelessly linked to the control panel. This would allow for much greater flexibility with the design layout.

In terms of locations, we would really like to test out the breathing tree in train stations, on the platforms, and bus stops in the CBD. We would like to try it in these areas because they are locations that have extremely variable and sometimes severe air quality.

In terms of viability, the Breathing Tree is a concept that could be packaged as a commercial product. An ambient lighting display for vertical surfaces that reflects air quality in its area could draw interest from a range of potential benefactors and potentially even as a personal product. Currently there is a high demand for smart home and IOT products, which further enhances the business opportunity for the Breathing Tree.

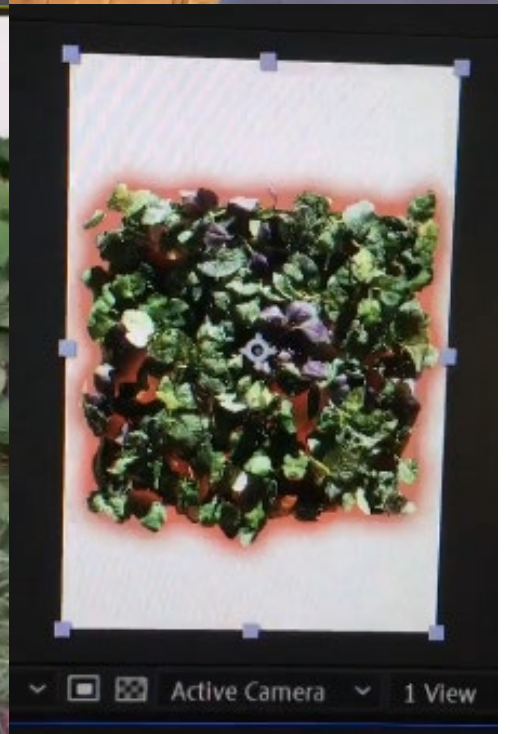
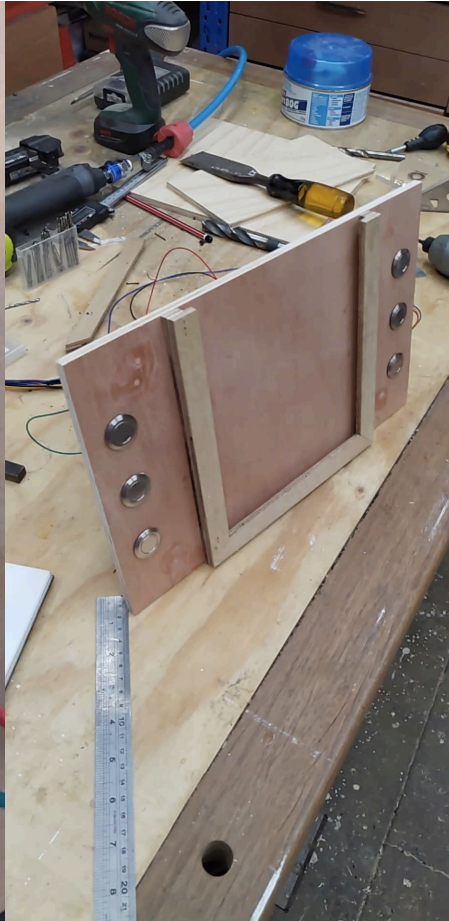
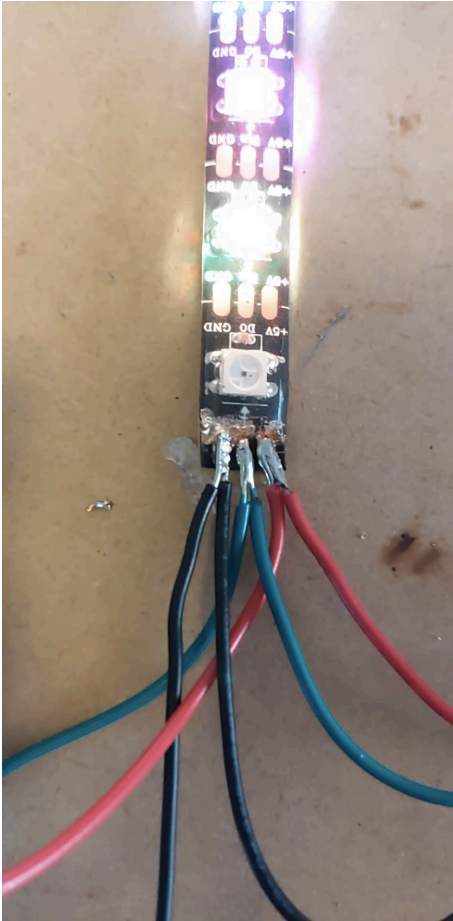


DESIGN MATERIALS





DESIGN MATERIALS





DISPLAY POSTER



B R E A T H I N G T R E E

The Breathing Tree is an adaptable display system, designed for urban green spaces or suitable public areas, intended to convey information about air quality within its locality.

Users can select different places to visualise on the panels with the buttons. Proximity and pollution sensors also detect and respond to the environment.





THE PROTOTYPE

