Product Design studio

Visual report / November 2019

FACE
D_TECT

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FACE D_TECT promotional video link

https://youtu.be/MklBujekyRk

Introduction

Project direction

Visual report

FACE D_TECT is an interactive artwork installation aimed at getting people to question an increasingly prevalent practice in the urban environment: computerised surveillance.

BNB & Co were tasked with augmenting the urban environment within the frame of supporting or empowering marginalised communities.

Our design process quickly proved that designing for these communities is not as simple as putting a microscope over it and hypothesising an isolated solution. Creating products for these communities involves creating with them or risking exploitation.

We sought to explore a way we could change the way people think about practices in the urban environment that further entrench inequality. How could we use people with power to lessen the strain on those without?

Computerised surveillance is quickly moving from future theory to lived reality. Through research we discovered that most people don’t understand that this practice more adversely affects those of us already on the margins.

How could we strike thought in these unaffected user groups, to question this practice, empathise with the most affected, to take up action?

Conceptual themes

Create empathy through self reflexive interactions in a bespoke artistic intervention in a way that raises critical thought on surveillance practice

Reflection is key to empathy, art is effective at evincing reflective thought.

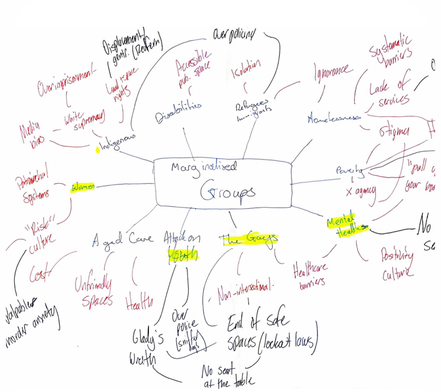
Communicate how our unawareness of algorithmic bias creates an exclusive urban environment that does not cater to all sectors of our communities

Through research we discovered that whilst most people were passively aware of this practice, they did not actively think it would affect them. Conversely - participants who identified as marginalised were terrified of the practice and already felt surveilled by government agencies.

Create an artefact that when interacted with leaves a lasting impression and seeks change of an individuals thought pattern in a way that poses the question: “am I okay with this?”

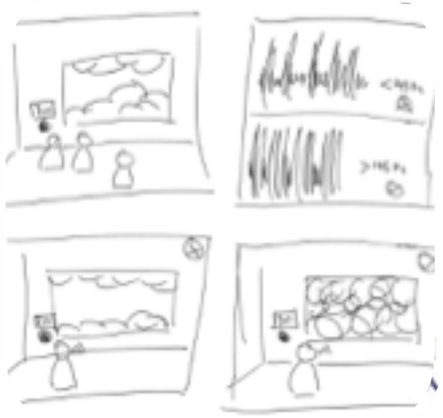
Design process

Background research



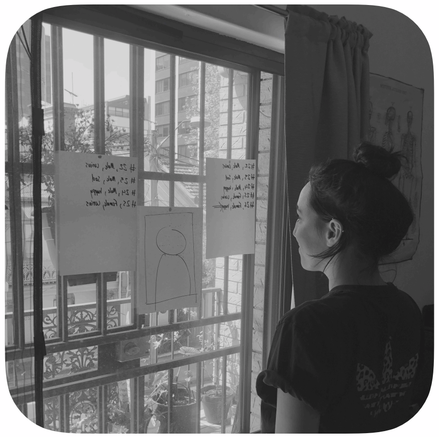
Researched our topic area and performed a comparative analysis of installations that help or promote awareness of marginalised communities.

Ideation



Based on our research, we sketched out initial concepts focusing on different areas and deduced to three hero concepts.

Conceptual testing



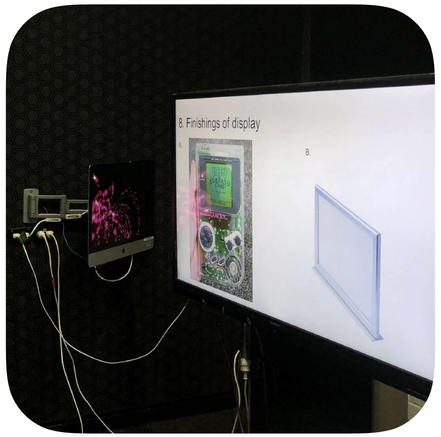
Tested the quality of our hero concepts through surveys, questionnaires, concept statement testing and experience walkthroughs of low fidelity prototypes.

Iteration

After synthesising our results, we chose the concept that gave the clearest message and provided the most opportunity for reflection and critique.

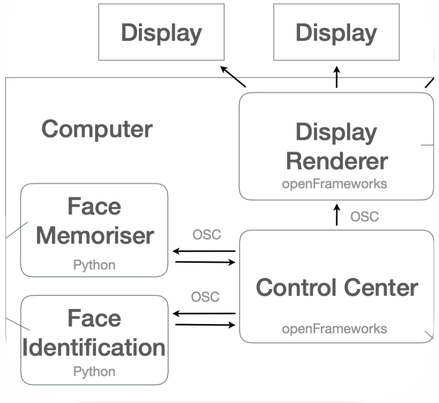
Design process

Desirability testing



With this testing method, we gathered peoples' perceptions of the concept from an aesthetic and informational perspective to gauge how clearly the message would come across.

Technical requirement gathering



To ensure feasibility of our product we researched all required hardware materials and frameworks we would need for the software.

Interface generation

Using Figma, the interface was designed to convey a particular mood and emotion, likening itself to a terminal input and based on image recognition white paper diagrams.

Code implementation

Using openFrameworks to communicate facial recognition data and Processing to display this information on screens, we visualised our designs.

Design process

Material sourcing

We obtained materials through different avenues such as gumtree, Bunnings and other hardware and electronic stores.

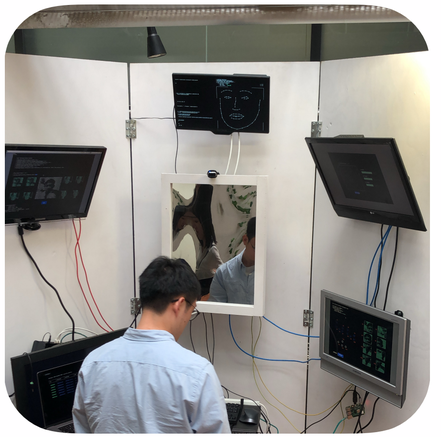
Construction

The installation was constructed with timber, TV’s and cables connected to a server running of a single computer and multiple Raspberry Pi’s.

Overcoming challenges + refinement

Technical challenges meant we had to innovate and prioritise certain aspects of our design while still communicating what we needed to.

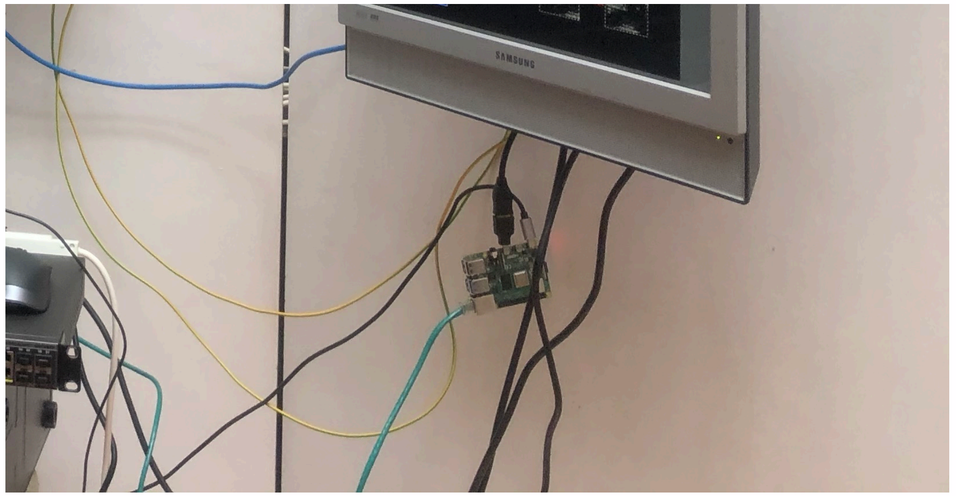
Exhibition



The final prototype was presented and we were able to observe users interacting with our installation.

Core functionality

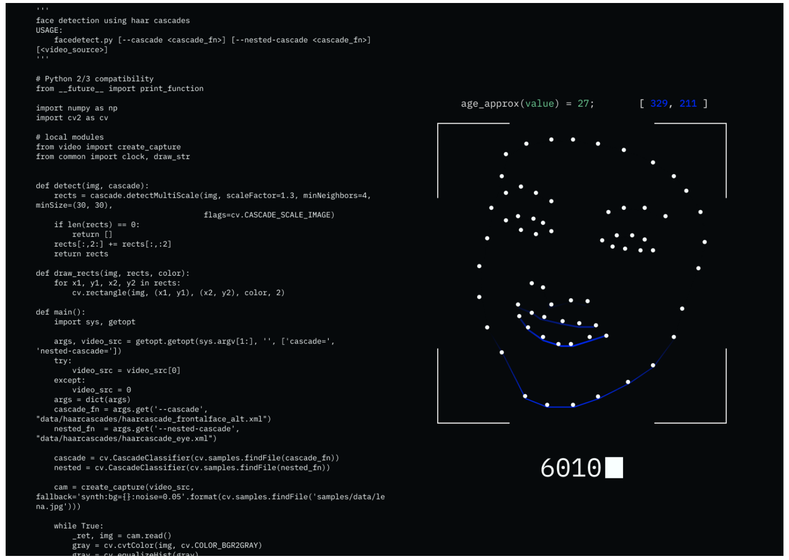
Art gallery visitors are first drawn in through the presence of the work - it draws interest as it is haphazard, menacing, and active.



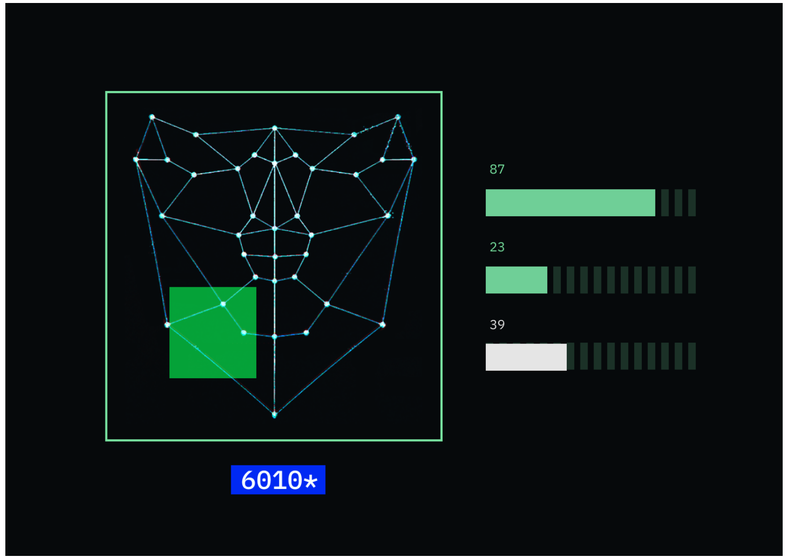
As they’re making sense of the work - the smart mirror registers their face as a new ID and starts the capture process.

Core functionality

First the users face is checked against other similar faces to check it is a new capture - ASCII is used to create a close representation of the user without being too literal.

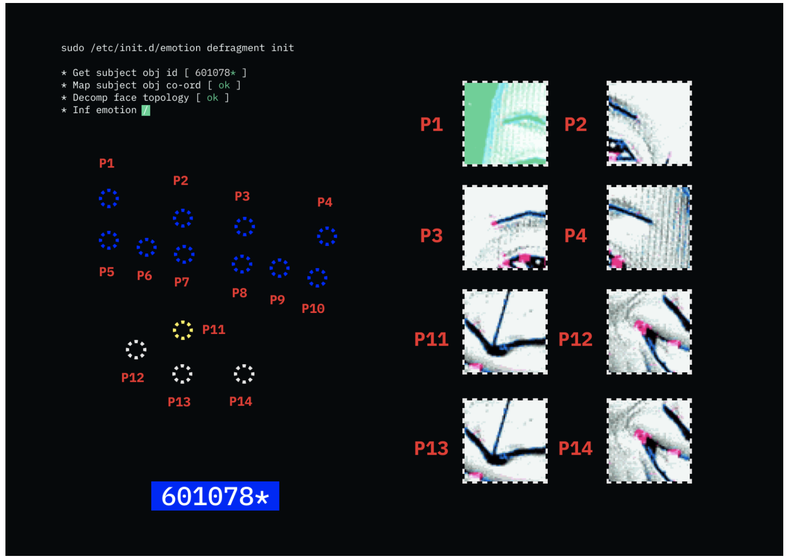


The users facial landmarks are mapped and drawn through a neural network, inferring their age. This adds to the ID below each screen program.

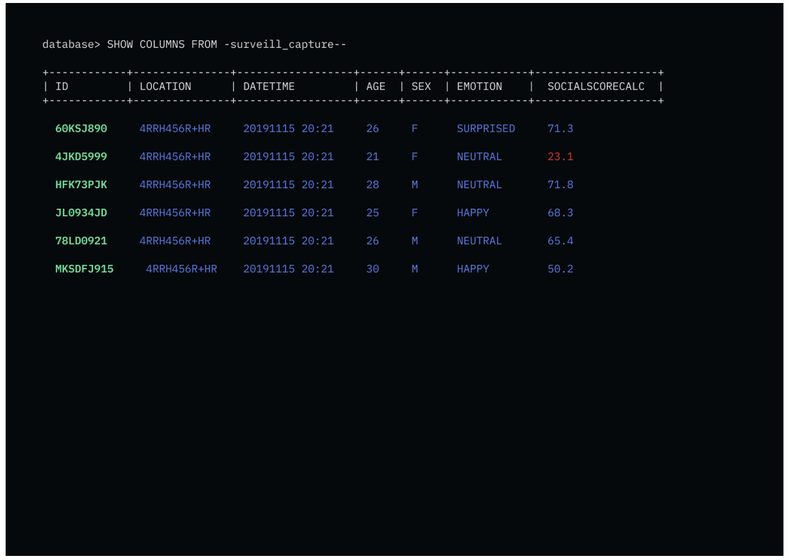


These landmarks are then triangulated using a Delaunay algorithm to form a topology map, inferring their sex. The ID grows - reducing the user to a number.

Core functionality



The users face is then recomposed as pieces from landmarks - completing the capture process.



database> SHOW COLUMNS FROM -surveill_capture--

ID	LOCATION	DATETIME	AGE	SEX	EMOTION	SOCIALSCORECALC
60KSJ890	4RRH456R+HR	20191115 20:21	26	F	SURPRISED	71.3
4JKD5999	4RRH456R+HR	20191115 20:21	21	F	NEUTRAL	23.1
HFK73PJK	4RRH456R+HR	20191115 20:21	28	M	NEUTRAL	71.8
JL0934JD	4RRH456R+HR	20191115 20:21	25	F	HAPPY	68.3
78LD0921	4RRH456R+HR	20191115 20:21	26	M	NEUTRAL	65.4
MKSDFJ915	4RRH456R+HR	20191115 20:21	30	M	HAPPY	50.2

This is then catalogued as an ID with the captured information. When the user has been processed they cannot interact with the artwork again - the mirror displaying their ID if they glance into it.

FACE D_TECT

BNB & Co

This actually happens to you a lot.

You are captured, analysed, inferred.

It's hard to know when, by who.

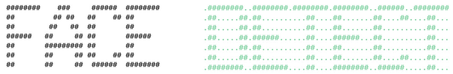
For what purpose.

You should ask about it:

https://bit.ly/33gGmFz

The unknowing aspect and being unable to interact with the artwork is designed to nudge the user into viewing the placard - a message asking them to pose a question.

The QR code opens on a mobile led website with a CTA to send an email to the government department that oversees public surveillance.



Hello, you somehow look familiar.

*No imagery or data from this project is stored for longer than necessary for your experience.

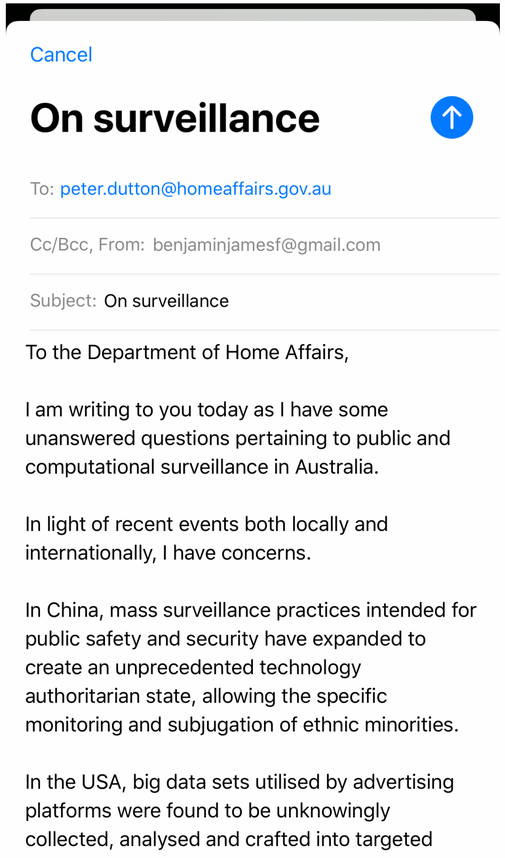
Clicking below will open your mail application with an email addressed to the Australian Department of Home Affairs.

It has questions we think everybody should be asking.

Feel free to add any of your own.

Open in mail

Users can then send an email from their own email address that asks Peter Dutton questions we feel need answering.



When you email a government department - they actually have to reply - creating post experience elements and giving users the ability to decide themselves if they are okay with this practice.

I ask the Department of Home Affairs:

- To what extent is computerised surveillance employed in Australia? What is the intent for future surveillance of this type?
- What laws govern transparency and accountability around the government's use of surveillance technologies? Are there plans for such legislation?
- What research has the government conducted or planning to conduct on the societal effects of data surveillance, specifically on the adverse affects on marginalised peoples, further entrenching inequality, and the erosion of public freedom?
- What controls are in place to prevent such systems to be used in a way that is discriminatory, disproportionate or otherwise unlawful?
- What oversight does the Government have on the collection of personal data by corporations?
- What measures does the Government take to curb corporate interests in maximising profits at the expense of peoples' privacy and other rights? What measures are planned?

Implementation

Hardware and software requirements

To work efficiently and deliver the experience we designed the system as three congruent logical components:

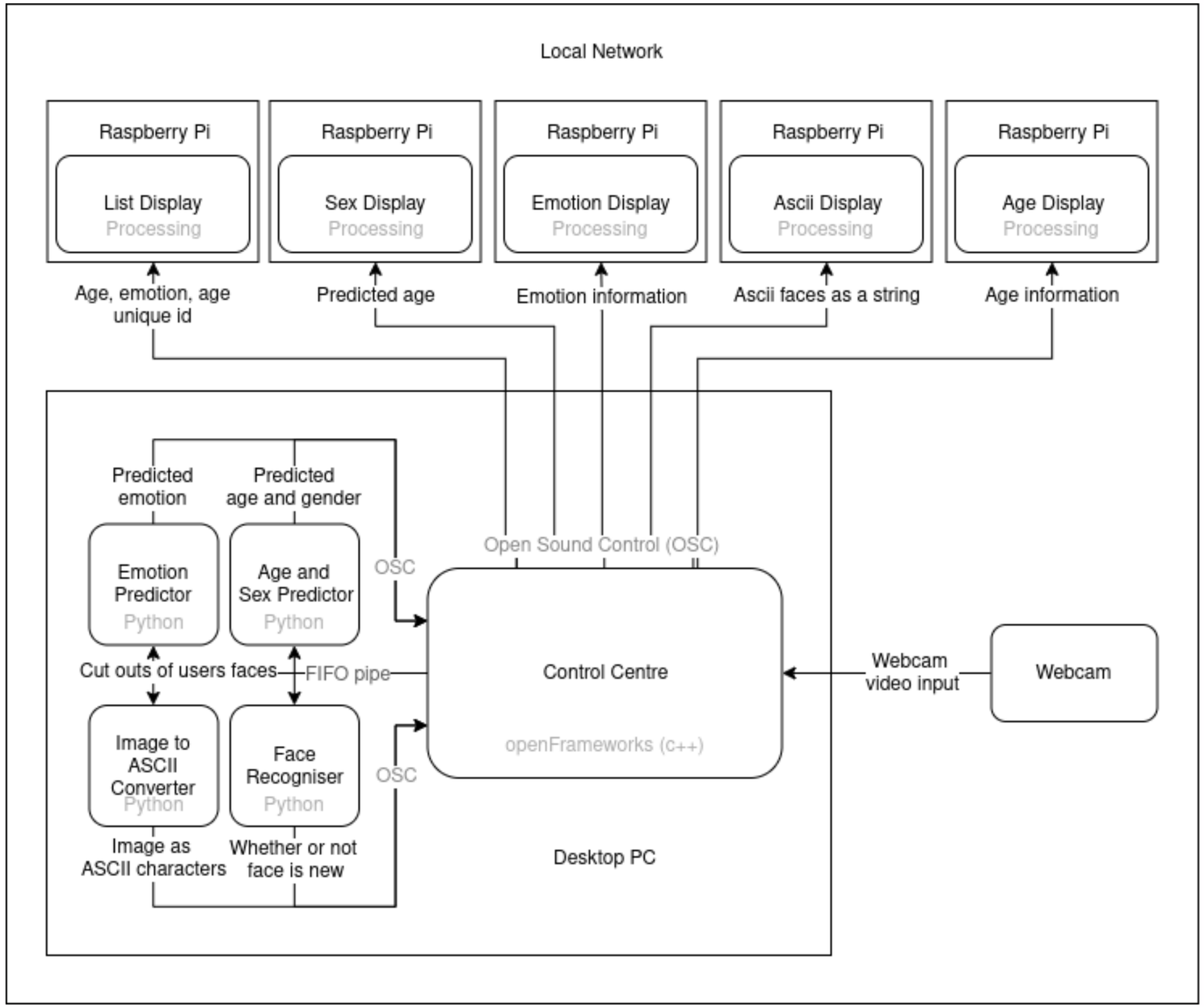
A control centre that was responsible for managing the dataflow, logic and communication of the display. It receives webcam input and passes it through openFrameworks addon ofxFaceTracker to find users faces and cuts out the regions of interest, saving the images via a named FIFO pipe.

The python processes run an OSC server and when alerted that a new face was present, read the face and ran it through their respective algorithms. These algorithms used pre-trained models and neural network architectures such as Convolutional Neural Networks, MobileNetV2 an Inceptionv3 from libraries such as Keras and TensorFlow to predicted characteristics of users before passing the results back to the control centre.

A number of Raspberry Pi's responsible for handling input data, formatted by the control centre, via an OSC server and rendering it in a Processing sketch.

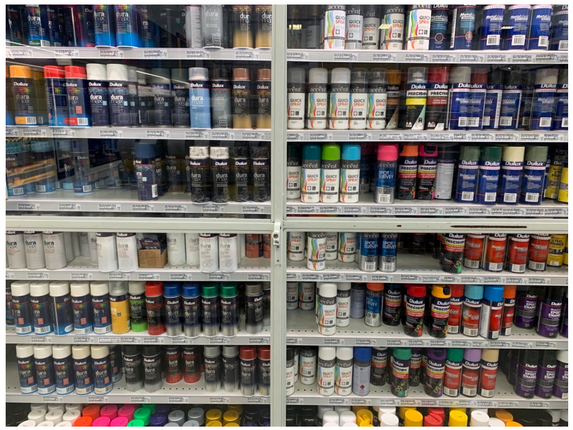
On the following page a diagram of each process of this project, showing a control centre that receives webcam input, passes a cutout of the user's face to each neural network, receives the returned value and passes it to each display process. As for the physical implementation, we collected second hand screens from services like Facebook Marketplace and gumtree and used a plethora of adapters to fit our Raspberry Pis to the range of inputs these screens required. Each computer communicated on a local area network over static IPs stored in an environment file.

Technical flow diagram

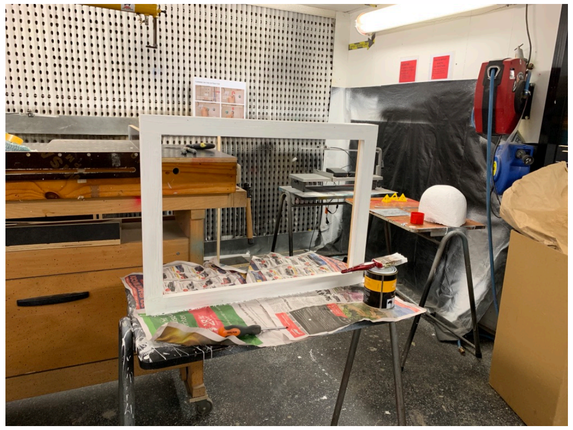


Illustrated Setup

Constructing frame



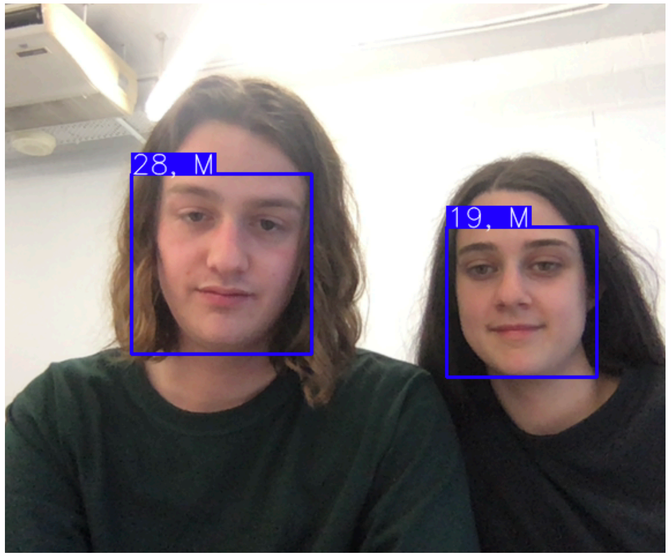
The panels were constructed as the the foundation of our installation. Three panels were hinged together to keep it structurally sound as monitors would be hung along them. We chose to paint it white to draw the focus to the displays.

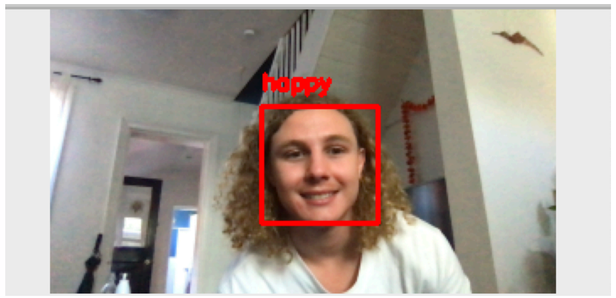


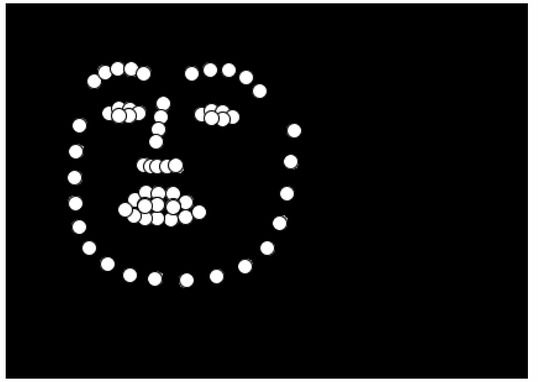
The mirror was the centre of the piece, we placed a monitor behind a tinted reflective material to create a ‘smart’ mirror that we intended to display a face detecting sketch through. We also painted it white to blend in with the rest of the structure.

Illustrated Setup

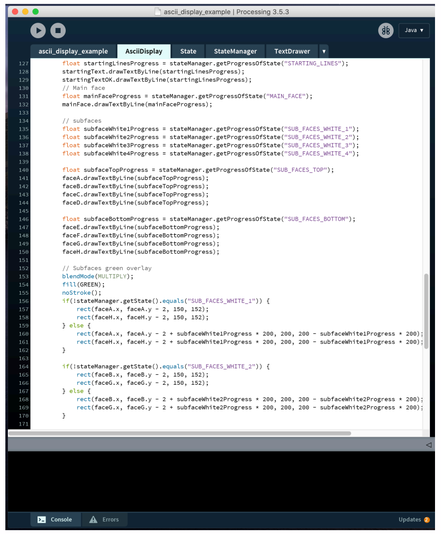
AI algorithms and Processing



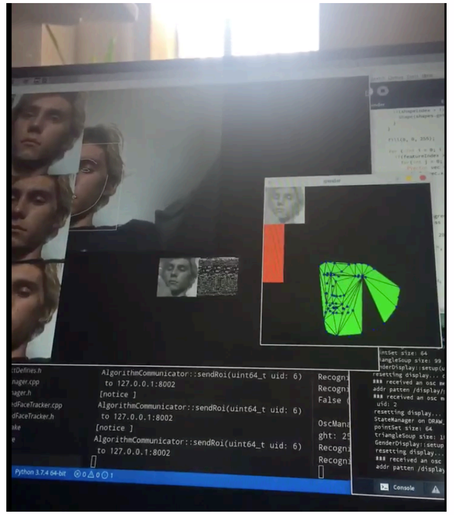


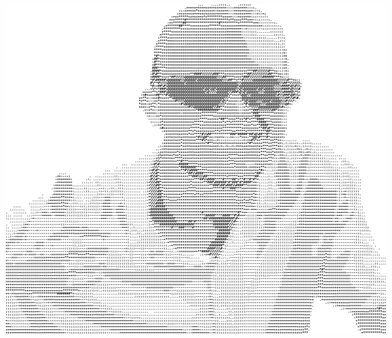


Iterating on processing sketches



The Processing sketches were made initially with dummy data to get the main functionality working. It would then be connected to the real data once complete.





AI algorithms were researched and obtained from multiple sources on GitHub. We tested them for their accuracy.

Illustrated setup

We screwed mounts into the wall to hold the monitors in place.

It was constructed in a three panel triangle fashion to support the weight of the displays whilst being free standing

A local wired network was created between the Raspberry Pi's and main controller via OSC - these were initially meant to be in the back of the display but a malfunctioning connector meant we had to bring them to the front due to unplanned cable lengths

The server was placed in the centre to reach all the necessary cables and connect the monitors to the network.

Future versions

Future versions of the work will be focused on refining the visual aspects of the construction. User testing lead us to construct the artwork haphazardly with exposed electronics: *“as if I wasn’t supposed to see it, it wasn’t made for me.”*

We still would like to reinforce this sentiment in a cleaner, more polished way.

The interaction model of the work needs refining - our intent was to have a logical flow throughout the radiating screens as the users face was decomposed. Technical issues (we hypothesise that one displays connecting cable internally frayed during construction) meant we had to remap this flow which caused confusion and interface trouble as the sketches had been coded according to each intended screens specific dimensions.

We envisaged the screens turning off and back on with an old CRT monitor effect as each program ran to draw the users eye to each screen - our use of timed delays in the Processing sketches rendered this difficult - we will be implementing event based state change logic in the future.

Future versions

Instead of having a plaque to direct the user to our mail website - we are going to implement a new screen that puts the users ASCII face into a QR code (pictured) leading to higher use and tightening the works unknown aspects further.

FACE D_TECT promotional video link

https://youtu.be/MklBujekyRk

In case you missed it