

# Research and Decoding

Zeiss is an interesting brand to decode, functioning in a range of industries all defined by precision, clinical sterility and subtlety, it does not have an easy to read 'face'. The main attributes I see as defining Zeiss's brand code are as follows:

## Historical President

Zeiss has a very long history and it makes no attempt to shy away from this, they use their established status to suggest reliability and heritage as if they are already intimately connected with their customers / clients.

## Dominant Industry Leaders

Similar to the above point, Zeiss does not shy from the fact they are almost completely dominant in the fields in which they operate, they take a similar approach to apple in proposing their products as the 'default' and 'best in class' even if their competitors can match or outperform them.

## Precision Engineering

Core to everything Zeiss does is precision as their technology relies on the utmost accuracy and dependability which manifests itself in a matte, smooth machined material language and can be seen throughout their online and promotional material.

## Accessibility / Enabling

Core to the camera and sports optics range as well as their glasses is the idea of allowing the user a greater ability, to see further, to see more clearly, to explore or to more accurately aim. Zeiss's technology is inevitably imbedded inside a product or machine thus Zeiss assumes the role of enabler. The strapline "We make it visible." Crops up in their promotional material again and again.

## Prestige / High Expense

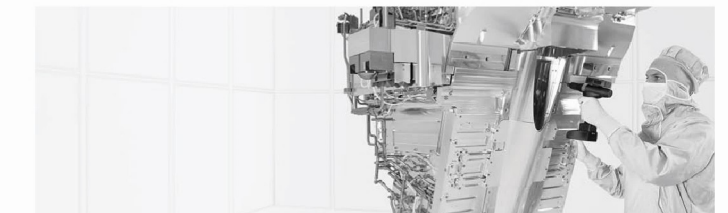
For better or worse, Zeiss products and services always exist at the high end of whichever cost range they operate in, this is a core part of their products and a potential stumbling point for diversification / expansion.



Carl Zeiss



Zeiss lense press image



Zeiss silicon wafer scanner / imprinter

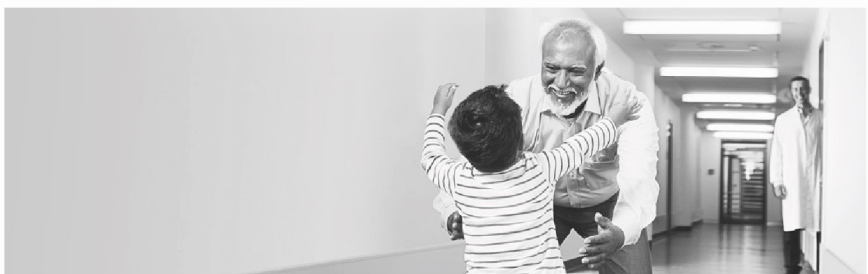
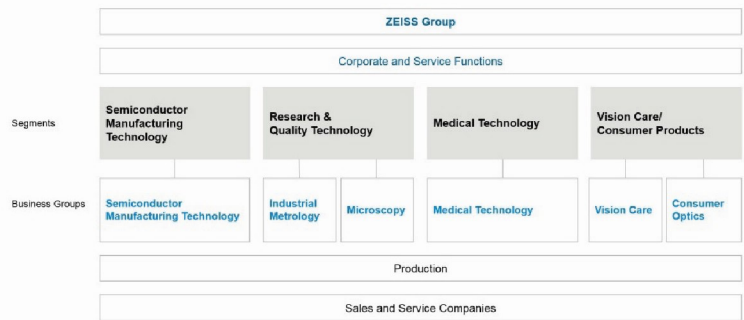
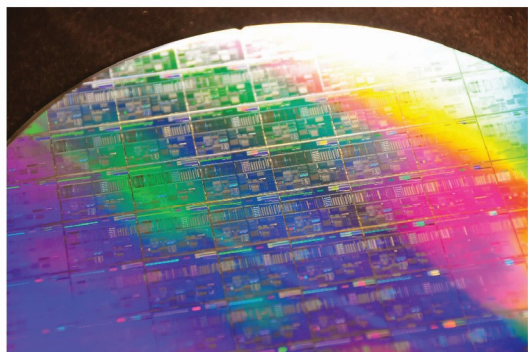
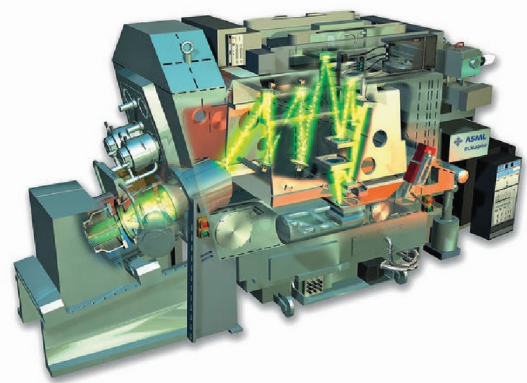
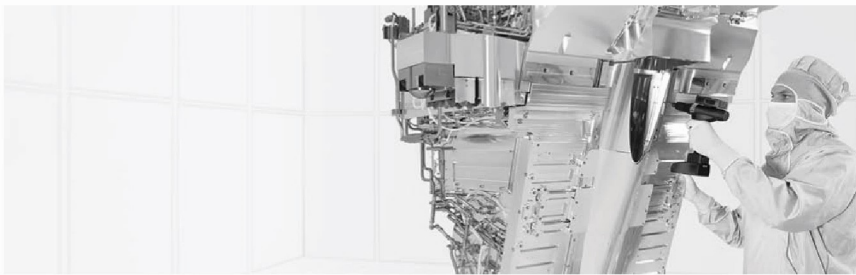


The Zeiss VR One



A Zeiss DSLR Lense

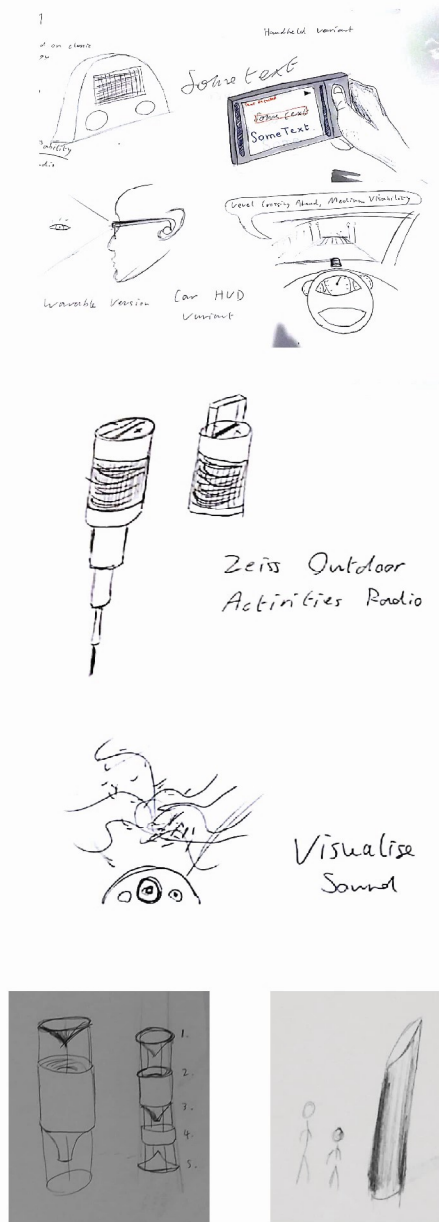
# Personal Moodboard + Material Language



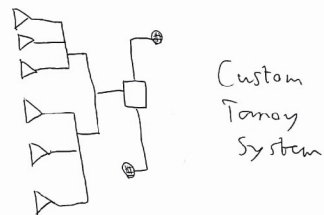
# Initial Ideas

The brief asked for 3 initial concepts so naturally the only thing to be done was to create 17.

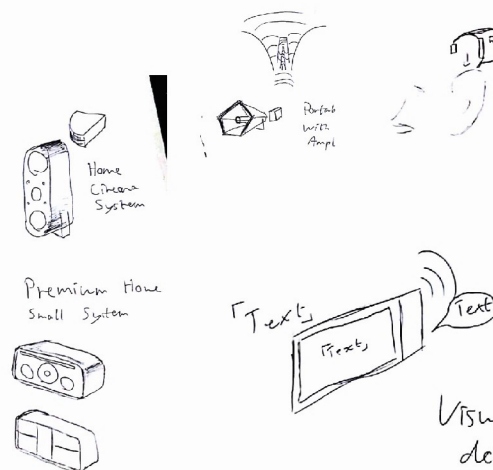
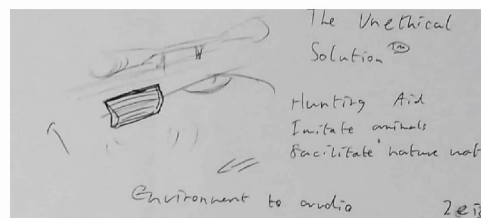
Title	Rough description	where	when	how	who	Interfaces	Safety
1. Sight-to-sound	A device using open source Apis such as Google OCR to identify and provide audio feedback on items the user has difficulty seeing.	Single person use, either on the person on attached to an item of theirs.	When minor visual impairment causes user difficulty.	Zeiss optical technology with possible links to technology firms uses open api's to give 'commentary' on things in front of the user.	People with minor visual impairment or other disability impeding their recognition of visual stimuli.	Multiple modes, minimal interface by button push or audio que depending on form factor.	3 – High Risk
2. Outdoor Activities	A utility and outdoors radio / player for use in conjunction with current sports markets targeted by Zeiss.	Long periods outdoors in camping terrain on nature observing / hunting trips.	While performing activities over a long period of time relating to the Zeiss sports optics range.	Premium and durable materials designed with ease of transportation and modular use in mind.	Users of Zeiss sports optics or photography equipment who require the use of supplemental equipment and would be attracted to the brand recognition.	Bluetooth, NFC, portable hotspot, USB C.  Analog input buttons and knobs.  Minor 'damp' LEDs to indicate status on underside.	2 –Medium Risk
3. Bone Conduction Earphones	Premium, desecrate earphones that use bone conduction technology.	User's ear + a bespoke carry option. Used like standard headphones.	Used as replacement for regular earphones / headphones.	Device will subtly clip onto the user's ears conveying sound wirelessly.	People with money but not necessarily looking for the best audio (high end headphones would likely always be better).	Tactile volume rockers and toggle pause button. Mostly interfaced with via Bluetooth control.	2 –Medium Risk
4. Portable device with amplifier	Portable premium player plugs into larger structure to amplify sound.	Portable device located in social settings, often outdoors. Larger amplifier to be situated	Mostly used for ambient or casual listening in social settings or while working.	The amplifier will use non electrical sound reflection to boost the volume of the smaller radio attachment.	Users who recognise Zeiss's quality but have a limited budget so cannot invest in multiple systems.	Evokes the sense of clipping in a camera lens when attaching / detaching.	1 –Low Risk
5. Visualising sound	Home audio player with visual output to represent the audio in abstract shapes and colours.	Situated in a home office or living room, taking a position similar to the TV.	For use in a home entertainment system or to supplement artistic audio engineers.	Zeiss optical technology used to project algorithmically generated images.	Creative audio engineers. People looking for a theatrical music experience.	Touch interface, some amount of motion input on the visual output.	2 –Medium Risk
6. Monolithic hall piece	Large vertical loudspeaker for large venues to represent the presence and power of the Zeiss brand.	Venues in large halls or rooms. Speaker is located either in the centre or multiple against walls.	Specialised events, product exhibitions.	Loudspeaker configuration stacked vertically.	Exhibitioners, staged events.	Input from staging equipment and mixing desks.	1 –Low Risk
Title	Rough description	where	when	how	who	Interfaces	Safety
7. Monolith Alt design	An alternative design to visually link to a camera lens	Same as above	Same as above. Smaller option for home use.	Conical structure and modular nature allows vertical alignment of loudspeaker functionality.	People with a flair for the dramatic. Looking for a single unit loudspeaker, perhaps lacking the space for more than one.	Minor touch interface functionality, mostly controlled through separate units.	2 –Medium Risk
8. Premium Home ambient sound system	A multi-room modular system to be used with streaming services to fill an entire house.	Corners of ceilings, placed in an ornamental location. Distributed al throughout the home.	Used in a whole house for ambient and casual listening.	Using an IoT model the series of speakers will connect over wifi to play audio from a streaming service.	Casual listeners who wish to play audio throughout the whole house.	Complete wireless interface via streaming plug-ins.	1 –Low Risk
9. Premium mobile device sound bar	A small device capable of attaching to a range of mobile devices to provide high quality sound	Attached along the edge of laptop bases or tablets. Attached in a	For constant use with a mobile device.	Device will clip onto the edge of a screen and supplement internal audio systems.	People who have money to spend on audio gadgets but for some reason do not	Digital interface only. Range of USB, Bluetooth, Audio Jack, Apple port options.	2 –Medium Risk



10. An accessible premium home phone system	A foray into lower cost devices. An accessible, ergonomic home phone to aid those with visual and audio impairment.	Replaces existing home-phone systems for the user.	Making or receiving calls in the home.	Using Zeiss's understanding of sight and visuals, the device serves as an affordable and accessible aid.	Users who are visually and/or audio impaired.	Specially designed easy to use interface with audio supplements.	3 –High Risk
11. Personal device directed sound	An embedded technology based on directional sound technology to be used in mobile devices for greater privacy.	Embedded in mobile devices.	For use with personal audio in public locations such as taking a call on a smartwatch.	Using a miniaturised version of directed sound technology allowing greater audio quality for the target and reduced volume for others.	People who purchase high-end wearable devices and require the use of portable privacy such as making video calls in public places frequently.	Technology would replace inbuilt speakers and use some amount of facial tracking to adjust direction.	3 –High Risk
12. Custom designed tannoy system	A service to design the acoustics of a shop or other location around a high quality sound system.	Shopping centres and open private locations.	High end department stores or complexes looking to upgrade their intercom technology.	Zeiss will work with the location to custom tailor the acoustics of the shop and ensure high sound quality. This will include directional sound, wearable devices and location specific announcements.	Large venues or department stores.	Wearable input/output, location specific microphones. Tailored interface via computer / tablet input.	3 –High Risk
Title	Rough description	where	when	how	who	Interfaces	Safety
13. Premium Home cinema system	A market leading home cinema system. Contextualise Zeiss as dominant in the premium audio market.	A 360 degrees sound system for a living room.	For use with movie playing system.	A series of Loudspeakers and directional mounted speakers to create a 360 effect.	Wealthy film enthusiasts.	Integration with existing media players.	2 –Medium Risk
14. Hunting aid	A device to aid hunters by imitating noises of animals.	For use hunting in various terrains. Device locks onto the barrel of a rifle.	For long durations in the wild.	Device will imitate various animal calls to interest or scare off targets.	Hunters	Analog interface mounted to the barrel of the gun with volume and noise options.	1 –Low Risk
15. Premium speaker with smart channels	A small speaker system that allows great control over audio channels, acting as a sort of mixing desk with an interface designed to facilitate beginners to advanced audio.	Home office use. Somewhere it can be used for intense listening and more passive use as well.	Designed for casual but also more advanced playback.	An intuitive interface with advanced options and a members 'club' for new audio enthusiasts to share insights.	New audio enthusiasts with a desire to expand their skills and invest in equipment.	Digital interface. Web API for others to plug-in. Modular analogue control options.	3 –High Risk
16. Home acoustic converting kit	A single room sound system with diffusing technology built in to help raise the acoustic capabilities of a home room.	A living room of home office for audio creation.	Where high level of audio is required but the room has bad acoustics.	A series of multi-use speakers and audio dampeners provided in a modular fashion.	Professionals who recognise the necessity of an acoustic environment.	Modular options depending on requirements, can connect to a player system, interface with existing setups or include only the non-electronic static components.	2 –Medium Risk
17. Medical Audio range	A system of audio receivers and speakers for use in sonar sound systems to supplement existing Zeiss medical equipment.	Medical clinical environments.	Specific function related to medical requirements.	Designed to be a part of an integrated system.	Medical professionals familiar with Zeiss technology.	Would depend on specific technology applied to.	1 –Low Risk



Custom Tannoy System

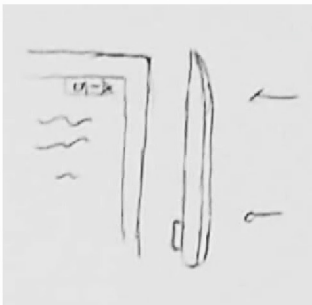


Premium Home Cinema System

Visual -to- Audio device



Accessible Phone System



# Selected Concepts

The ideas were whittled down to three concepts and an idea chosen to move forward.

## Visualising Sound

The principle idea was to create a device embodying the brand quality identified wherein Zeiss provides a technology to enable great things to happen. This device converts audio input to an algorithmically generated pattern projected onto a surface to create an emotive, dramatic visual narrative to supplement the listening experience.

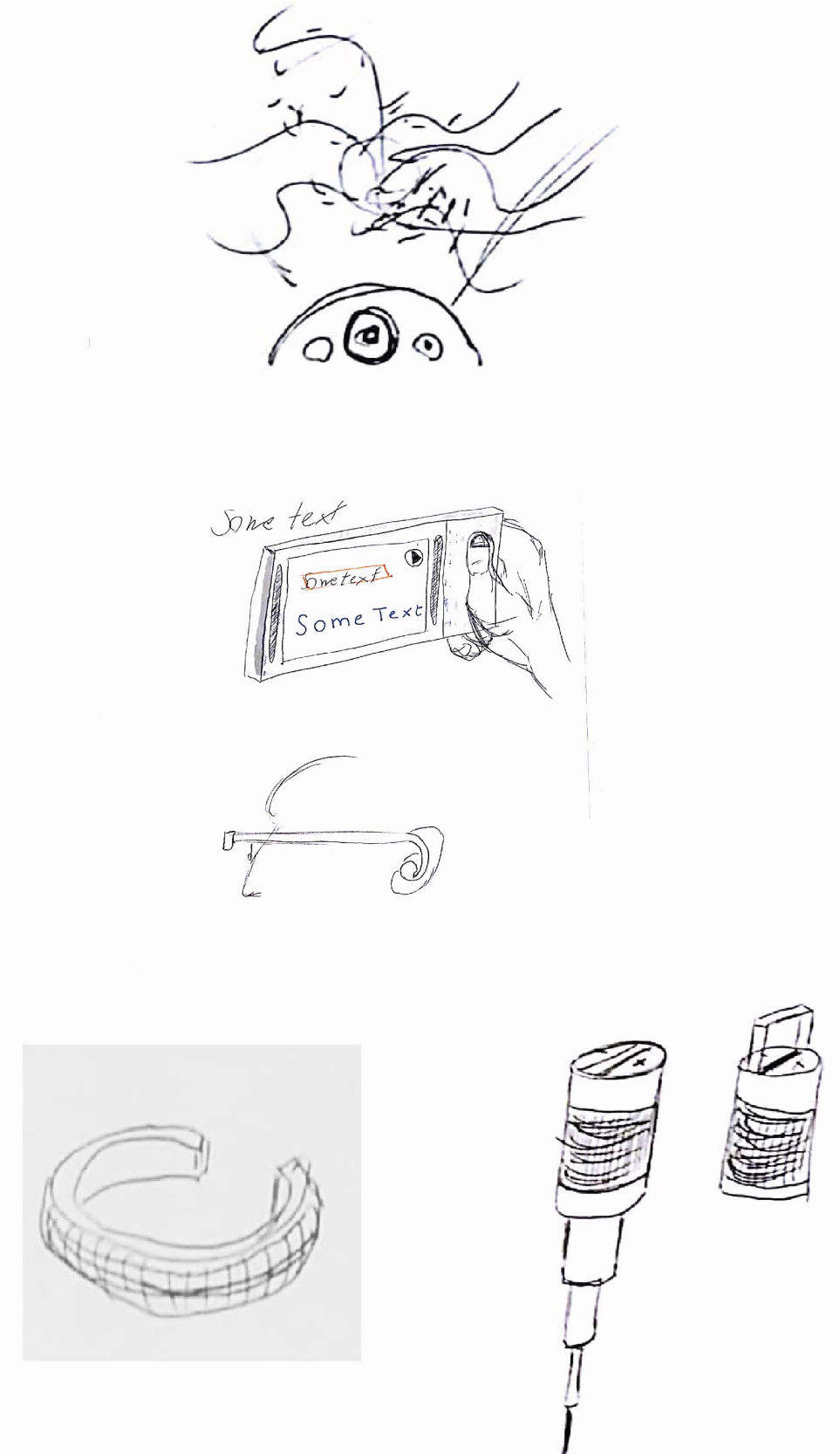
## Text to Audio

This device is built off existing Zeiss technology and provides a reader, connected to the google OCR API to describe objects in front of it to aid the visually impaired.

## Sports Optics Speaker

This device is a durable modular outdoor speaker designed for camping trips to supplement the Zeiss sports optics range. Configuration ideas involve methods of attaching the device to one's person and adapting it to a range of environments.

The Sports optics speaker was the idea chosen as it felt like the most plausible area for the company to explore its brand and provided great opportunity for design outcomes.



# Teardown Take-aways

The teardown session in which we disassembled, documented and reassembled a small speaker was an excellent chance to 'get real' with a consumer product similar to the type of devices we would go on to design. There was a lot learned from comparing the simple device to more complex and perhaps over-engineered products such as a designer toaster brought in. Some key insights I took away were:

- **Components could be as simple as they seem, no hidden 'mystery' pieces.**

Often in design there is a sense that there are always additional features (concerns of product design engineers) that cannot be fully accounted for. This speaker was the bare minimum components, all of which had a clear use and no extraneous detail.

- **The driver can be attached to a frame which simultaneously hold the cover.**

A primary concern for me early on was the way in which the drivers would be attached, this one used a frame to hold the driver by it's top whilst also holding the more robust exterior cover which helped me develop my own ideas.

- **Snap-in components are easier than adding lots of screws.**

The device had four screws to hold the assembly together and two to hold the driver in place but everything else was either held in place by friction, being locked into position or clipping in place.

- **The driver need not be centred for seemingly even sound distribution.**

From the outside the device looks symmetrical and shows no imbalance of sound distribution but inside the driver is very skewed to one side however this seems to have little to no effect on the noise produced.

- **The minimal processing can be fit on the PCB around other components.**

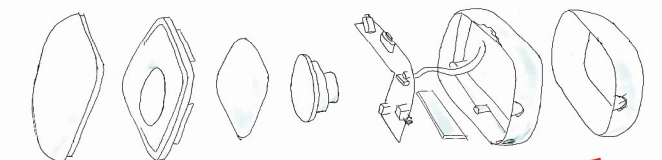
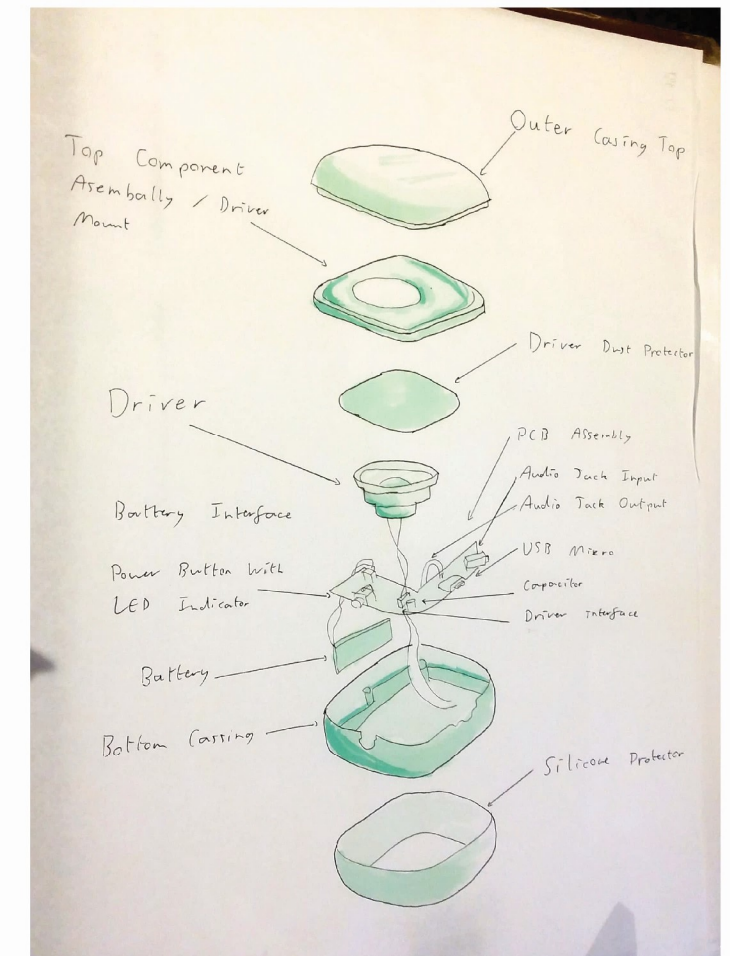
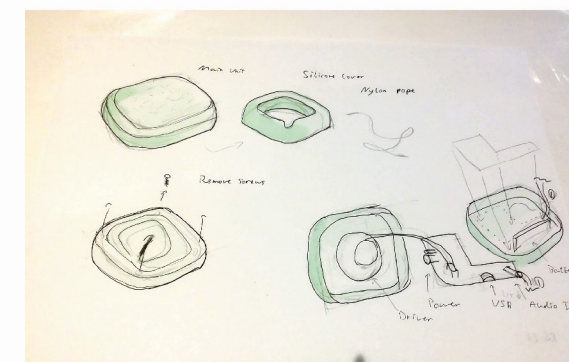
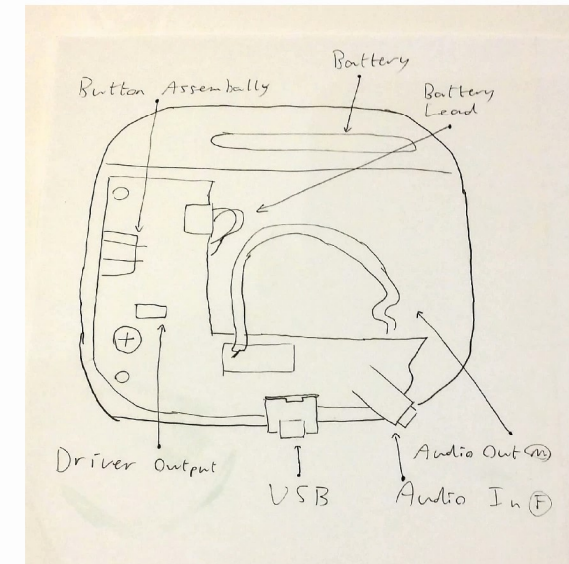
The device had relatively complex functions for such a small product (amplifying sound, detecting inputs, chaining inputs, redirecting sound channels) yet had no central processor and the small processing units were fit around the bulkier components on the PCB.

- **Standard connectors are can be used.**

The power and data connectors on the PCB aswell as the battery and audio jack looked to be standardised components akin to the ones you could find in a Maplin store.

- **A 'sandwich' form makes for the easiest component access.**

Most of the components are directional, for example the driver outputs sound in one direction but has screws accessed on the opposite side, the split-down-the-middle form factor means all can be accessed very easily.

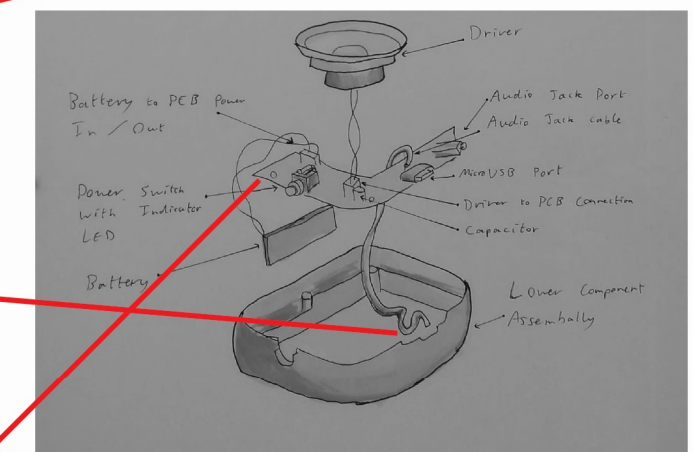


Part of the session asked us to reflect on ways in which the sustainability of the device could be improved, the main ideas we had were:

1) Replace the silicone sleeve with another, less damaging material.

2) Attach the audio jack cable using a clip-in-place mechanism to remove the glue on the bottom of the casing.

3) Consolidate the mini processors into one CPU to make the PCB easier to reclaim.



# Teardown Process



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2



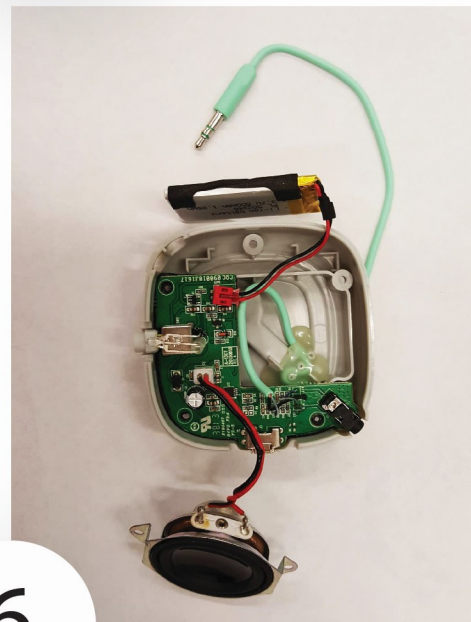
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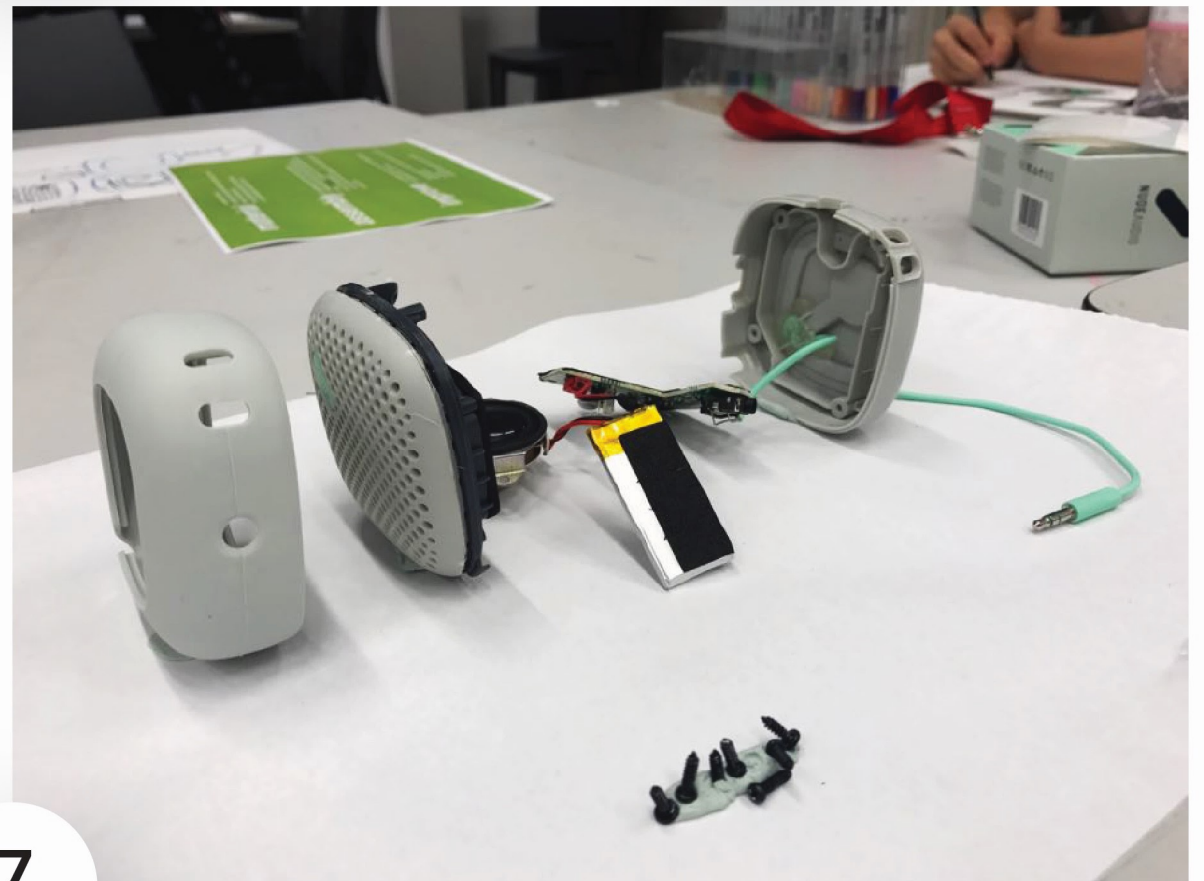
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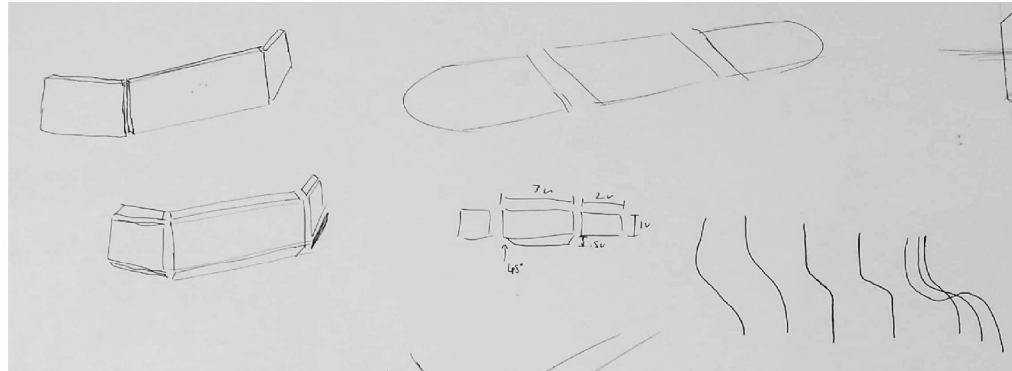


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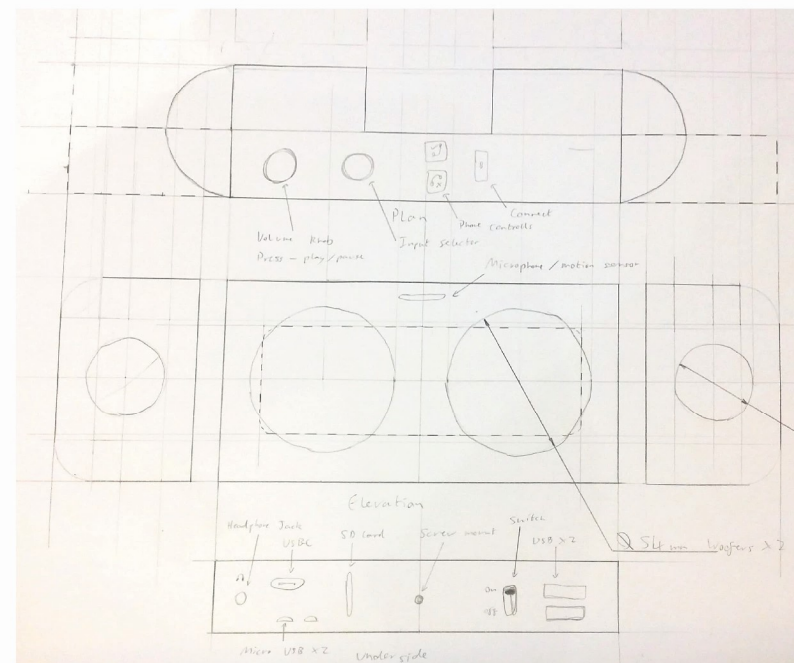
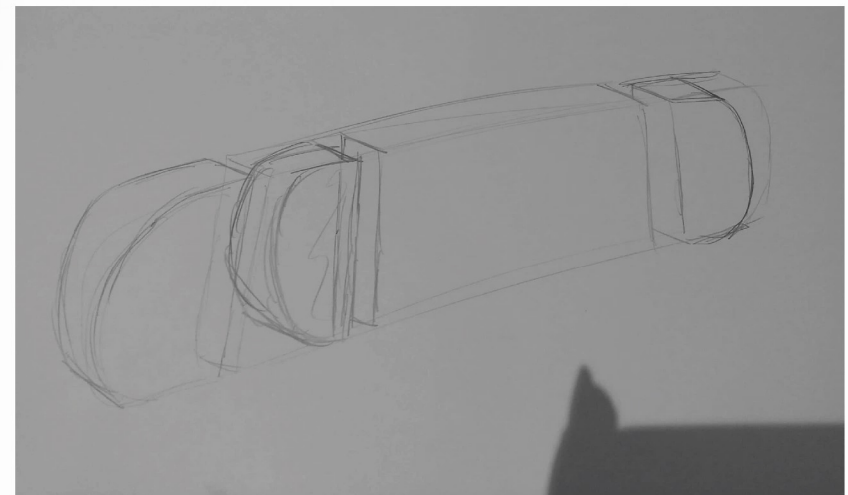
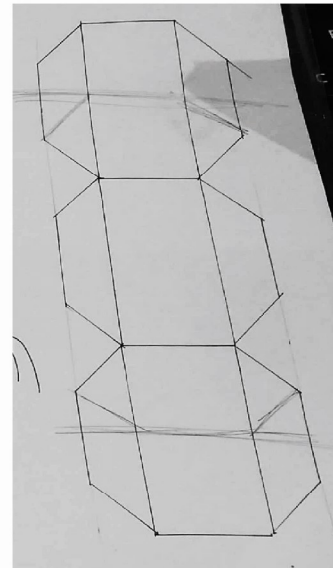
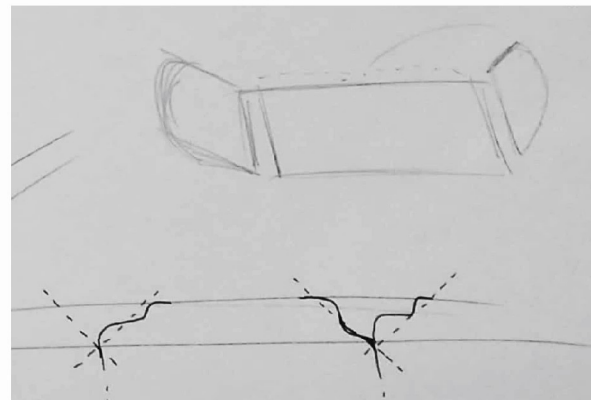
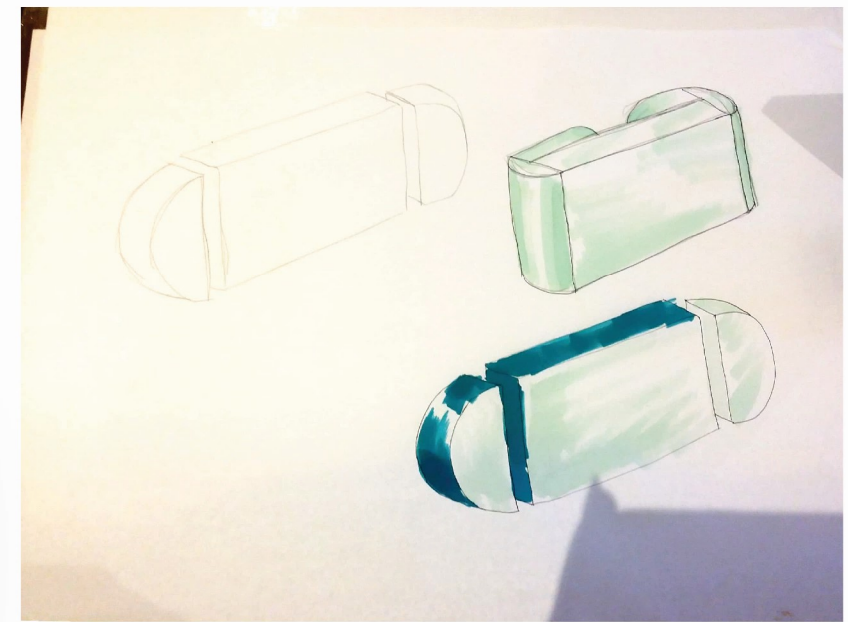


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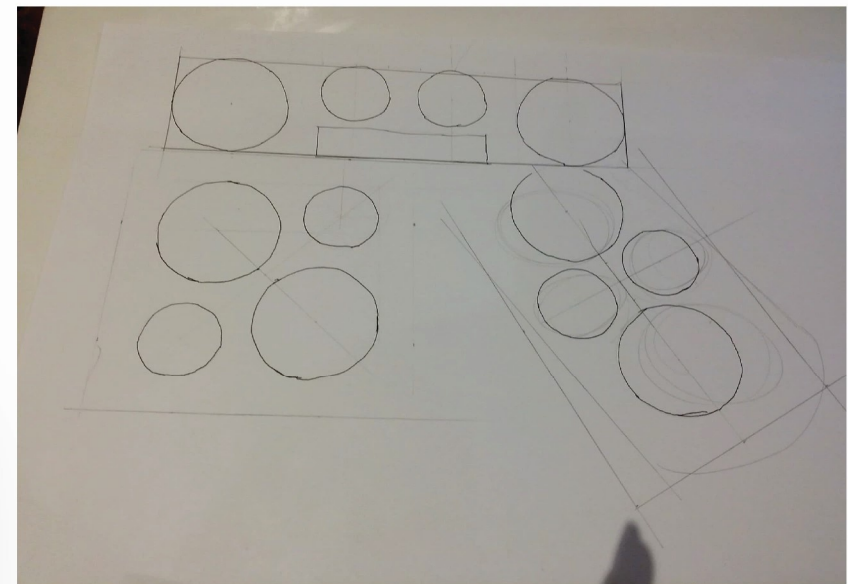
# Development



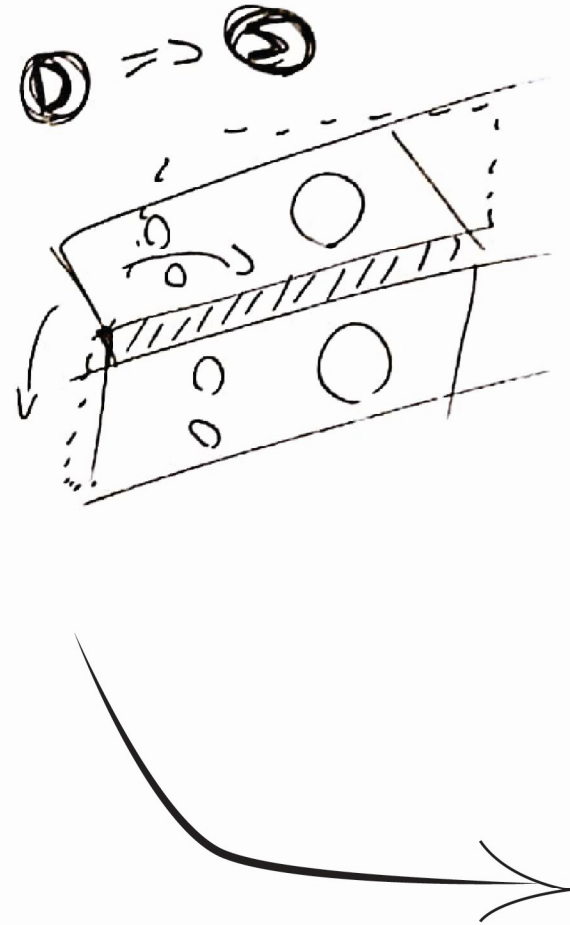
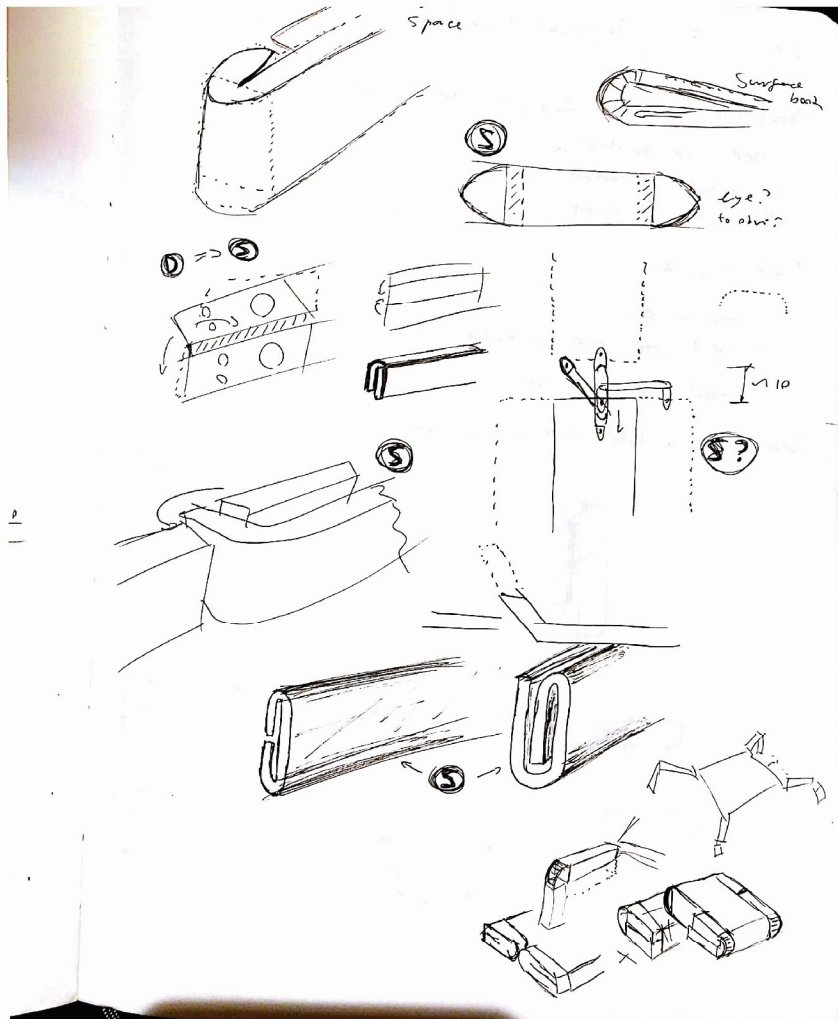
Using the wrap around idea as a starting point I quickly realised that there is little desire to have a speaker playing while attached to your arm and so refined the idea to have foldable sections to allow for portability.



Different driver sizes and configurations were considered, I quickly realised that housing larger drivers on the folding sections was unwieldy and that the smaller ones were best kept separated. The device was still too linear and took the form factor of a sound bar more than a portable device, it needed to be slimmed down and more consideration had to be given to the interface.

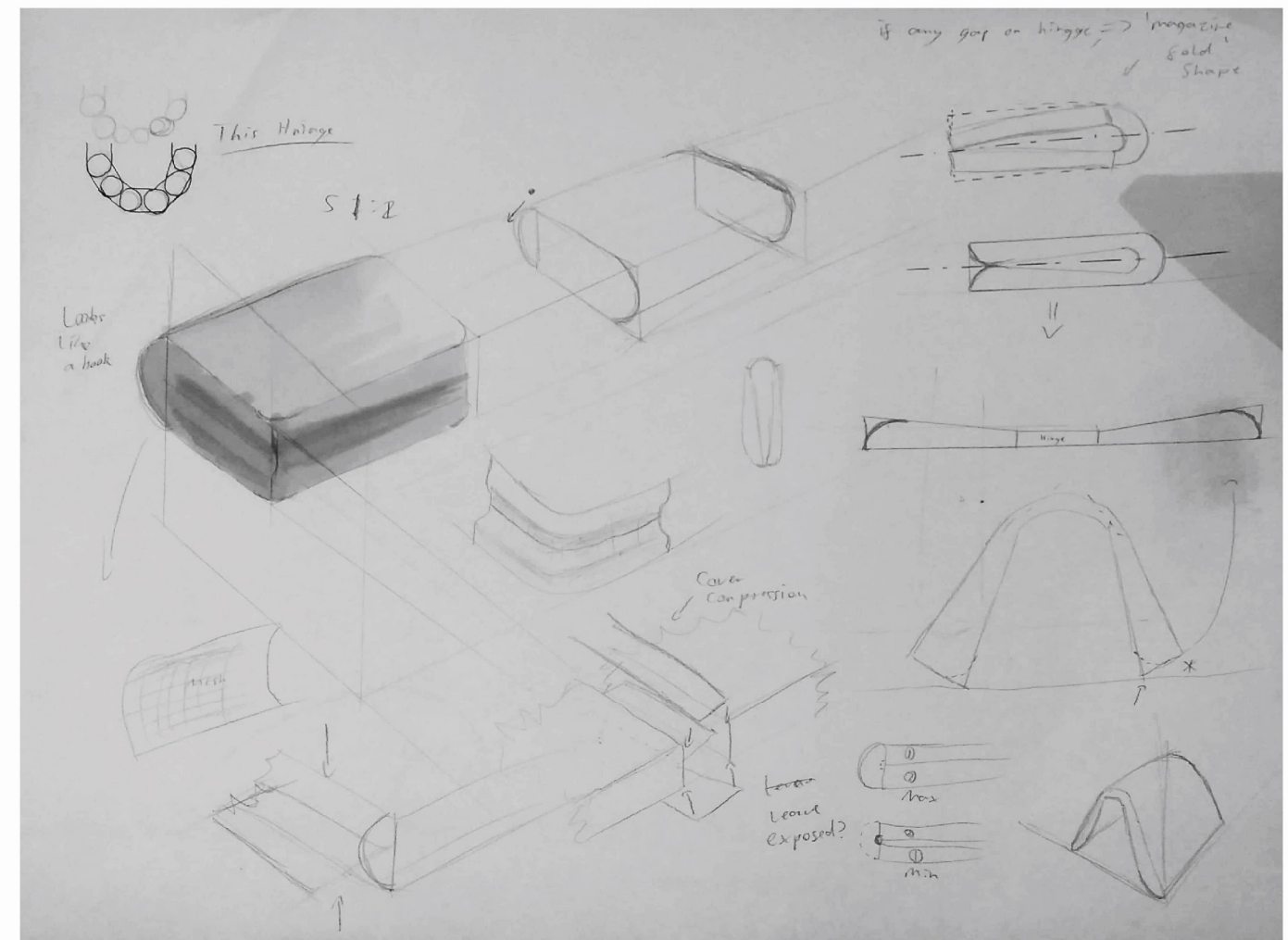


# Development

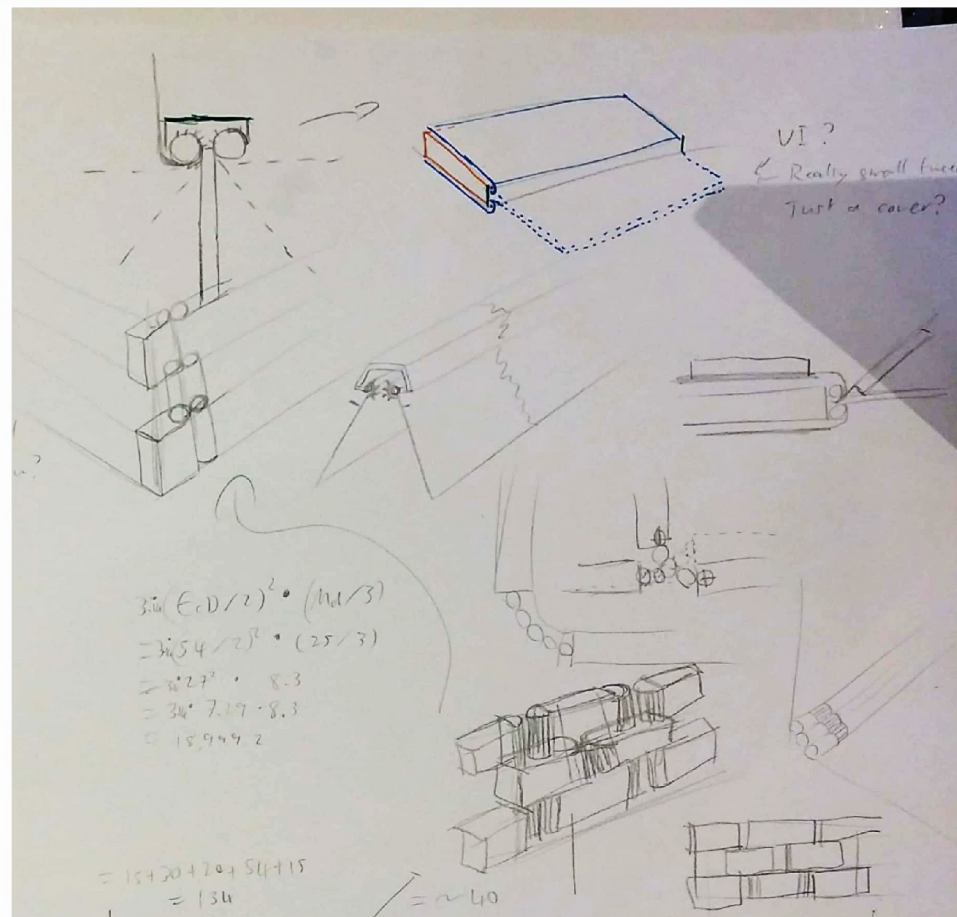


After the week three meeting I began by assessing ways in which the configuration could be changed and began considering the hinge mechanism. I questioned whether the idea of a moving component was necessary at all. I settled on the idea of a book configuration to give the speaker the ability to be placed in a range of positions and have a wide surface area but maintain portability.

Numerous configurations and forms were considered eventually culminating in this uneven shape. The shape was designed to account for the hinge if it was unable to rotate in the manor I first devised, the shape then lead me to realise that a curved form on the underside could help the device stand at an angle and grip uneven surfaces.

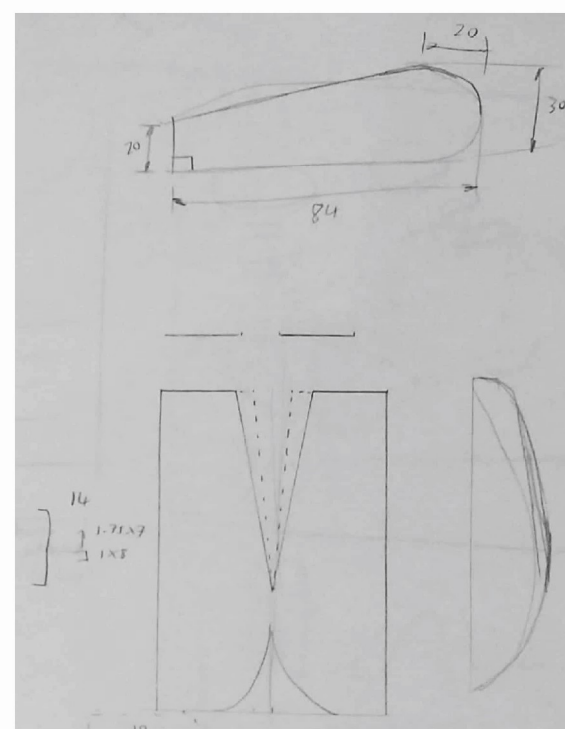
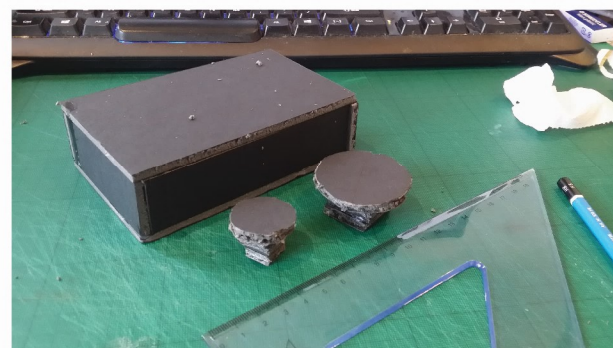
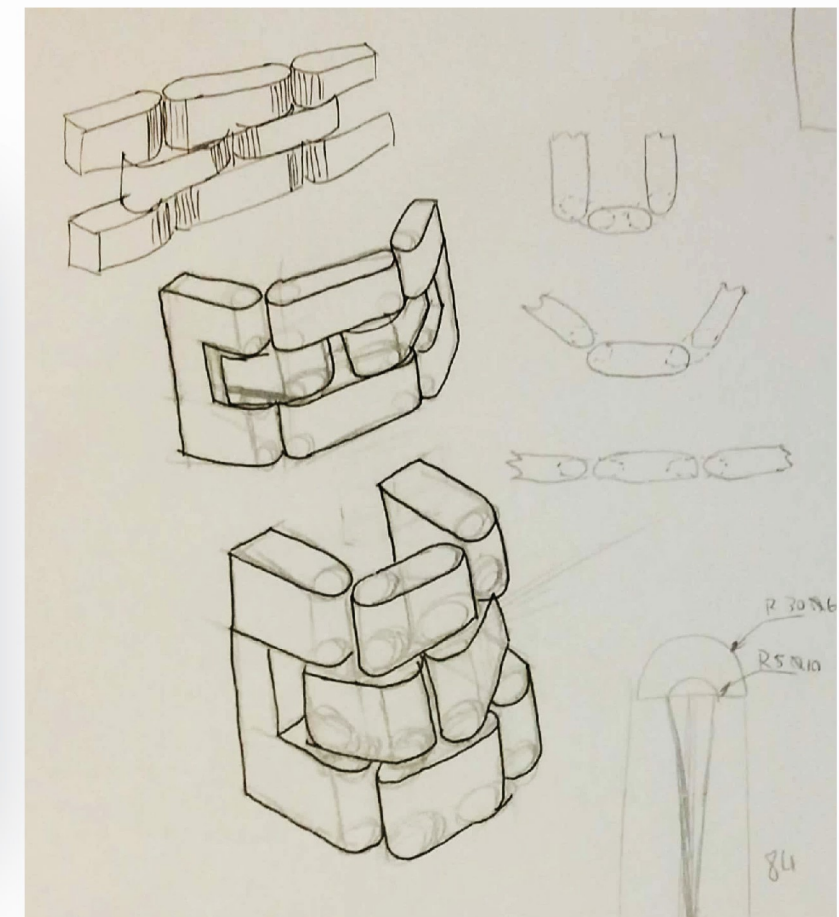


# Development

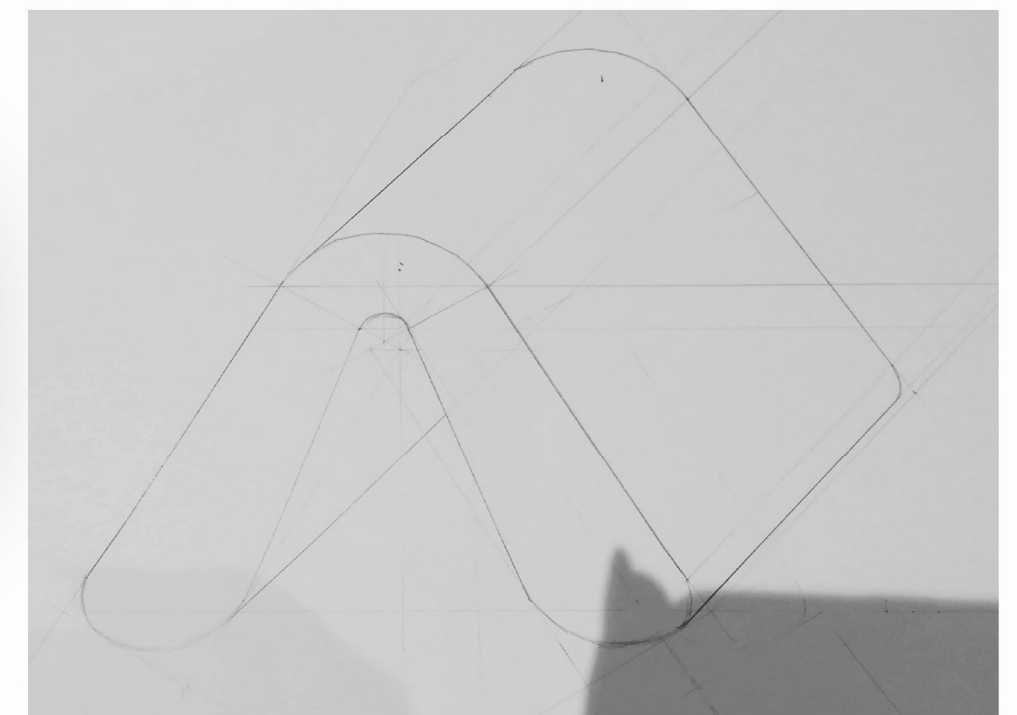


The next stage was to find a suitable hinge mechanism, I wanted the sections to rotate 360 degrees but without following a full radius to do so. This idea was eventually abandoned when I came across the following mechanism in secondary research.

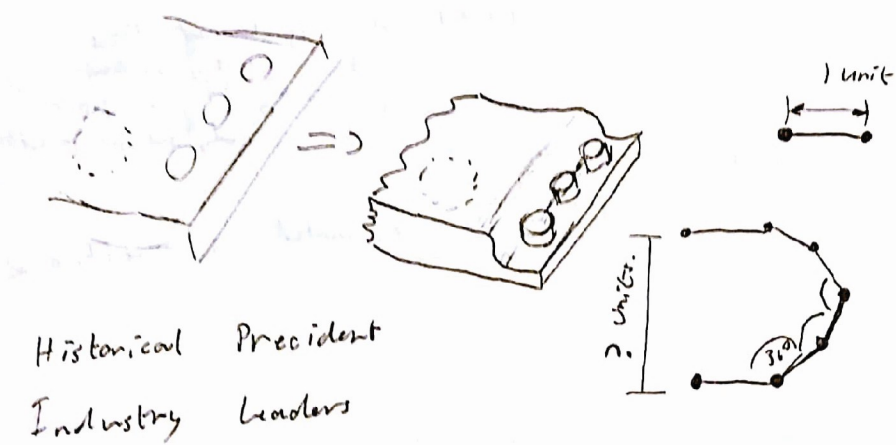
This gear mechanism involves equal length segments locked together in an alternating 'brick' layout. The result is that when one side moves relative to the centre, the other mirrors it. Taking inspiration from the Lenovo Yoga 900 I realised this mechanism could be applied to create the required hinge.



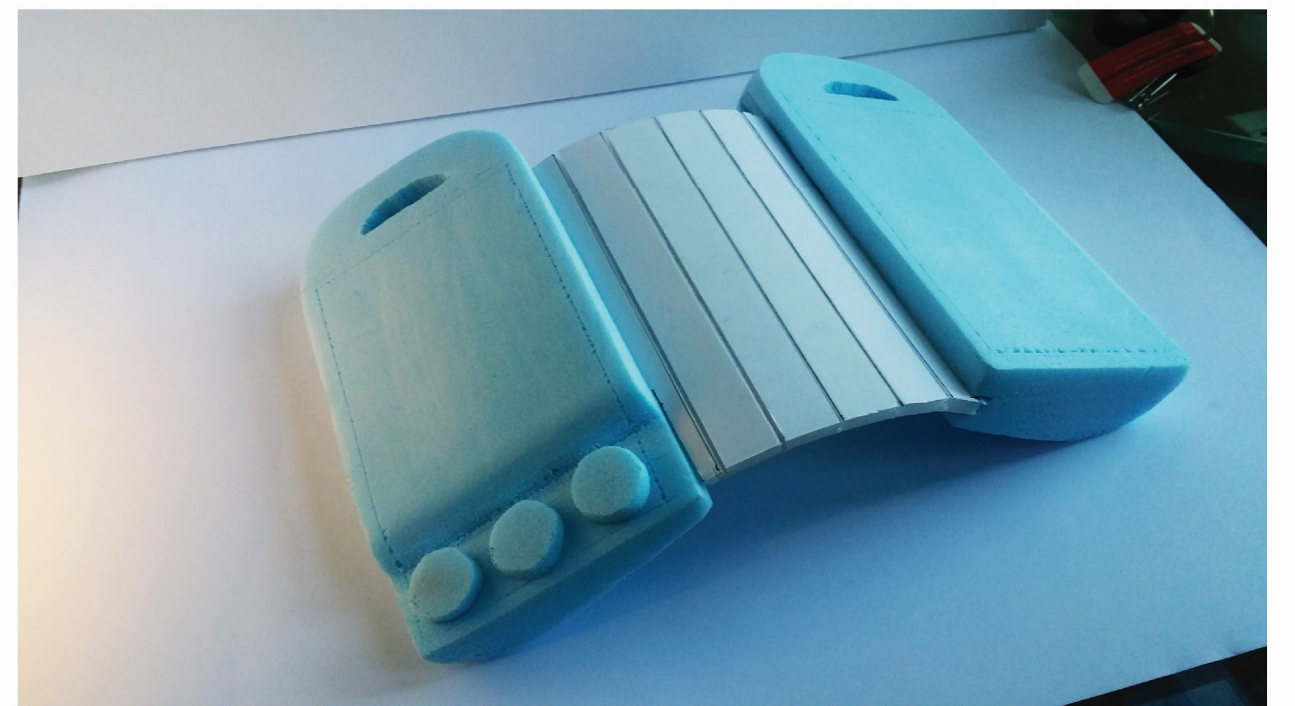
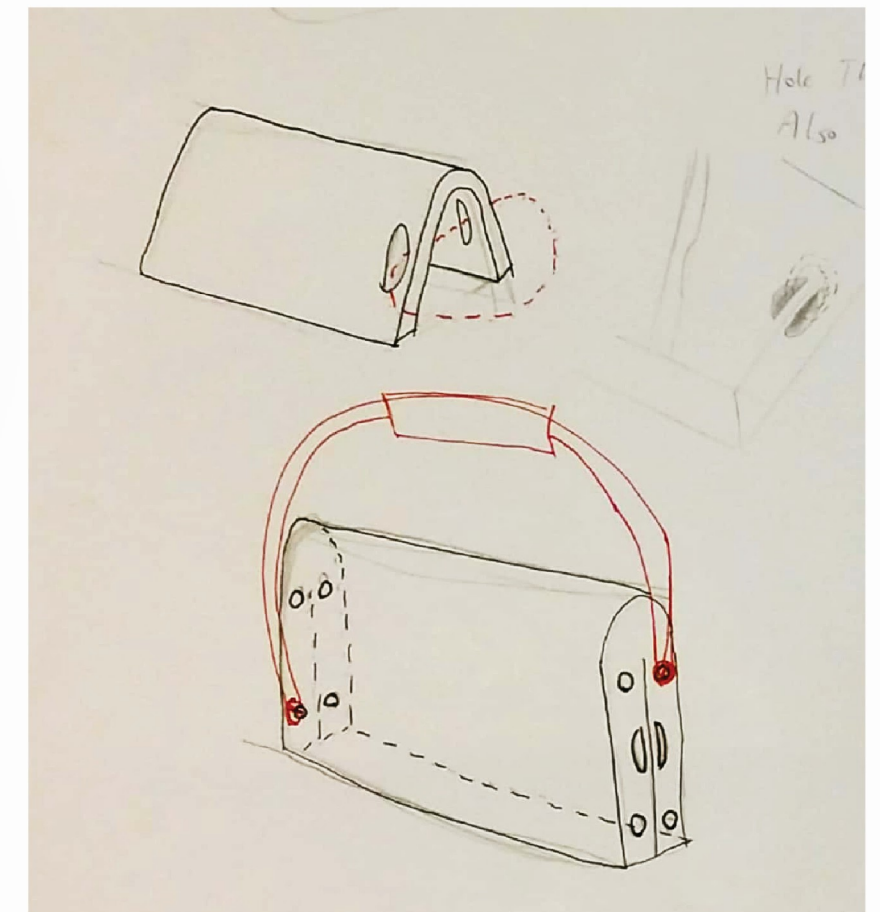
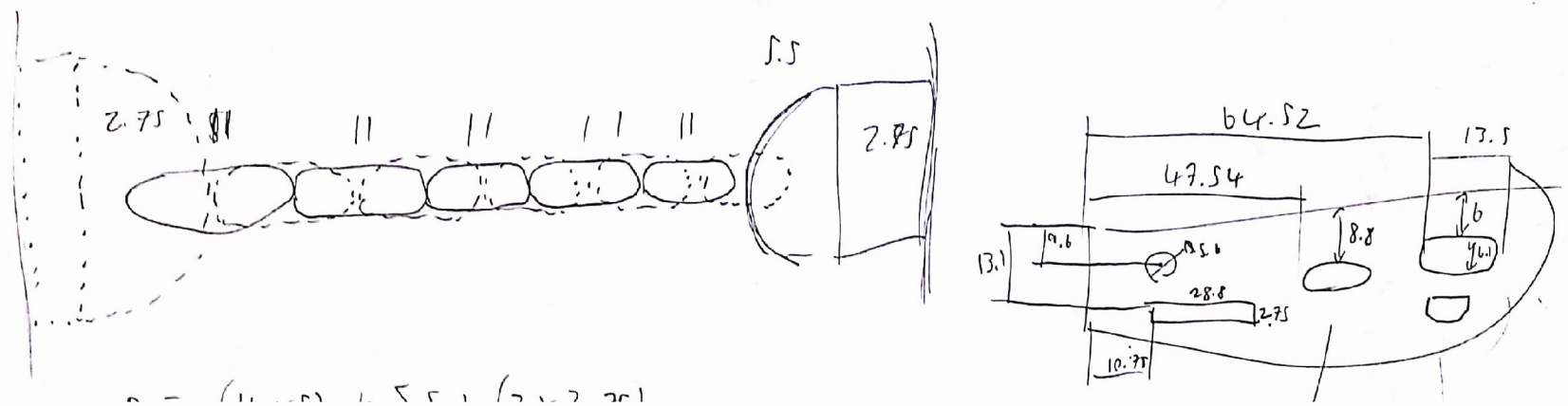
At this point the overall form was adjusted by the creation of specific dimensions and volume modelling.



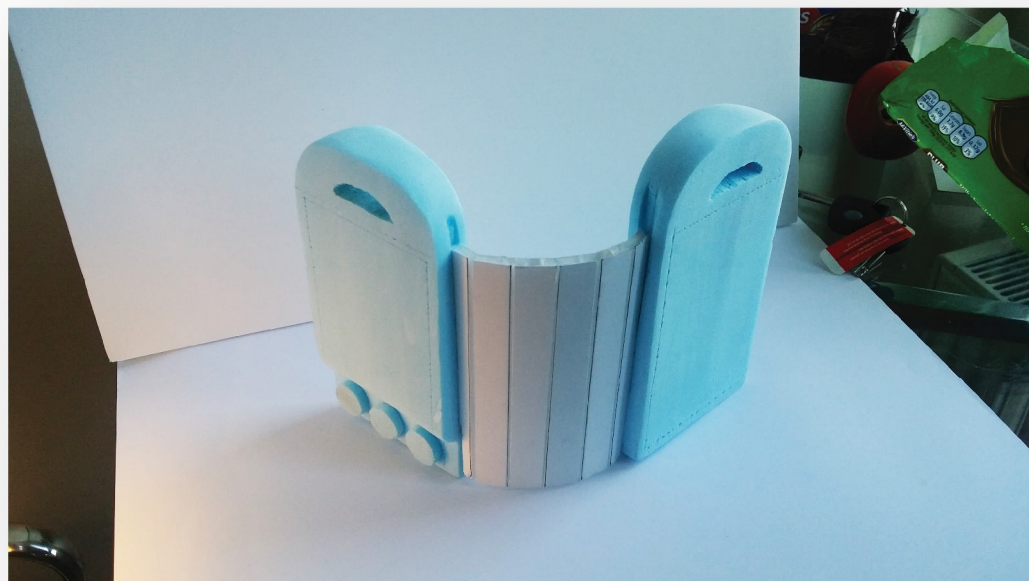
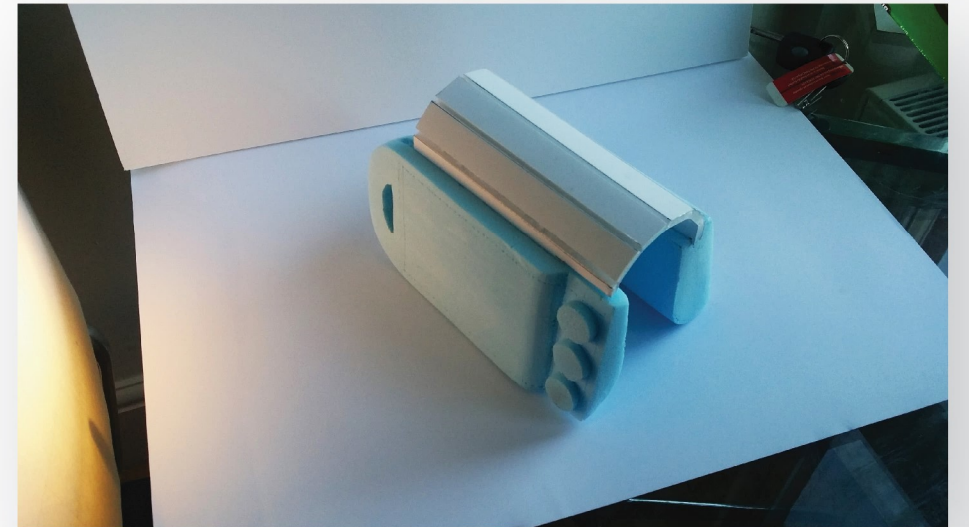
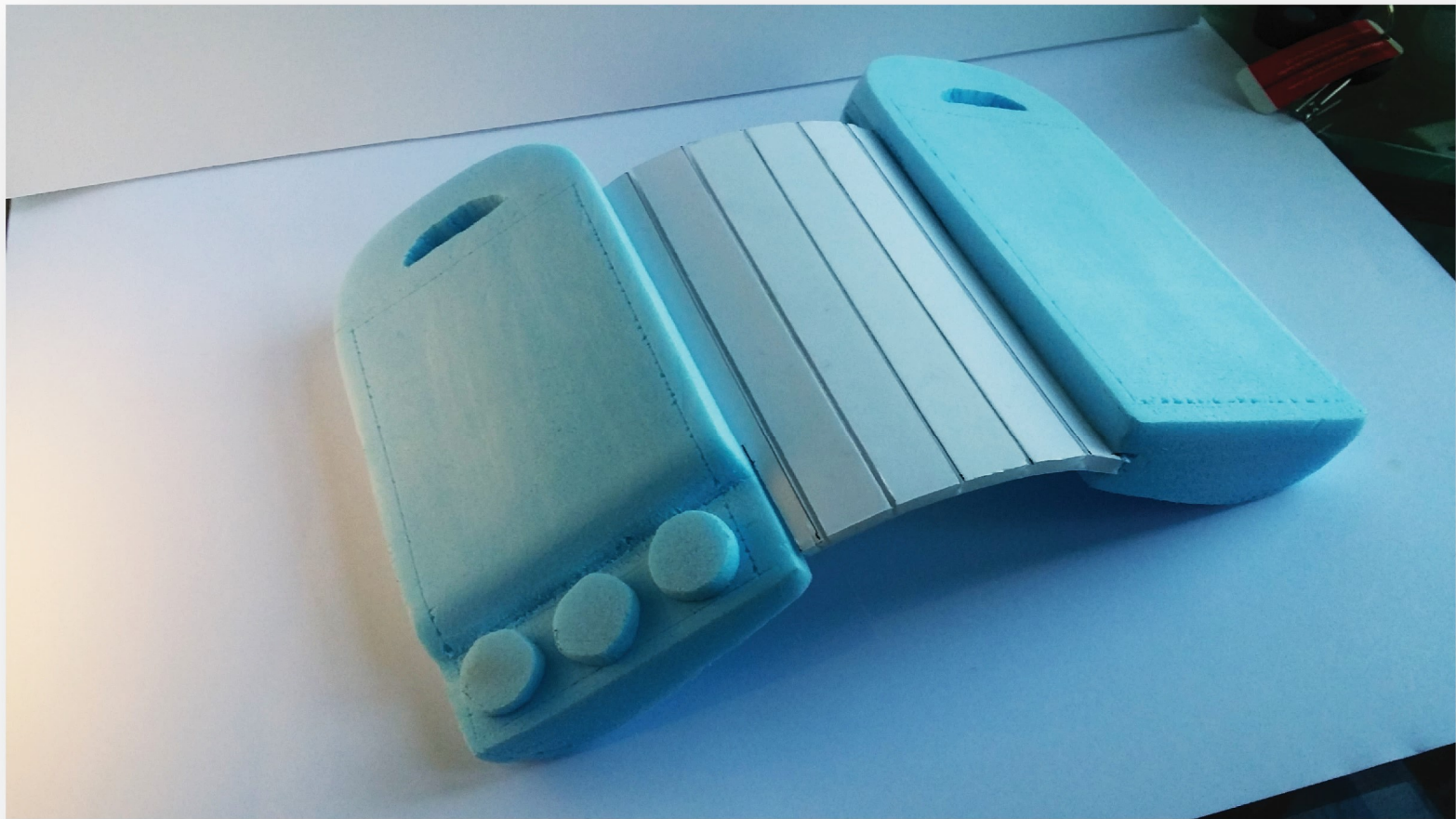
# Development



With consideration to the interface and the details of attaching peripheral components such as straps the model was refined into the final design solution.



# Final Model



# Final Design -The Zeiss Zugriff

The Zugriff (German for 'Access') is a small outdoor speaker intended to supplement the existing Zeiss sports optics range, the brand extension being to bridge the gap between expeditions out and home life.

The device can be folded to create an almost rectangular profile with the internal slope accounting for the gap of the hinge and magnets in the feet snapping the two together.

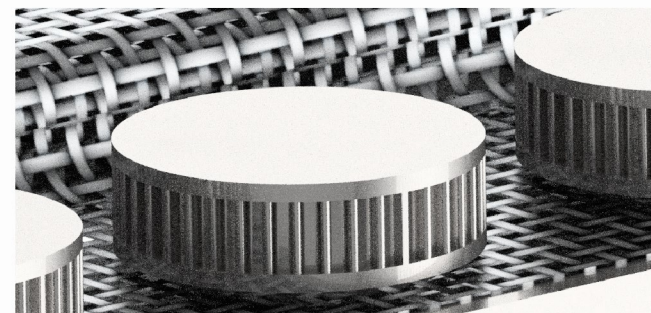
It can additionally be folded in the inverse direction to protect the speaker face from impacts.

The small loop allows the device to be attached to the outside of a bag or onto a camera strap.

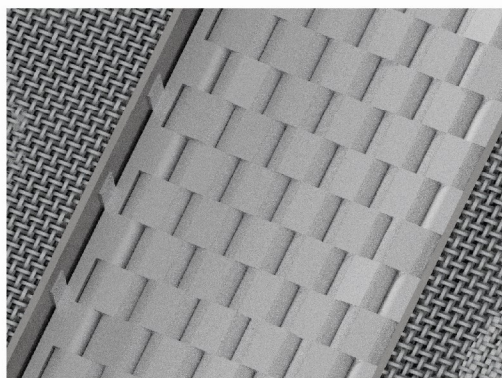
The speaker is equipped with numerous direct and wireless inputs as well as a radio antenna. It has a large internal battery and can charge or be charged through standard USB-C and USB-micro connectors, functioning as a battery pack.

It's inputs include:

- Bluetooth Connectivity
- NFC Connectivity
- Radio receiver
- Audio Jack input
- Universal SD card slot
- USB-C Input
- USB-A Input
- USB-Micro Input

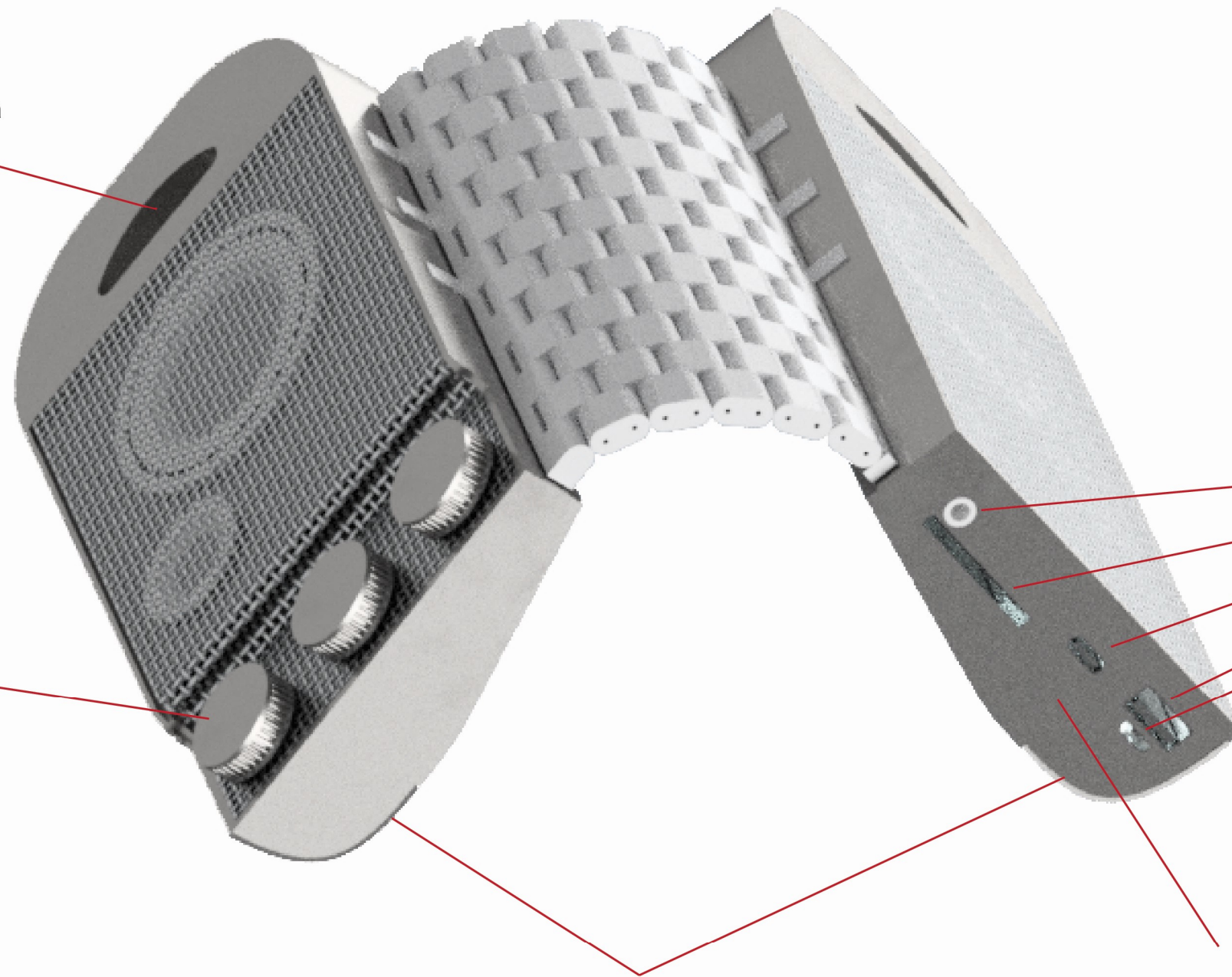


Three twist and push knobs suffice as the input, deliberately kept analogue to evoke a feeling similar to Zeiss's material language.

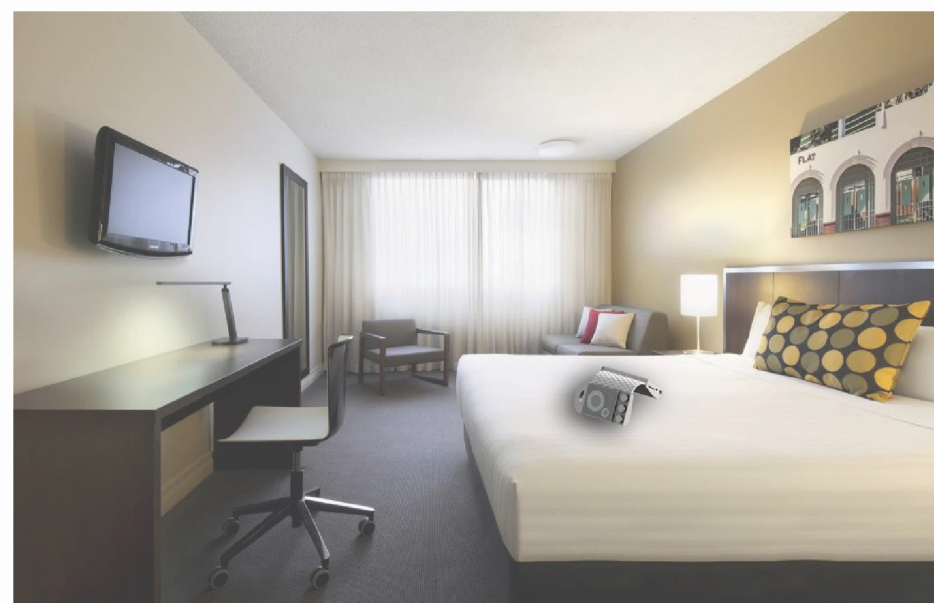


The 'watchband' gear hinge allows the two sides to rotate through 360 degrees while Viton rubber feet allow the device to be dynamically positioned on a range of surfaces, angles and environments. Viton rubber was chosen for its extreme resistance to abrasion, gases, chemicals, heat and aging.

CNC milled extruded aluminium grade 2014 was used to create a unibody appearance and premium Zeiss aesthetic whilst also creating a high strength-to-weight ratio and high impact resistance.



# User Scenarios / Locations



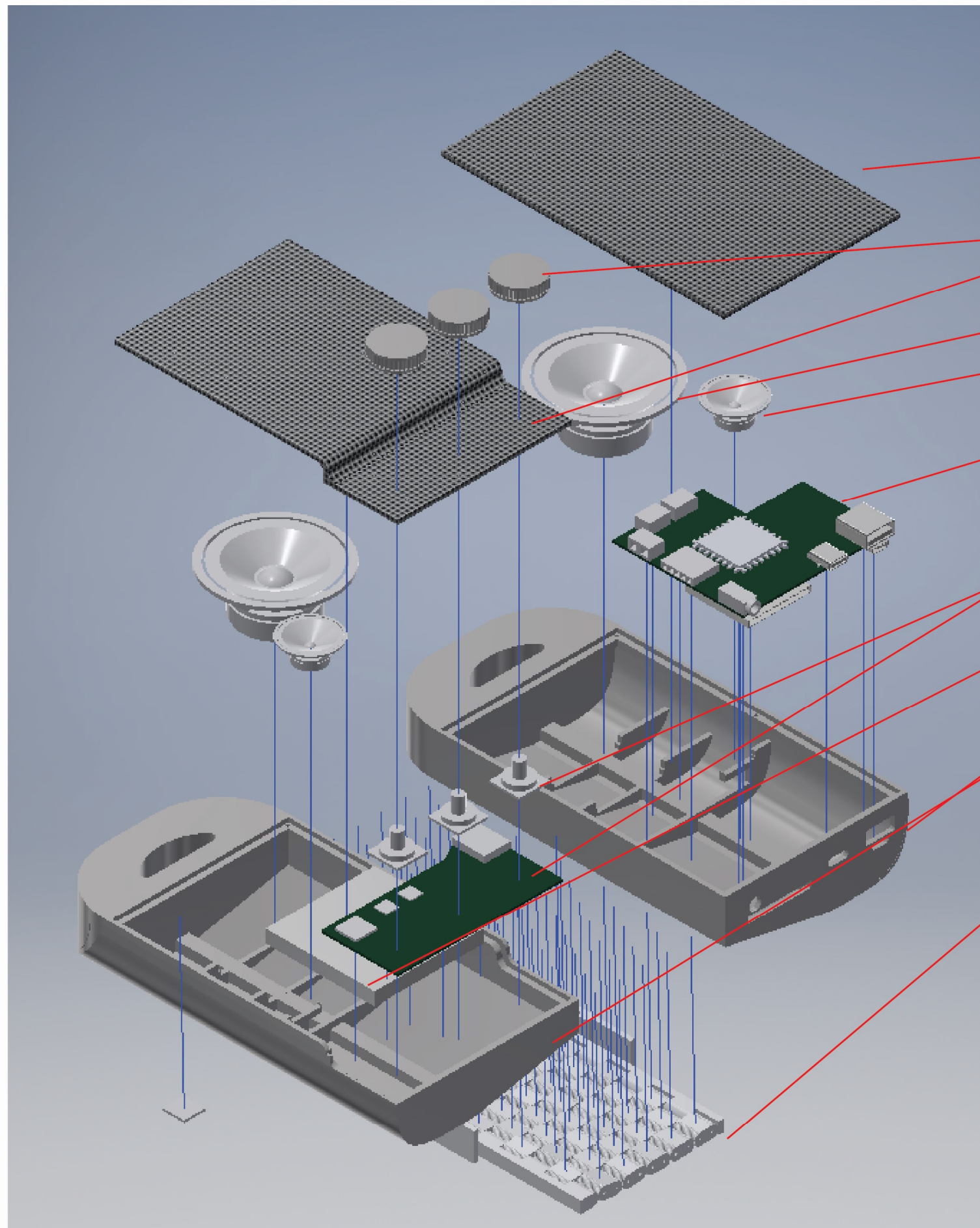
In keeping with the original concept as it was developed through the project, the target user is primarily wildlife and nature photographers in addition to anyone engaging in activities related to the sports optics range generally speaking.

The user needs to travel light, may find themselves in almost any part of the world and will likely spend a great deal of time away from urban environments and even longer away from home altogether.

The user travels in small groups on expeditions and is limited by lack of technological infrastructure (no internet, no readily available power) as well as weight / bulk restrictions. The Zugriff is equipped with minimal features to create high quality, direction adjustable audio. It facilitates a range of inputs including a built in SD card reader and radio functionality to allow users to stay up to date with local news and weather forecasts / danger warnings.

The device folds to approximately 164 x 120 x 60 and can be attached to the exterior of bags, straps or laid flat. The 50,000 ma/h provides a great deal of power and can act as a power-pack for mobile devices.

# Internal Layout



Top cover plating Right

Top cover plating Left

Interface Knobs

54mm Drivers

24mm Drivers

PCB Right

PCB Left

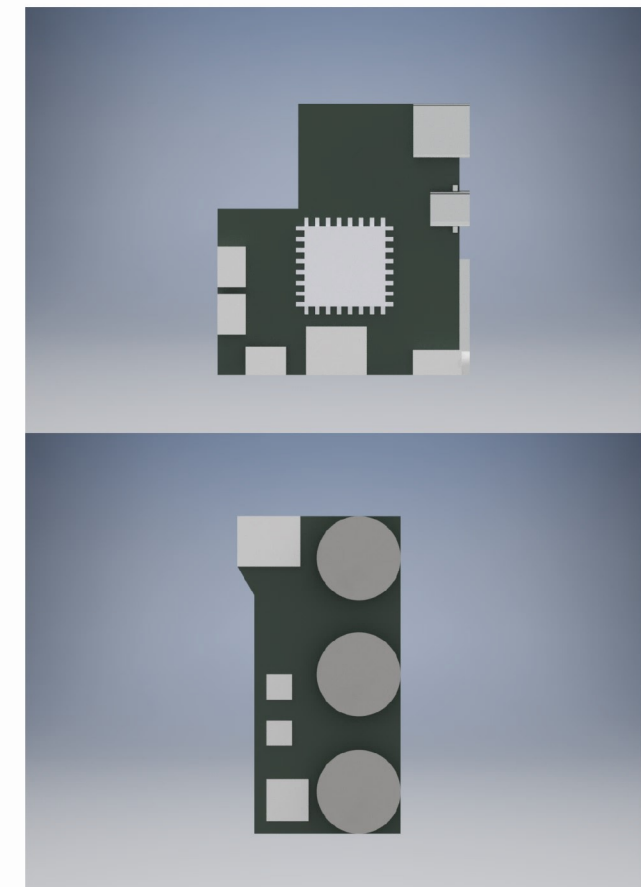
Interface Knobs PCB mount

50 000 ma/h battery

Primary casing Right

Primary Casing Left

Hinge sub-assembly

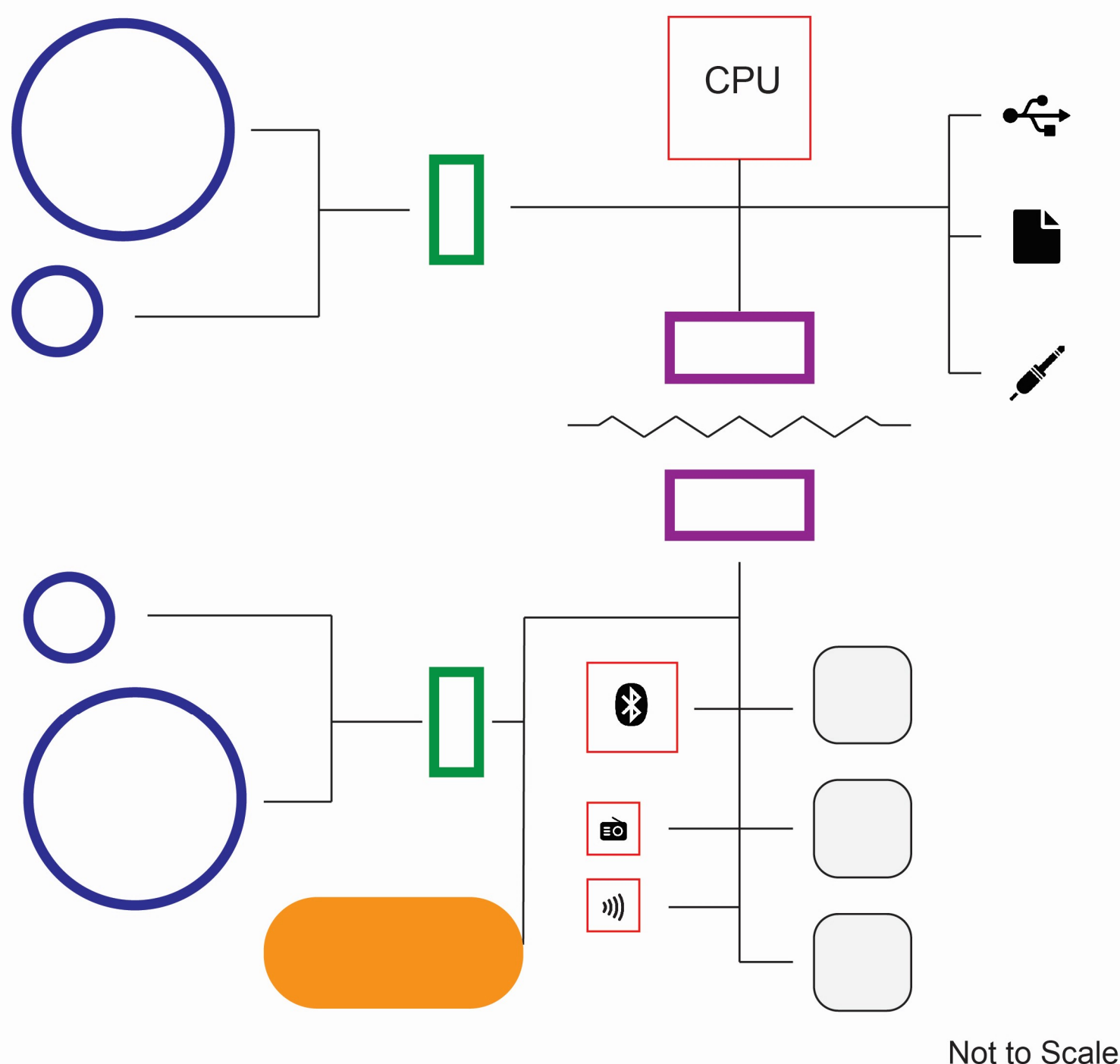



# Internal Technical Layout


Two PCB's are employed on each casing with components more or less balanced to evenly distribute weight and heat.


On the top side the inputs are found, the device charges through the USB C and micro-USB connectors. The central processor is also housed here along with one of the 54mm drivers and one of the 24mm drivers.


The second board, connected by ribbon cable which runs through the centre of a section of the hinge components, houses the antenna and processors necessary for the Bluetooth, NFC and radio functionality. In addition, it supports the mounts for the dial inputs and the battery as well as the other two drivers.

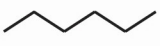



 Drivers

 Processor

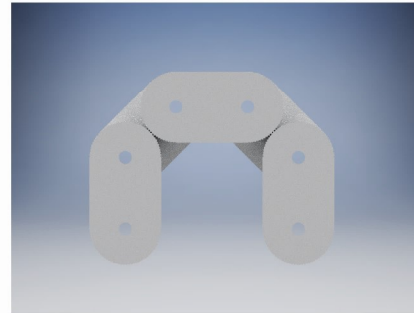
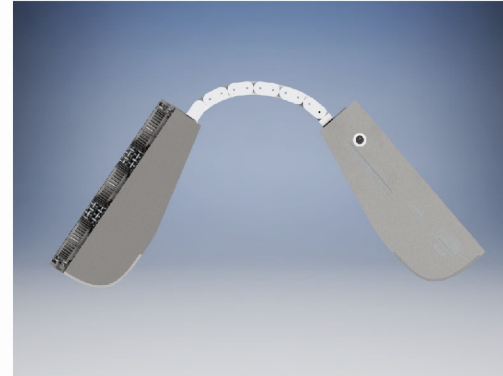
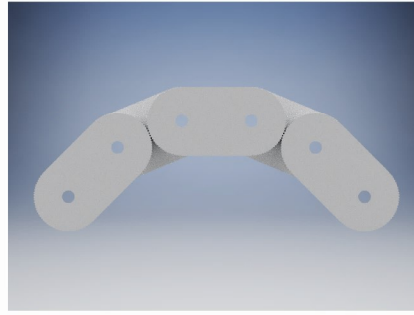
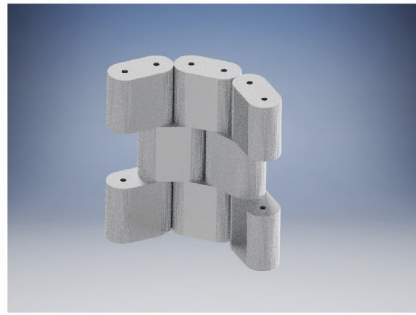
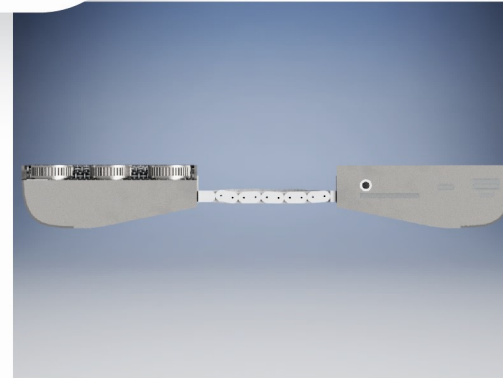
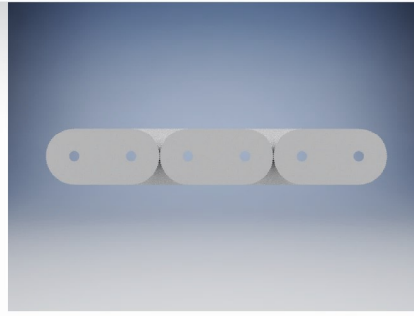
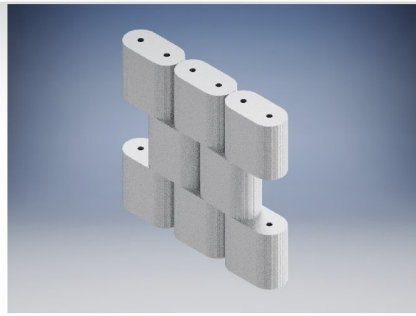
 Power / Data out

 Ribon Cable Connector (over hinge)

 Hinge break

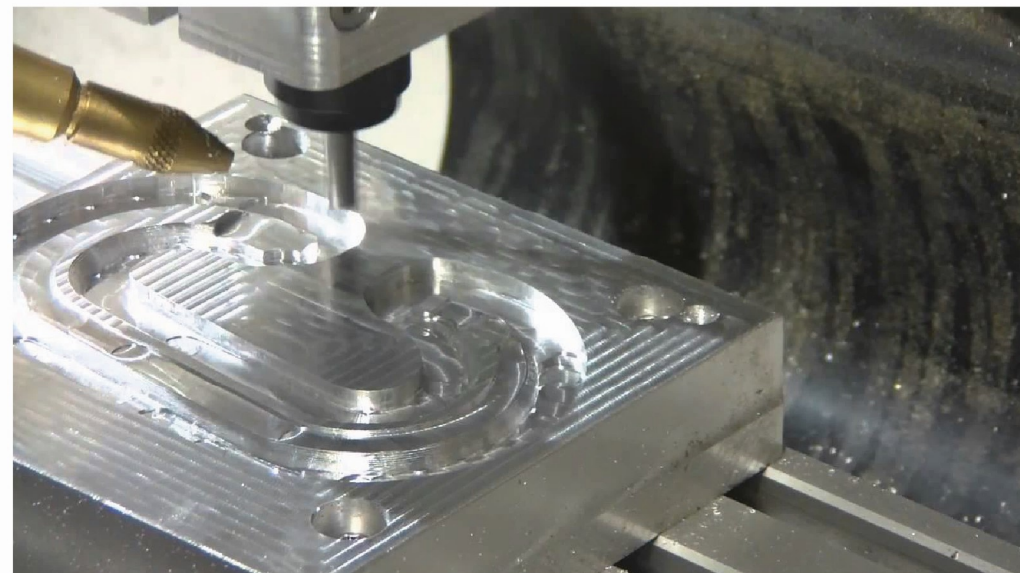
 50,000 ma/h Lithium Ion Battery

# Product Details



## Hinge Mechanism

The hinge is based loosely on a watchband made of identical segments with the dimensions shown below. The segments alternate as shown in the sample above and hold each other in place resulting in a mirrored motion when bending.



An example of extruded aluminium CNC milling.

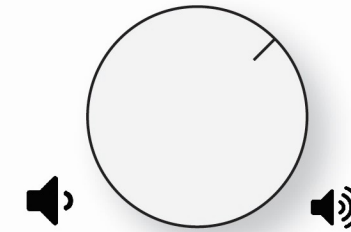
The primary casing will be made of Aluminium grade 2014 for its machining capabilities and high durability rate. Durability and lightness are key to the product's portable and outdoors nature and the primary casing will be CNC milled extruded aluminium to give a smooth body (free of seams and split-lines) and gives a premium feel to the product to appeal to the user base.

Before the casing became too complex I had intended to use Hybrix™, a stainless steel mesh encased in two stainless steel sheets resulting in a 90% air sheet material with extremely high durability and strength-to-weight ratio. The casing now relies on detailed internal webs and connection points which could not easily be connected to Hybrix, in addition the added connection loop would not be able to be manufactured from sheet material.



A CAD render of a section of Hybrix sheet

The user interface is comprised of three equal sized knobs on the lower casing.



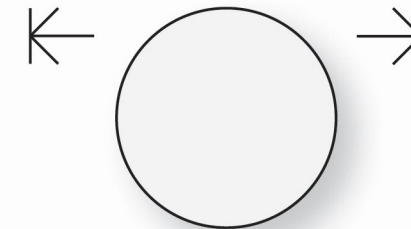
The first knob toggles the power on and off (indicated by a small verbal recording) and twists from 90 to 270 degrees to adjust the volume.



The second selects the mode of the device in a manner similar to the function dial of a DSLR camera cycling through:

- Radio input
- USB input
- NFC Input
- Bluetooth Input
- SD Card input
- Audio Jack Output

Pushing it in activates a connecting mode for the selected input if necessary to allow devices to find the speaker.



The third knob also moves incrementally and is used in a manner similar to a scroll wheel used as a left-right selector to select the next track, the next radio station etc.