ÉILIS O'REILLY

KELVIN

FINAL YEAR PROJECT

KELVIN

Be part of the solution, not the problem.

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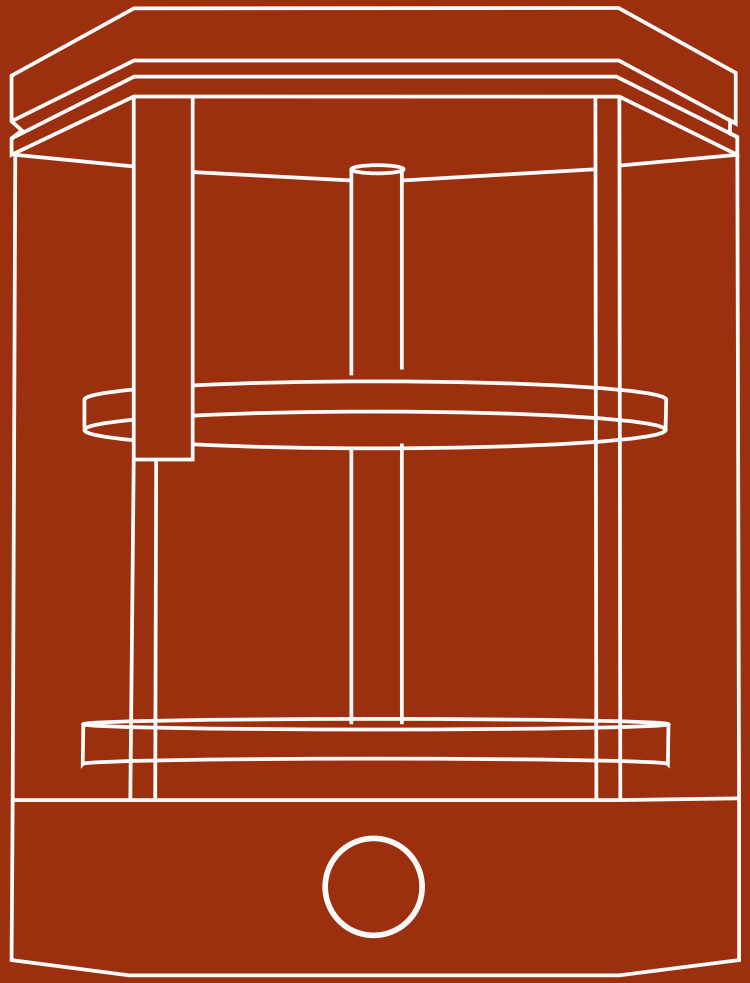
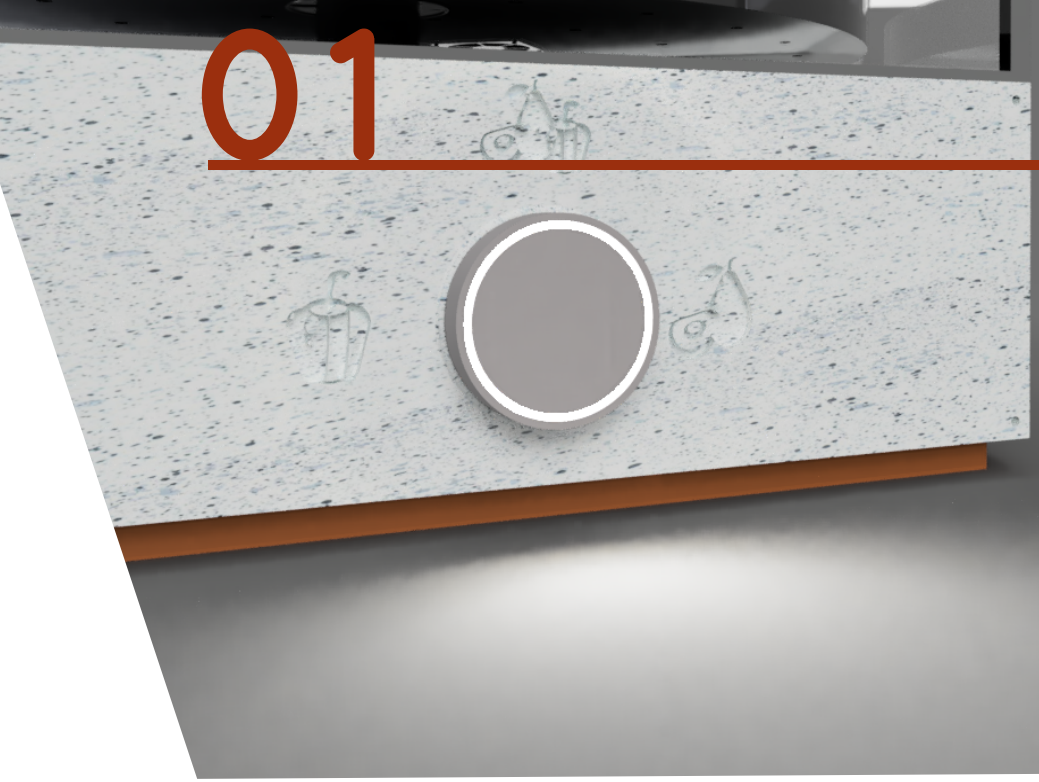


Globally, **1.3 billion** tons of food is thrown out a year, around **1/3** of this comes from households. The rising food losses and waste are expected to have detrimental environmental and economic impacts on society. But some **250,000 tonnes** of food waste can be prevented by just a one-day increase in product life. In recent years there has been a growth in awareness of the harm that plastic pollution causes to the planet. It has driven a number of campaigns to remove plastics from the daily lives of consumers. Numerous supermarkets are recently trying to go package-free particularly in the Fruit & Veg department. At present removing plastic entirely from the food supply chain is not the best solution when it comes to reducing food waste. If plastic packaging is removed from foods there will be an increase in food waste by **25%** . Plastic aids in extending the life of F&V both in the supermarket and in the home. As supermarkets begin to eliminate plastic packaging there is a need to put in place a sustainable method of dealing with the storage of fruit and vegetables that will extend the storage life.

My vision for KELVIN is to create an alternative environment that will prolong the storage life of fruit and veg in the home and in an aim to prevent food waste.



01

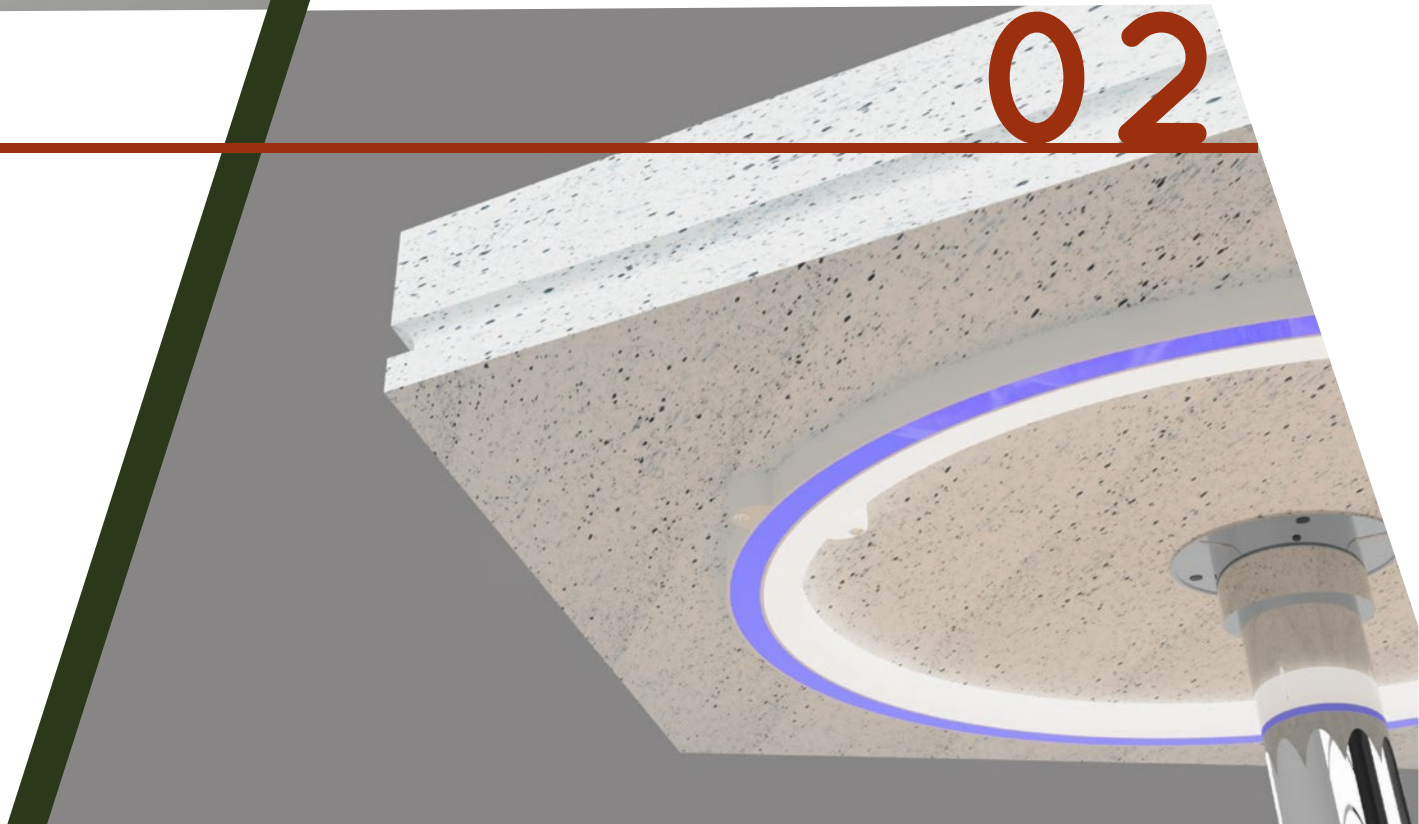
TEMPERATURE CONTROL

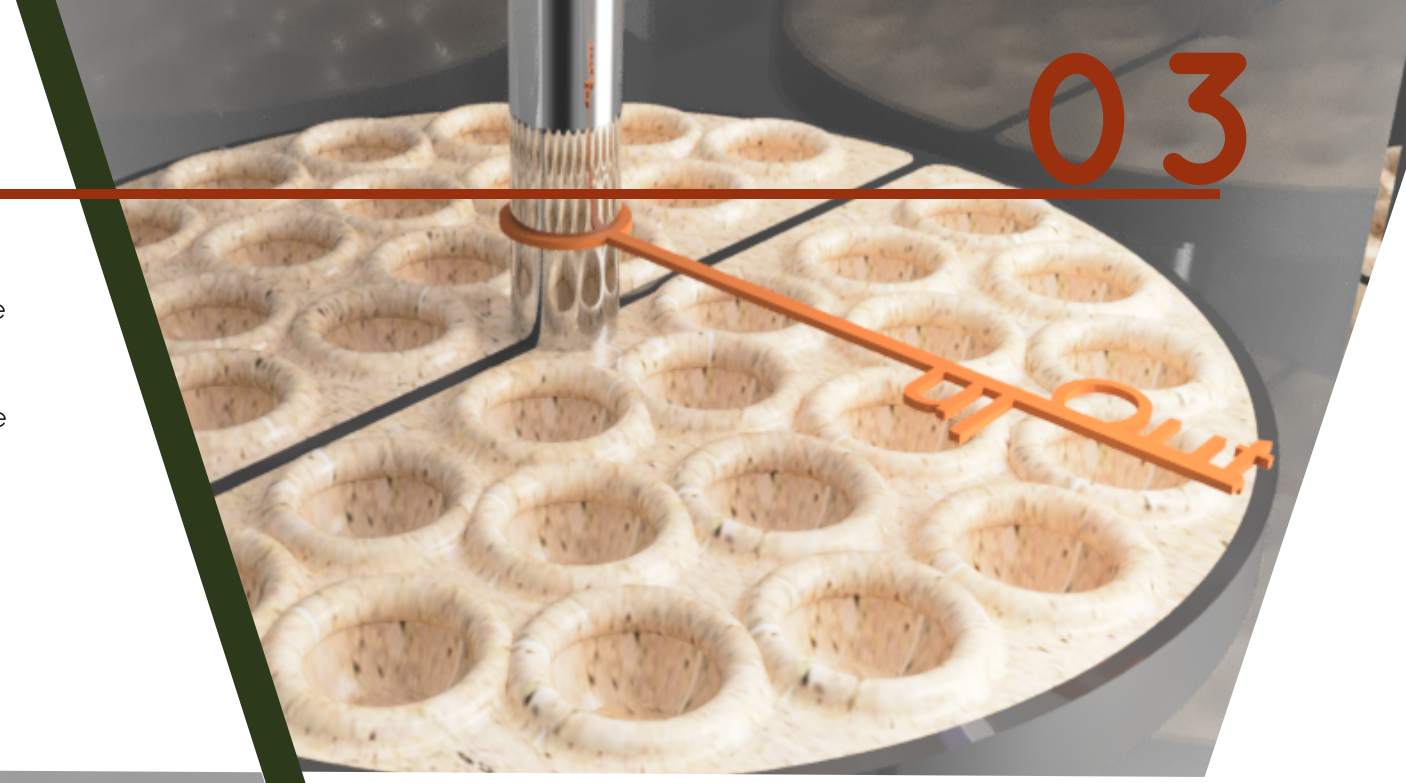
Kelvin gives users the option to choose from 3 different temperatures, according to the type of produce being stored. One temperature option if for the storage of fruit, another for the storage of Veg, and the third option is a temperature of between 7-8 degrees which both fruit and veg will keep fresh in.

02

LED & UV

The use of LEDs has shown to improve quality and photo-nutrient level of fruits and vegetables, without the use of harmful chemicals. UV is very effective at removing unwanted ethylene. Ethylene is a gas released by some fruits & Veg that causes product to ripen faster therefore the removal of ethylene will ensure produce will stay fresher for longer





03

DATE DIAL

Attached to the centre pole is a date dial. This guides users where to stock new produce in from and where to take produce out from. This helps to give time to new Fruit & Veg to ripen and for the older items to be eaten first resulting in less food waste

04

DARK STORAGE

Vegetables such as potatoes,tomatoes, garlic and roots store best when kept away from direct sunlight. These types of produce stay fresh for longer when stored in a cool or room temperature, away from moisture and heat. Therefore the dark storage is not temperature controlled and provides the perfect environment to keep produce fresh in.

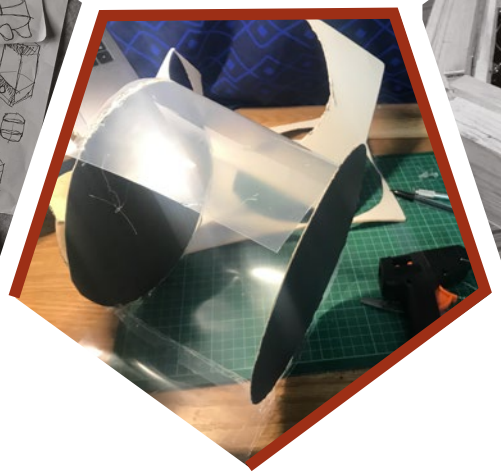
DESIGN PROCESS

EMPATHISE

DEFINE

IDEATE

PROTOTYPE



TEST


RESEARCH
IDEATION
TESTING
Methods of Reseach
Key Findings
Survey Results
Competitors
Swot Analysis
Inspiring quotes
"Plastic Packaging is often heralded as a means of avoiding food waste but it has not provided a comprehensive solution".
With the removal of plastic packaging, there will be a 25% increase in food waste.
20%
60%
"Many vegetables and fruits that we are keeping in the fridge, are actually suffering in the fridge, from the cold, but we don't know that," said Ryou [35]
Future Solution
CONCEPT 1
CONCEPT 2
CONCEPT 3
THE PROBLEM
THE PROBLEM
THE PROBLEM
KELVIN

01

EMPATHISE

I carried out research to help gain an empathic understanding of the problem surrounding food decay. I consulted a food waste expert and completed a tour of a waste management center. This help me gain a deeper understanding of the problem. I then carried out Interviews, observations, a Focus Group & a an Online Survey to engage and empathise with those who experience food decay in their homes.

USER INVESTIGATION

A user investigation was conducted as a means of gaining empathetic, actionable insights into the key users experiencing food decay. The aim of this research was to inform the design of the product, so it may address the real needs of the user in a meaningful way. Observations were carried out to identify common storage habits, Interviews helped with understanding the user and their problems, An Online survey helped me to gauge the problem in different households and finally I the Focus group helped me identify methods consumers are currently using to aid in preserving their fruit and vegetables.

PROBLEM

20% of fruit and vegetables harvested for human consumption in the world is lost due to spoilage. A major cause of household food waste is products not used in time. Many reactions that cause spoilage of fruit and vegetables occur during storage.

Current storage methods for F&V contribute to faster food decay. Almost all methods of storage involve piling the produce together in a bowl, basket or drawer which results in produce at the bottom rotting. There is a gap on the market to provide storage that will slow down the decay of fruit and vegetables in an aim to prevent food waste.

02

DEFINE

I put together the information I gathered during the empathise stage. I then analysed my observations and synthesized them in order to define the core problems that I had identified. I then carried out a market analysis to measure the current need for a storage unit that will prolong the life of fruit and vegetables.


Survey Results
Big PROBLEM
Less Plastic
More food waste
THE BEST WAY
FOOD WASTE WORSE THAN PLASTIC FOR CLIMATE CHANGE
Are Irish supermarkets doing enough to reduce their plastic packaging?
Ways to seperate the F&V so they don't hit each other
APP IN tray to HELP Produce from Browning + allows air circulate
Counter top unit?
Free - Standing unit?
OK option but too complicated would need instructions
Verry Good option arrow showing where to stock from and where to take from
Would not work for F&V that is not round
Not good fail too many colours and way too complicated
Would not work not good option
THE PROBLEM
Ethylene is a colourless and odorless gas. Every fruit has a certain level of ethylene production throughout its life-cycle. However, in some fruits, ethylene levels shoot up when the fruit starts ripening. Ethylene accelerates ripening and decay, when present in the surrounding atmosphere of fresh produce
FEATURES
"Plastic Packaging is often
food waste but it has not
provided a comprehensive
solution".

MARET ANALYSIS

"Food preservation is no longer a concern just for industry-related clients, but for consumers as well," Dr. Paula Hock,

88% of Irish people recognize the importance of eating well. The presence of health-conscious consumers in Ireland is likely to boost the consumption of fruits and vegetables, thereby resulting in increased food waste generation.
Every household in Ireland is responsible for **117 kg** of Food Waste coasting between €700 and €1000 per year. Kelvin can make a big difference in the battle against food waste, and help save money.

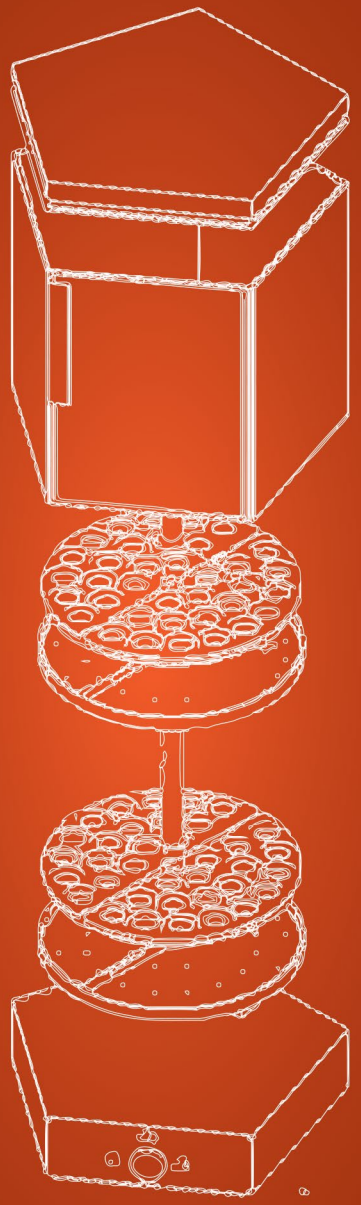
03

IDEATE

I generated ideas through sketching, CAD, moodboards and rapid prototyping. I narrowed down my ideas to 3 concepts. I then focused on these 3 concepts to eventually combine aspects of each concept to define my final design. My initial idea was a free standing storage unit, but after discussing with users and through ideation it was found that a counter-top unit is the best option as users will see their produce which will encourage consumption, and therefore result in less food waste. I then began validation testing which aided in providing the best possible solution to designing a product to prolong the storage life of fruit and vegetables.

SKETCHING

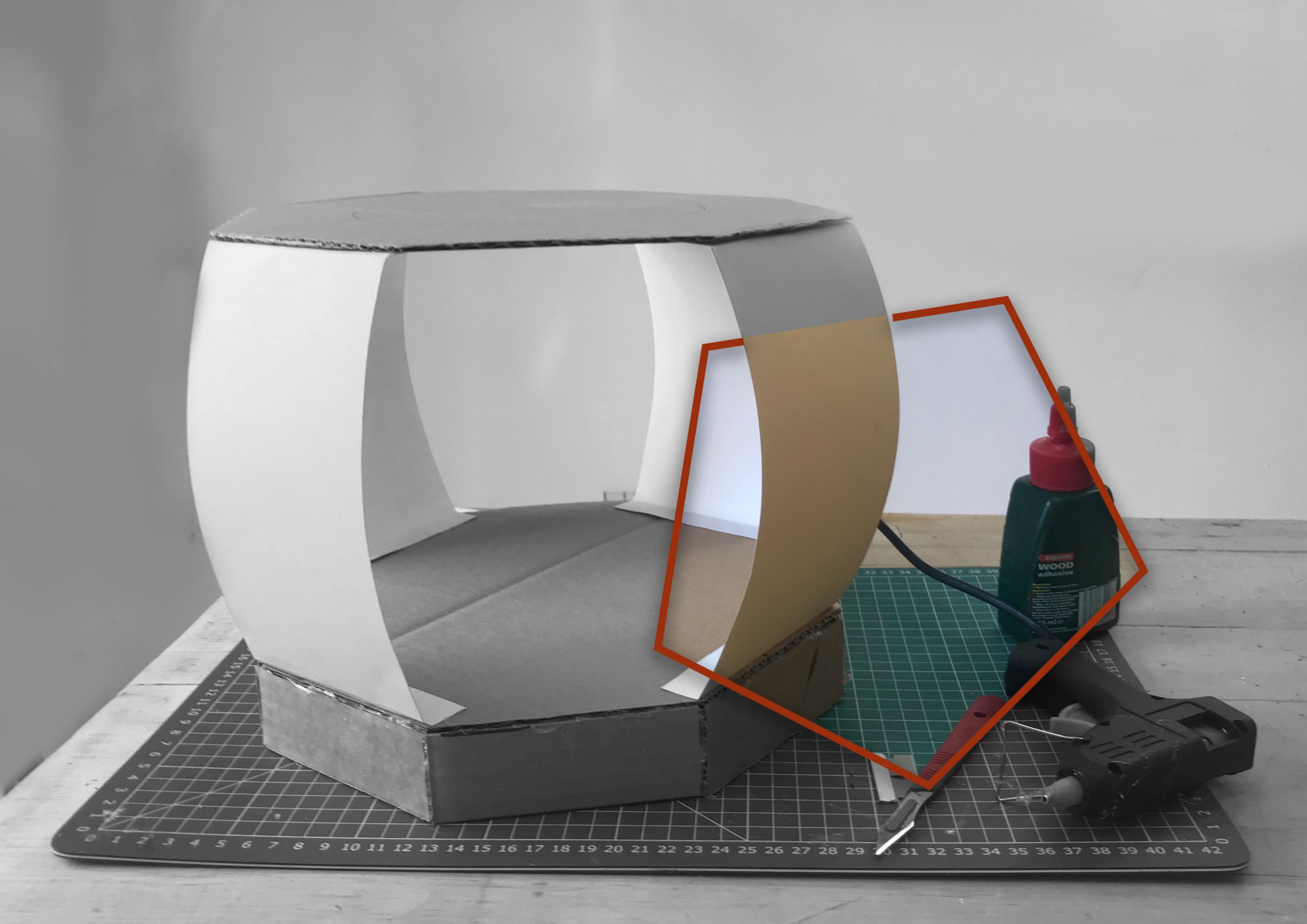
SKETCHING

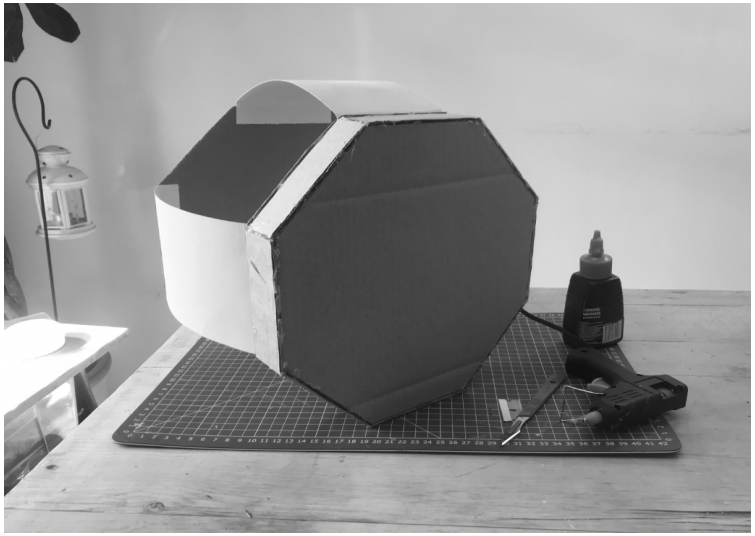
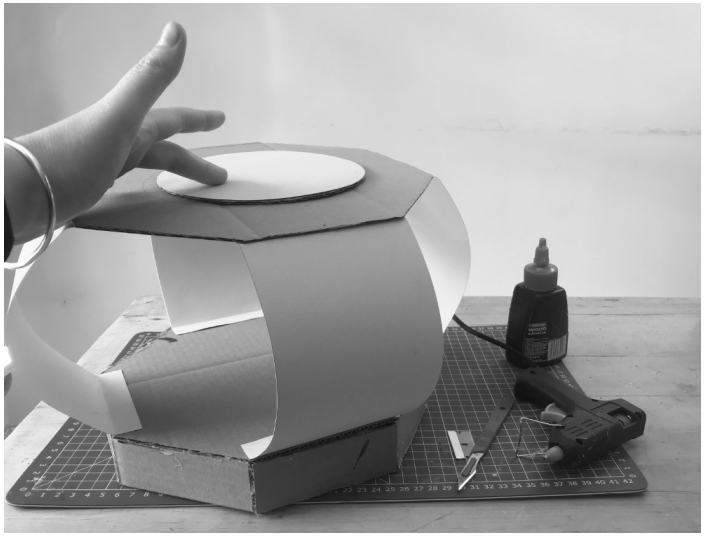
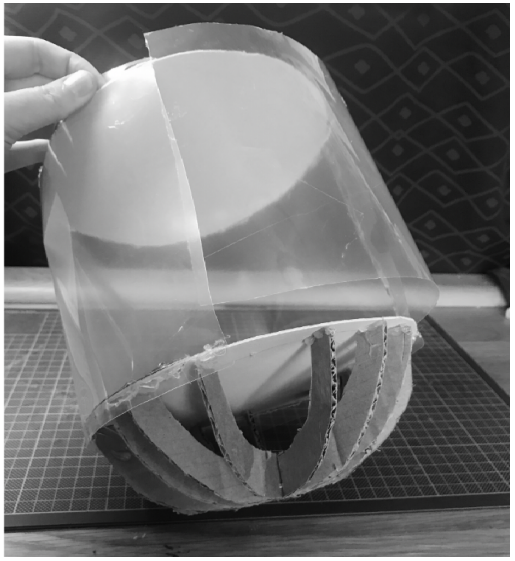
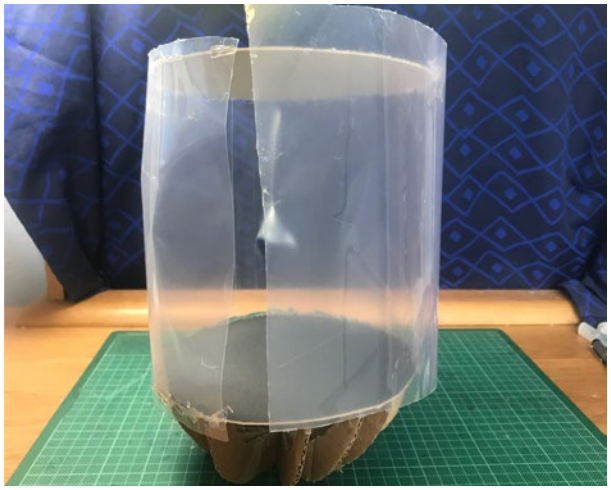
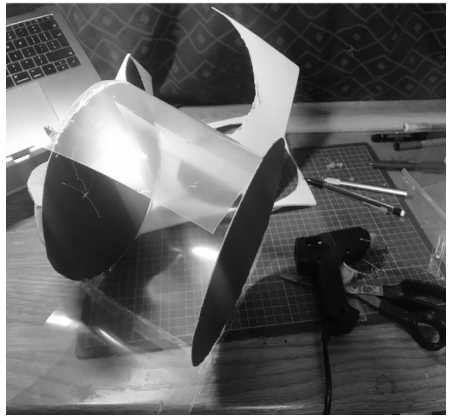
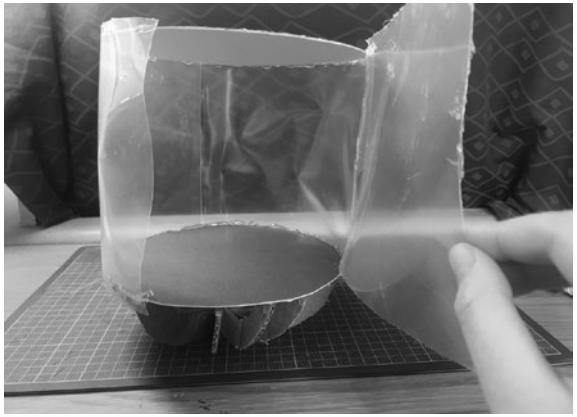



PULL-OUT
DRAWERS
PROMARKER

PROTOTYPE

In order to define the shape I constructed small scale prototypes made from cardboard. Once I had decided on the overall shape I then focused on how the inside of the unit will look. To do this I used various items found around my house. This helped me assess dimensions and scale the unit needed to be. I then Finalized my concept and made a working prototype.


WOOD
adhesive

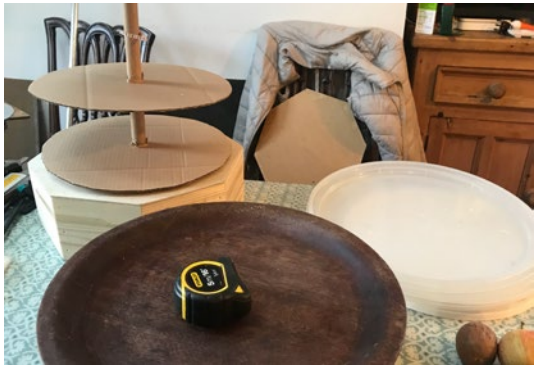


WORKING PROTOTYPE

In order to finish my project I created a working prototype. The final model was made entirely by hand over a 7 week period. The construction consisted of a wooden hexagon base and top,clear acrylic side panels, Cork shelves along with some other materials and electrical components.





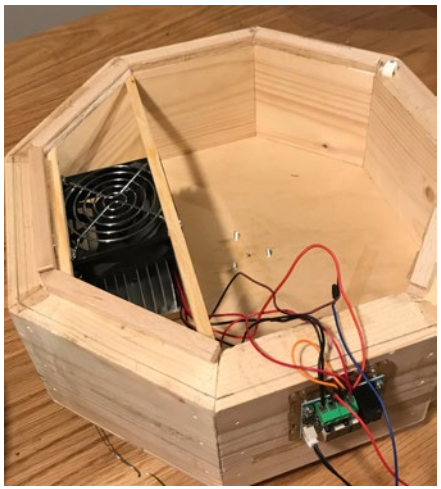


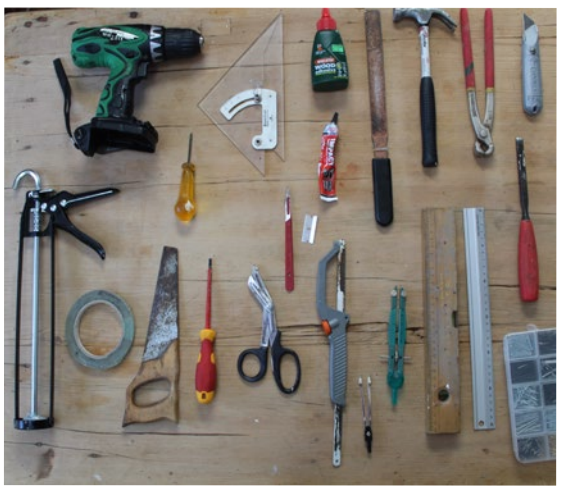
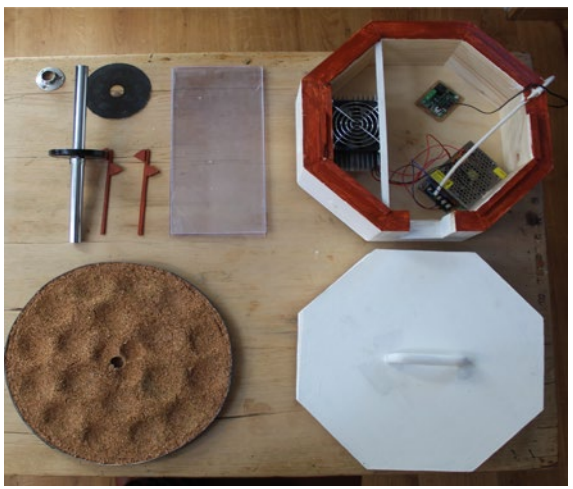






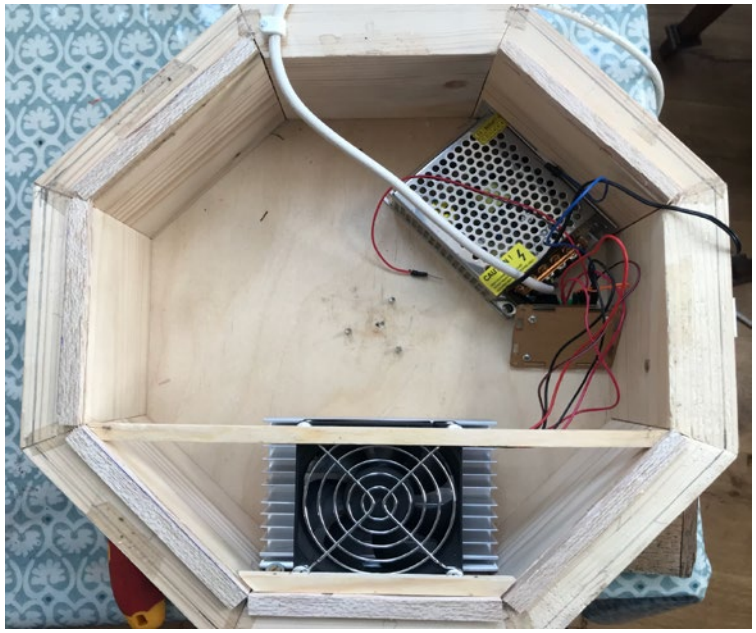

THE ECONOMY SHEET
HOW TO WORK WITH

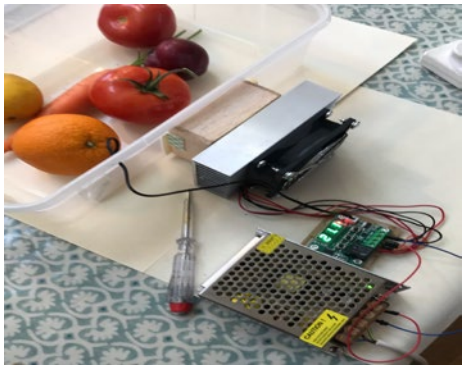



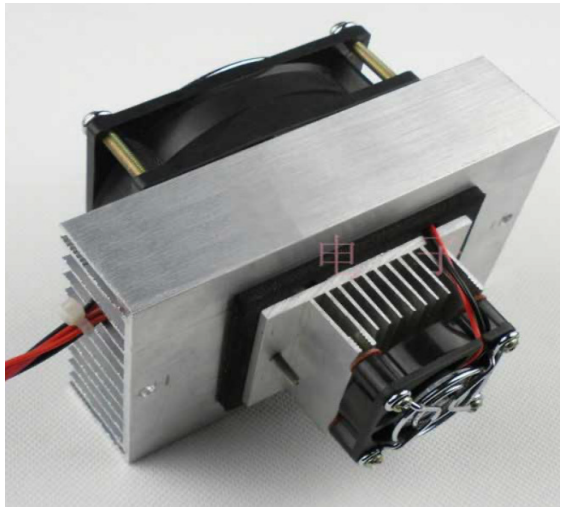



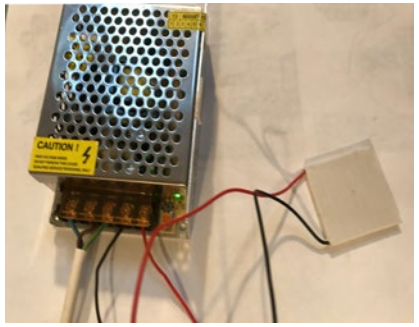
TECHNOLOGY VALIDATION

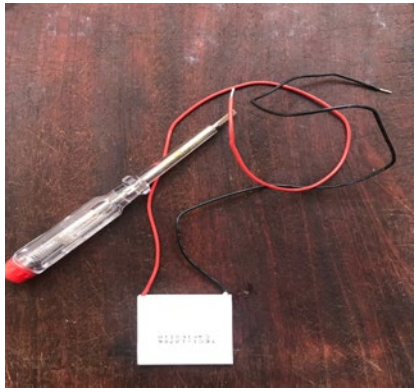
The method of cooling chosen was (TEC) Thermoelectric cooling. TEC is the most environmentally friendly option to cooling as it does not use chlorofluorocarbons or other chemicals that may be harmful to the environment. TEC operate by applying a low voltage DC power source to a TE module, heat then moves through the module from one side to the other. One module side, is cooled while the opposite side simultaneously is heated. The temperature is controlled using a thermostatic switch and the unit is power by a 12V power supply.











05

TEST

Throughout the process of this project I aimed to test all prototypes I made with users, although due to Covid 19 lockdown I was only able to test with my family, Although I strived to be as creative as possible and find a solution to this problem. One Test I was able to carry out was to ask users to recreate my design using plates and glasses in their homes. I gained a lot of positive feedback from this test. When I finished constructing my working prototype I had my family interact with KELVIN and I took on board all feedback.

USER TESTING

TESTING WITH WORKING PROTOTYPE

USERS RECREATING PROTOTYPE IN THEIR HOMES

THANK YOU!

KELVIN

FINAL YEAR PROJECT