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Controlling Sound in Multigenerational Homes
Justification Book

UBLF79-43-3

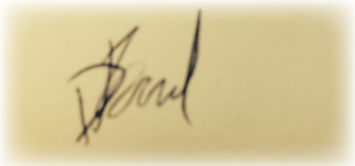
Coursework Declaration

The coursework submitted is my own work and has not (either in whole or in part) been previously submitted towards this award, or any other award or qualification, either at UWE or elsewhere.

I have read the UWE Plagiarism Policy which can be accessed on
http://www1.uwe.ac.uk/aboutus/policies and understand that cheating, collusion, plagiarism and other breaches of assessment regulations are taken seriously by the University.

I understand that design often is a collaborative process, and that I have worked collaboratively with the following people over the course of this project:

Activity	**Collaborator**
Branding	Curtis Bean



Signed .....

Contents

The Problem

With increasing Multigenerational homes and closer living people find themselves on top of each other a lot more while leading very different lifestyles in the same household. One of the main issues arrising out of this is sound and how sleep and general living can be disturbed due to conventional speakers with technology devices such as televisions and gaming systems also increasing in numbers within households.

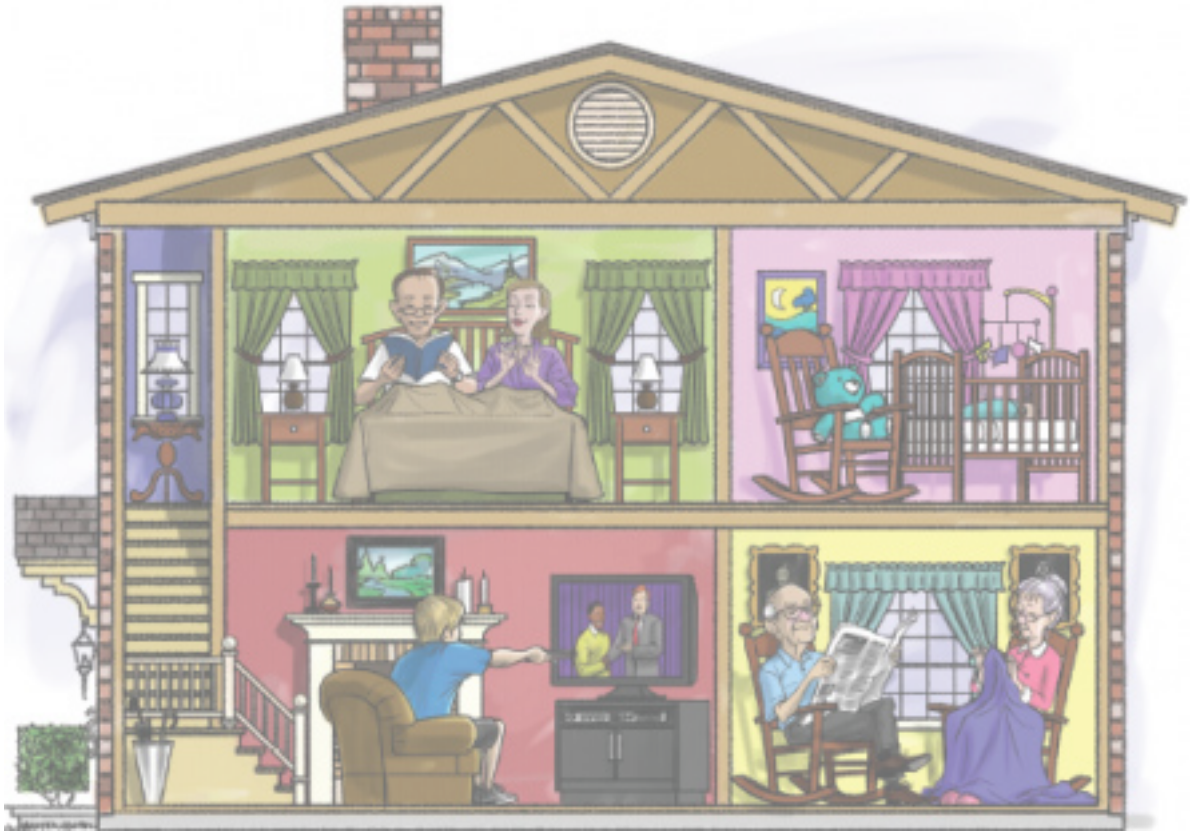
Homes with teenagers and grandparents under the same roof are especially part of this problem with the difference in sleep patterns and daily routines sometimes clashing. watching television and gaming into the late hours can be a disturbance for others in the house as well as during the day.

Although some see headphones as a simple solution to this, they isolate you from your surroundings and in a family heavy household it cuts you off and is an unsociable solution.

Design Brief

The problem presented a great opportunity to revolutionise the way we listen to music in the home and could also filter into television watching and gaming.

The new speaker will create a sociable solution to sound in multigenerational homes, allowing for people to do and listen to what they love without disturbing anyone else in the household.

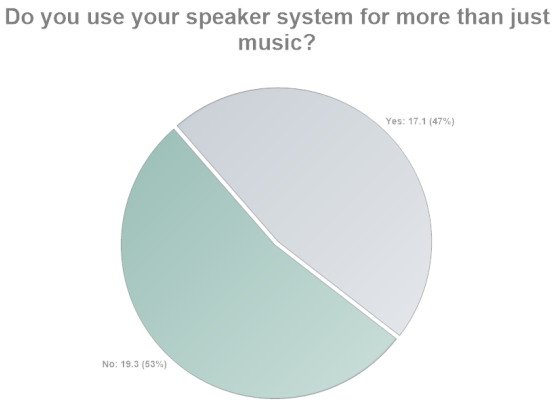


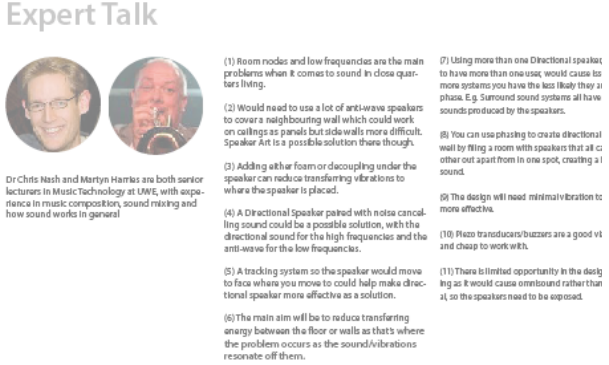
Initial insights from Report

One insight was taken from a user survey and speaker placement photographs where it was found that not many people use their speaker for just music these days and that it is a key part of them watching television and films also to have a greater experience. as well as being used for gaming and more commonly music.

Another insight that was brought into the design came from the expert talk with Martyn Harries and Chris Nash, both Senior Music Tecnology Lecturers at UWE.

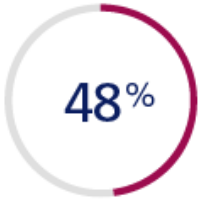
Speaking with them they highlighted that adding either foam or decoupling under the speaker can reduce transferring vibrations to where the speaker is placed.





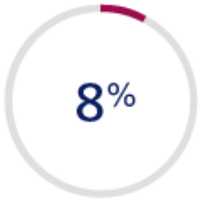
Key Research

people aged 15-34 live in a multigenerational house



of 20-24 year olds live in the parental home

of 25-29 year olds live in the parental home



of 30-34 year olds live in the parental home

Source: Aviva's changing household report, Office for National Statistics

Key Research

people predicted to live in multigenerational households by 2025

multigenerational households have parents or elderly relatives

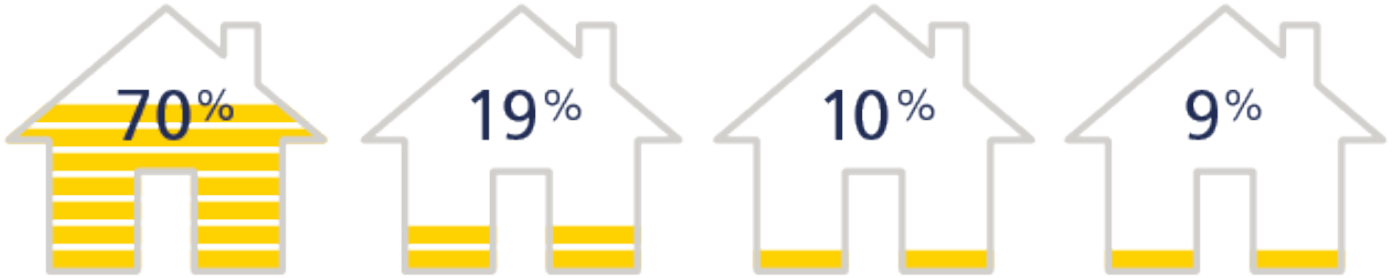
would share or have shared a home to look after a poorly relative

would consider a multigenerational home to assist with childcare

Source: Aviva's changing household report, Laing & Buisson Care of Older People UK Market Report

Scenario

Composition of **multi-generational** households



Adult children have not yet moved out

Adult children moved back home for other reasons

Adult children moved home after uni/higher education

Adult children moved back home to save for house deposit

Source: Aviva's changing household report

User Defining

"The insurance company Aviva has estimated that 3.8 million people aged between 21 and 34 could be living in the family home by 2025, up from 2.8 million in 2015"

The Guardian
House prices will force extra 1m young people to live with parents

"In the 10 years to 2015, the number of young people living with their parents increased by almost 700,000, or 32%, transforming the makeup of UK households by making multigenerational living much more common."

The Guardian
House prices will force extra 1m young people to live with parents

"Nearly half of 20 to 24 year olds lived with their parents in 2015"

Office for National Statisitcs
Why are more young people living with their parents, February 22nd 2016

"60% of 20 to 34 year olds living with their parents were male in 2015"

Office for National Statisitcs
Why are more young people living with their parents, February 22nd 2016

"Increasing numbers of young adults are also choosing to stay at home while attending university. In 2014, 24% of UK University undergraduates opted to stay at home living with parents whilst studying, compared with 12% in 1996.

"Additionally many young adults are choosing to return to their parental home after completing their studies"

Office for National Statisitcs
Why are more young people living with their parents, February 22nd 2016

User Group, Target Market and Stakeholders

User Group

Multigenerational households, where there might be up to 3 generations living under one roof due to children staying at home longer and older generations living longer.

In these households all 3 generations live in a different way, with different sleep patterns, tastes in television and music as well as very different pass times.

Target Market

18-34 year olds

predominantly male

UK market

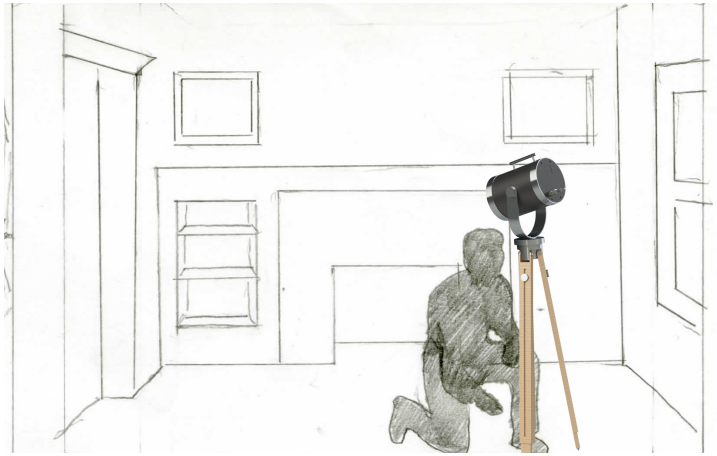
Multigenerational homes

Stakeholders

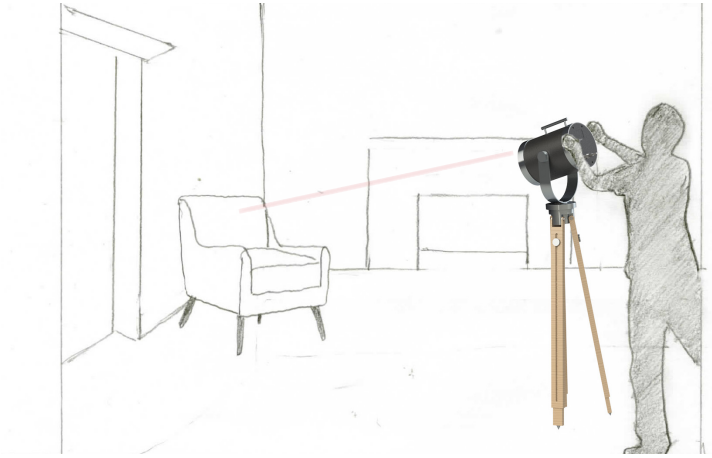
- Young adults
- Parents
- Grandparents
- Close neighbours

Story Board

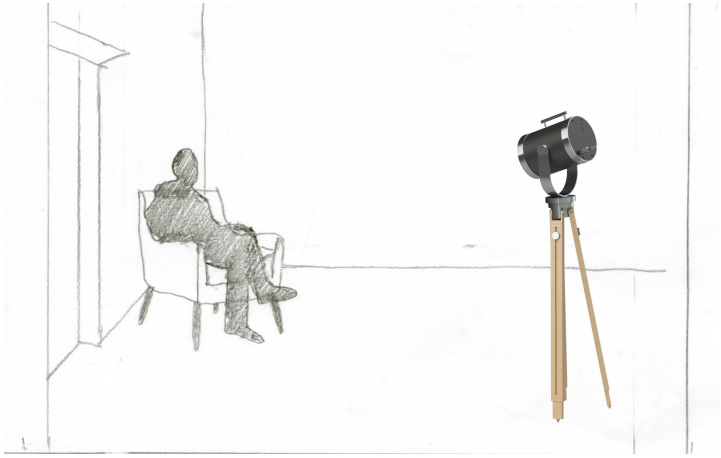
1. Take the folded speaker out of storage



2. Extend the tripod legs to get the desired height

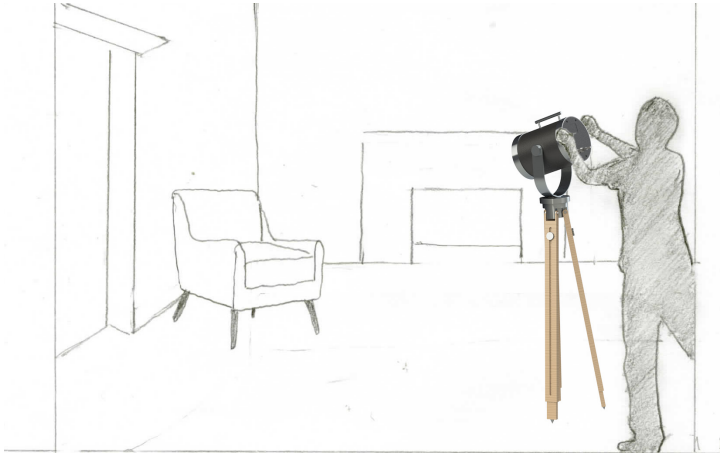


3. Press the on button and use the laser to set the angle for listening



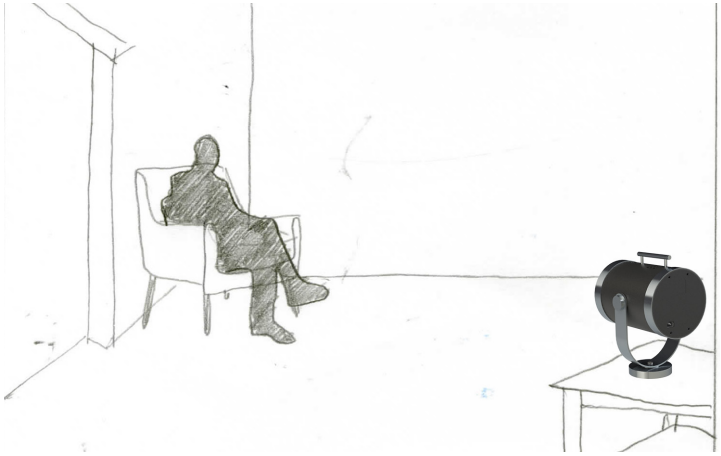
4. Sit back and enjoy the sound

Story Board



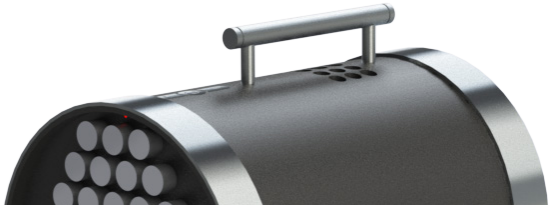
5. Unscrew the speaker base from the tripod

6. Place the speaker on a sideboard or table and adjust for the desired angle



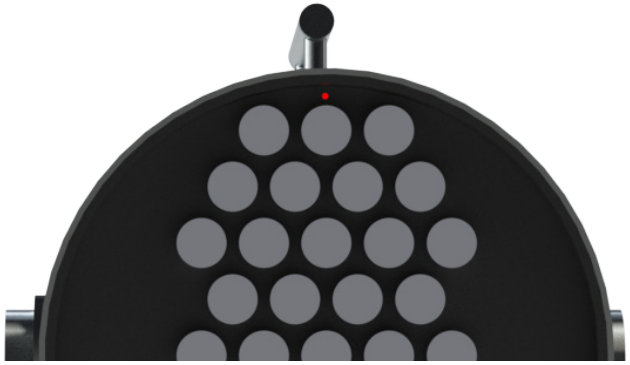
7. Sit back and enjoy the sound

Human Centred Design

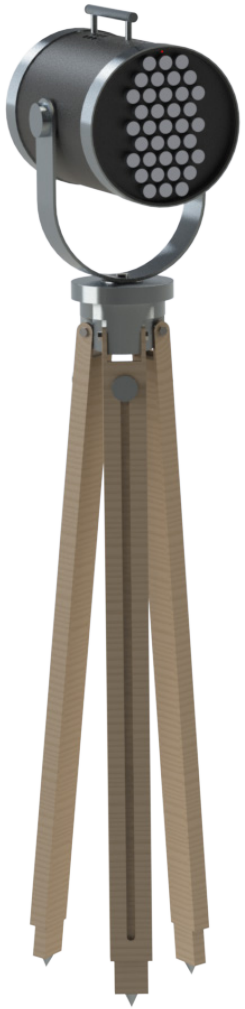


The addition of a handle to the design adds both a nod to the classic design of the nautical search light as well as serving a functional purpose to make the adjustment of the direction and angle much more user friendly.

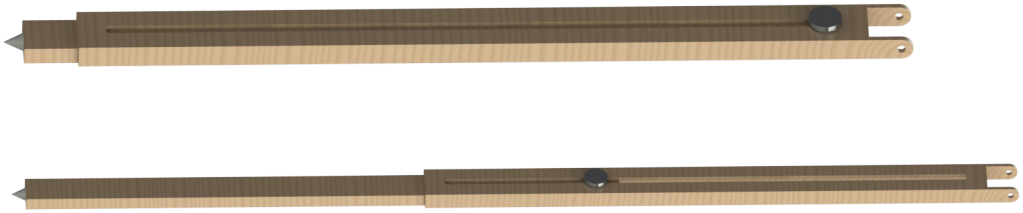
The front panel features a laser that turns on for one minute with the power button of the speaker. This prevents the user from a constant battle of small adjustments to get the speaker angle right, with the laser showing exactly where the sound will be.



The height and adjuatble legs were a focus of the design to increase its versatility for the user. the Height was developed following research into general room layouts and furniture height to ensure it reached over them as well as being the right ear height for varying users.



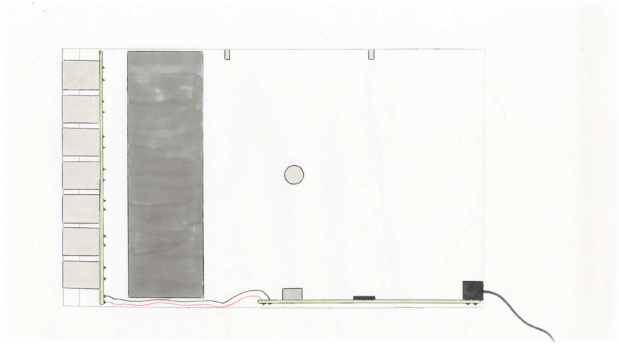
Functions

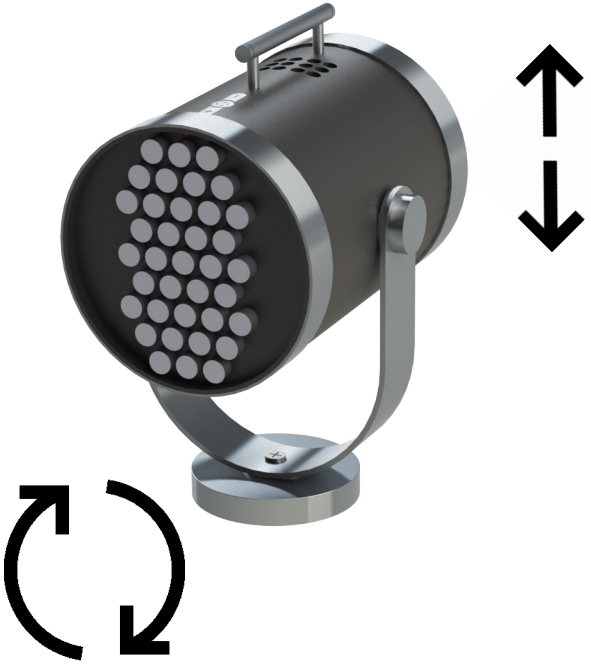


Fully extendable tripod legs to achieve the rquired user height for your desired room and surroundings. Extendable from 815mm to 1447mm.

Back panel of the speaker holding connection ports for both 3.5mm audio jacks as well as USB input for a folder of music. As well as being Bluetooth connected to allow for connecting to a range of input devices.

The internal components feature a large piece of sound and vibration reducing foam placed behind the tranducers. The foam used is similar to that of packaging foam.





Fully rotational around the base to adjust to face the user as well as the main casing being fully adjustable with the arm to be able to achieve the desired angle for use.

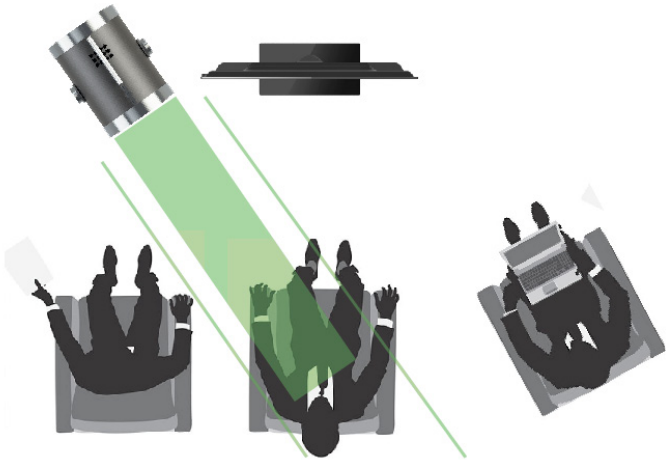
Capability

37 Ultrasonic transducers creating a directional soundwave with sound that can be heard after contact with the air around them.

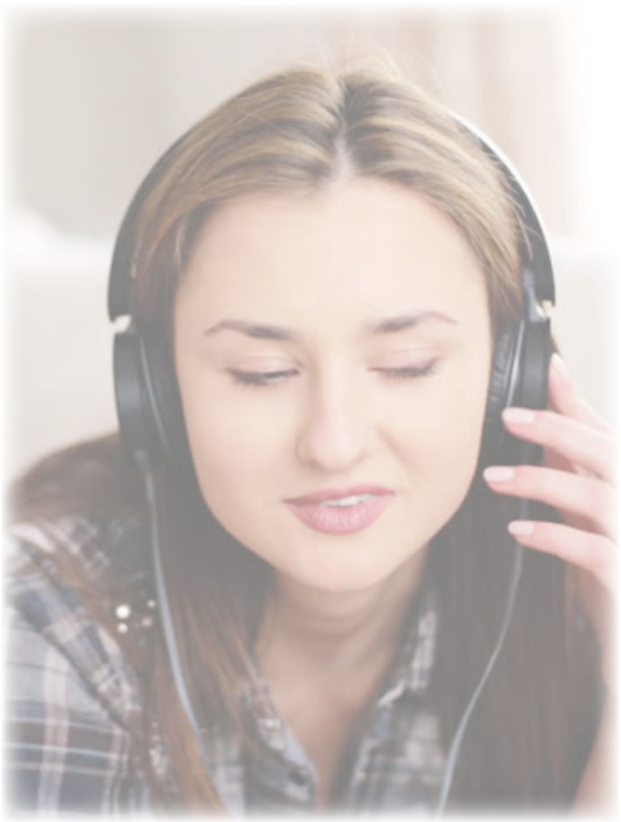
In this array the soundwaves bounce off one another to keep them in the straight focused beam so that only the user hears the outputted sound.

Putting the sound where you want it.

Sound heard within 30cm either side of the speaker with the majority travelling in a straight line following the width of the front panel.



Multi Use



User Group Validation

Feedback from Alistair Hill, part of a Multigenerational household.

"love the design and think its a brilliant concept and idea."

"Could work well for those hard of hearing especially the older people living in the house or anyone with a hearing disability."

"where theres loads of people competing for sound and space it has loads of potential."

"I dont see it being used in a living room as there would be too much sound coming from other people that would still make the tv hard to hear. But it has loads of potential for conference centres and other rooms."

Expert Validation

Feedback from a meeting with Martyn Harries, a senior lecturer in Music Technology at UWE, with experience in music composition, sound mixing and how sound works in general.

"The array you've set up creates the right narrow beam to create the directional sound being higher than it is wide."

"It has a desirable aesthetic that looks like it would be it would be in a modern home, with the tripod working really well for the versatility."

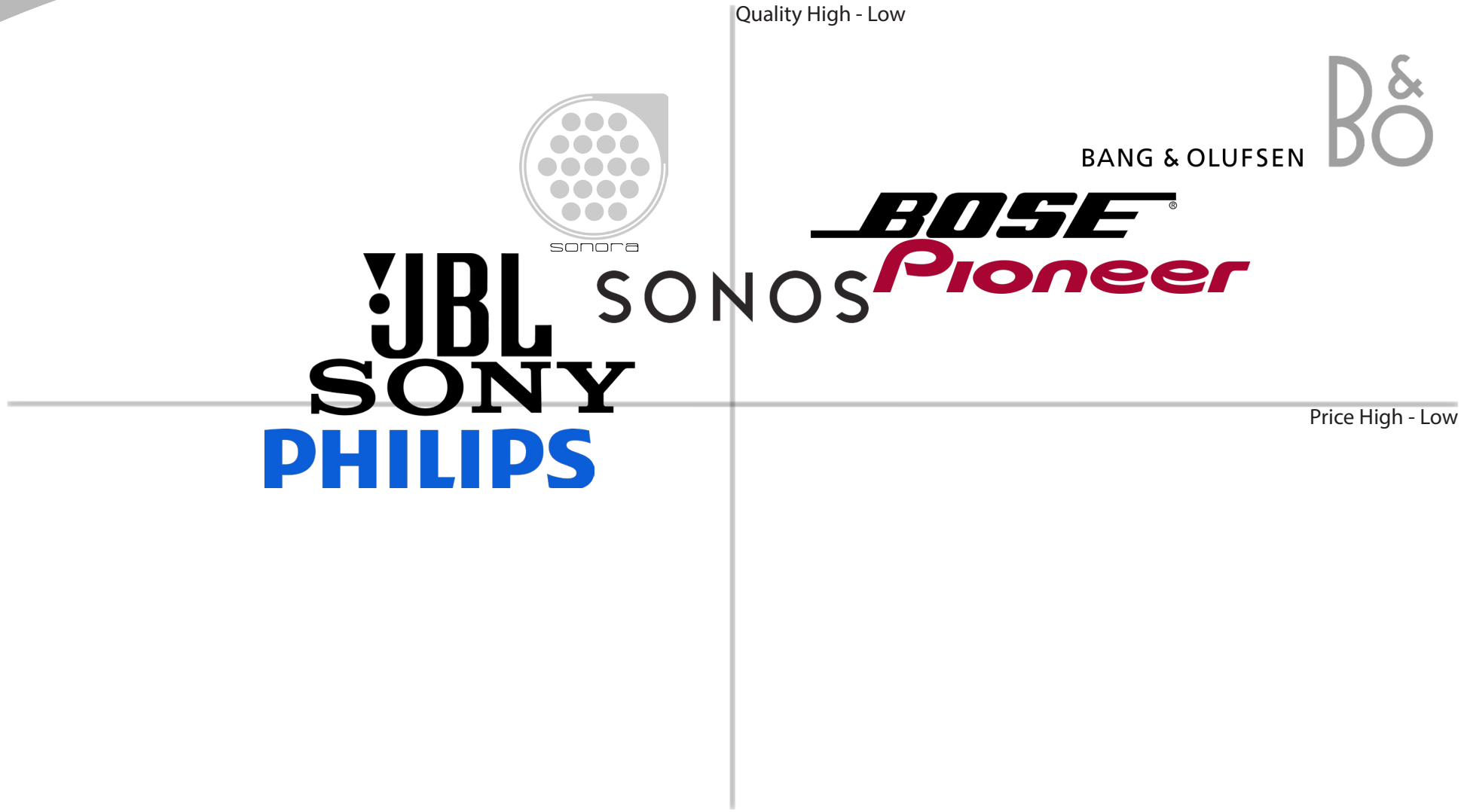
"You may have trouble with the resonance in the back of the housing but the foam behind the drivers should limit or stop it."

"The foam and spikes are in the right place to reduce the vibrations coming from the speaker drivers."

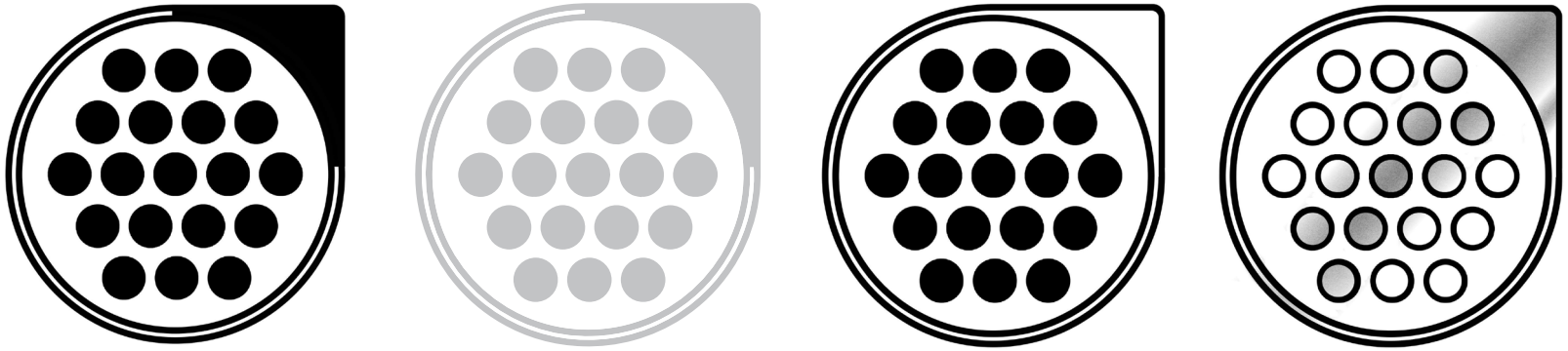
"There's no reason why in theory it shouldn't work as a speaker and a marketable product and i'm interested to see a working prototype."

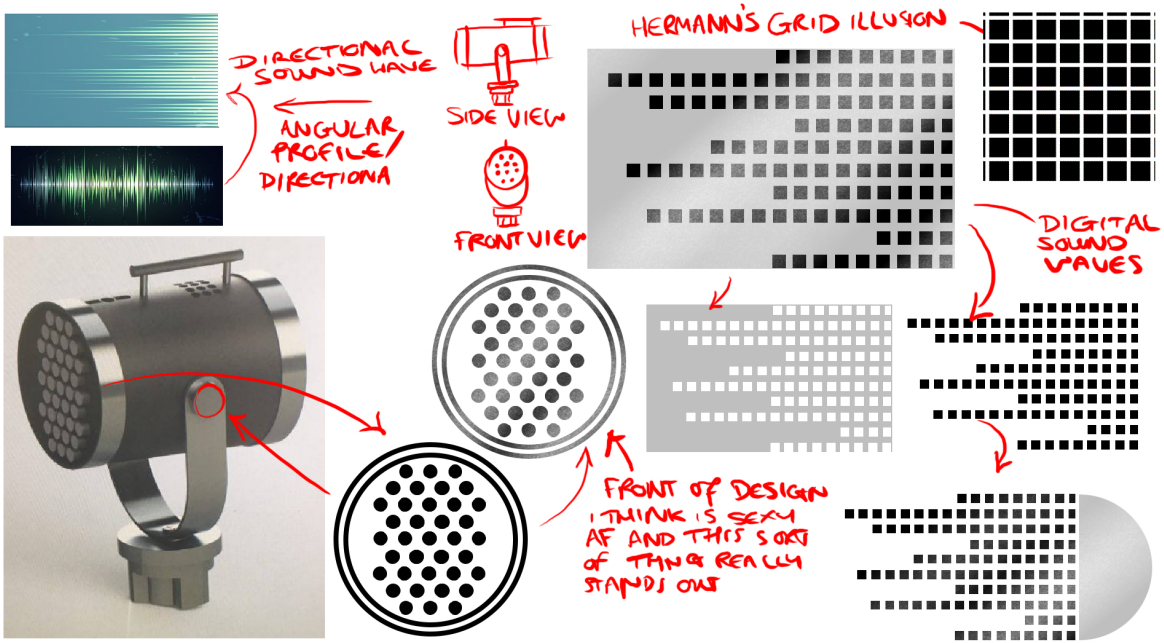
Directional Market Positioning

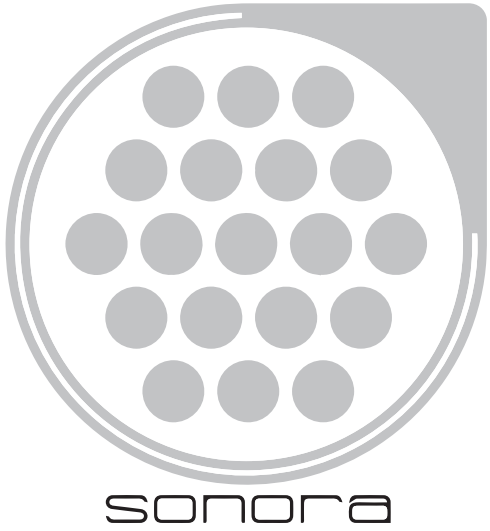
Home Speaker Market Position



Brand Identity







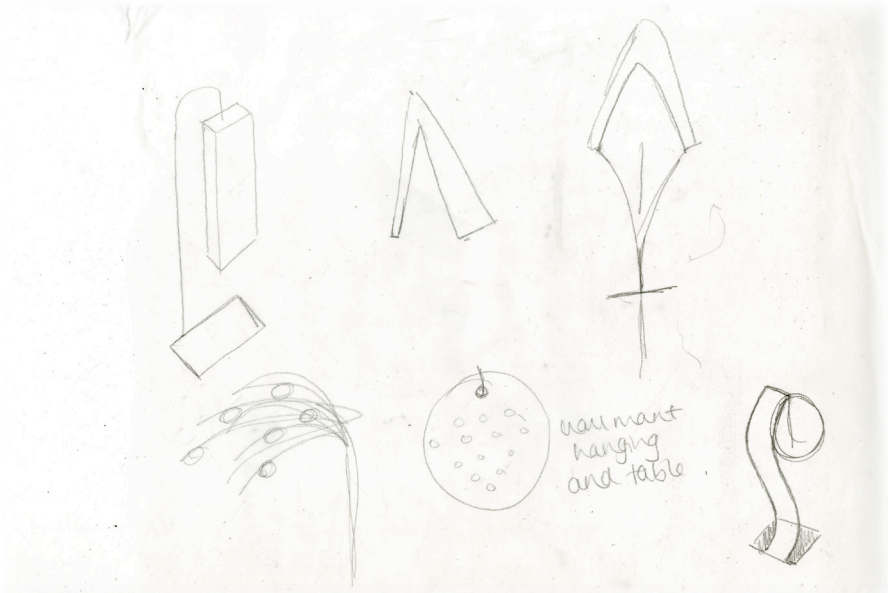
Precedents

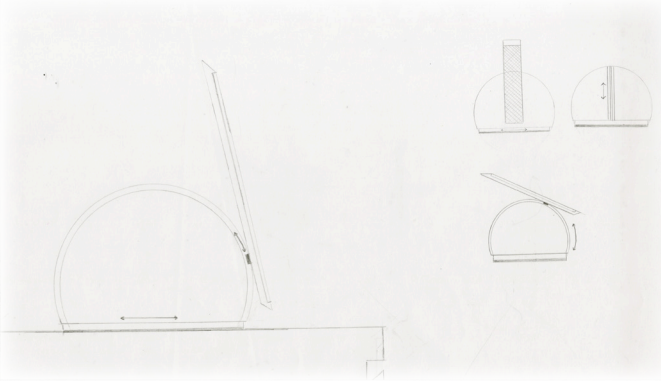
Two of the current competitor companies that are making home use Directional speakers show how they approach making the functional product more desirable. Both make use keeping the transducers on show as a key design feature, something which i also wanted to implement.

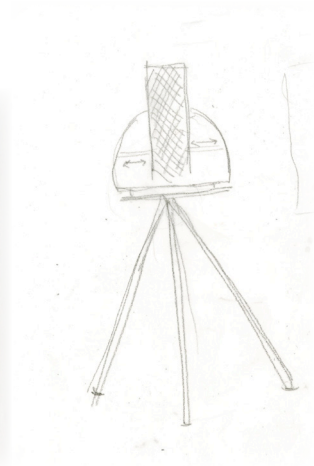
The key differnecs being in the size and shape of how these companies approached their designs compared to myself. one aimed more portable being smaller and battery powered, with the other design being stationary and wall mounted but with a much more sleek aesthetic.

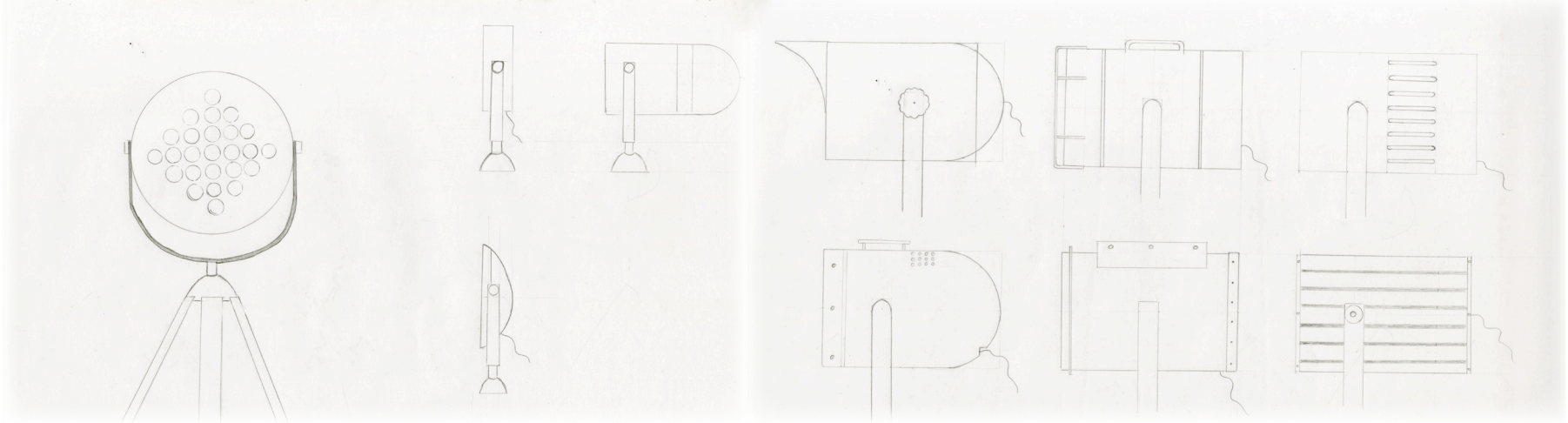
The Inspiration for the design of the speaker came from recent floor lamp designs originating from nautical search lights. Playing on the idea that a Directional speaker is a spotlight of sound a spotlight design fits in making this a feature as well as functional piece within a room.

Development (Sketches)









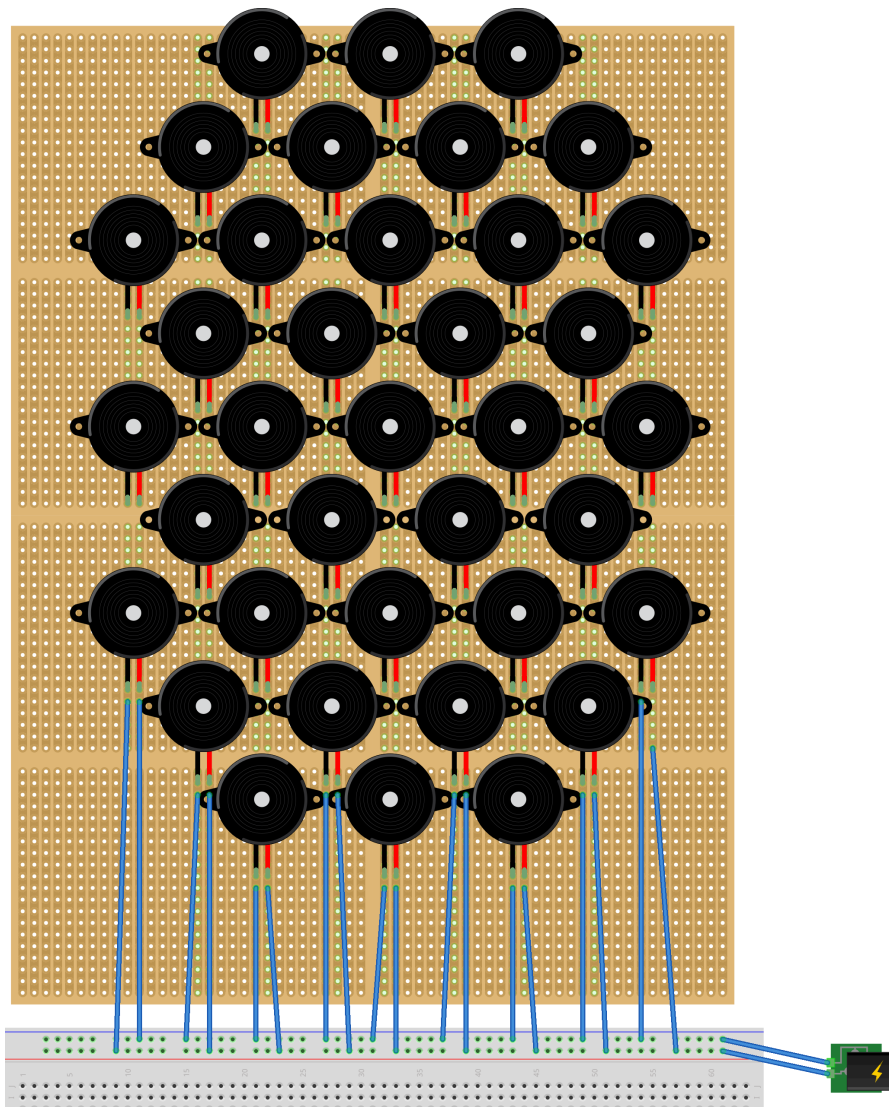
Development (Models)

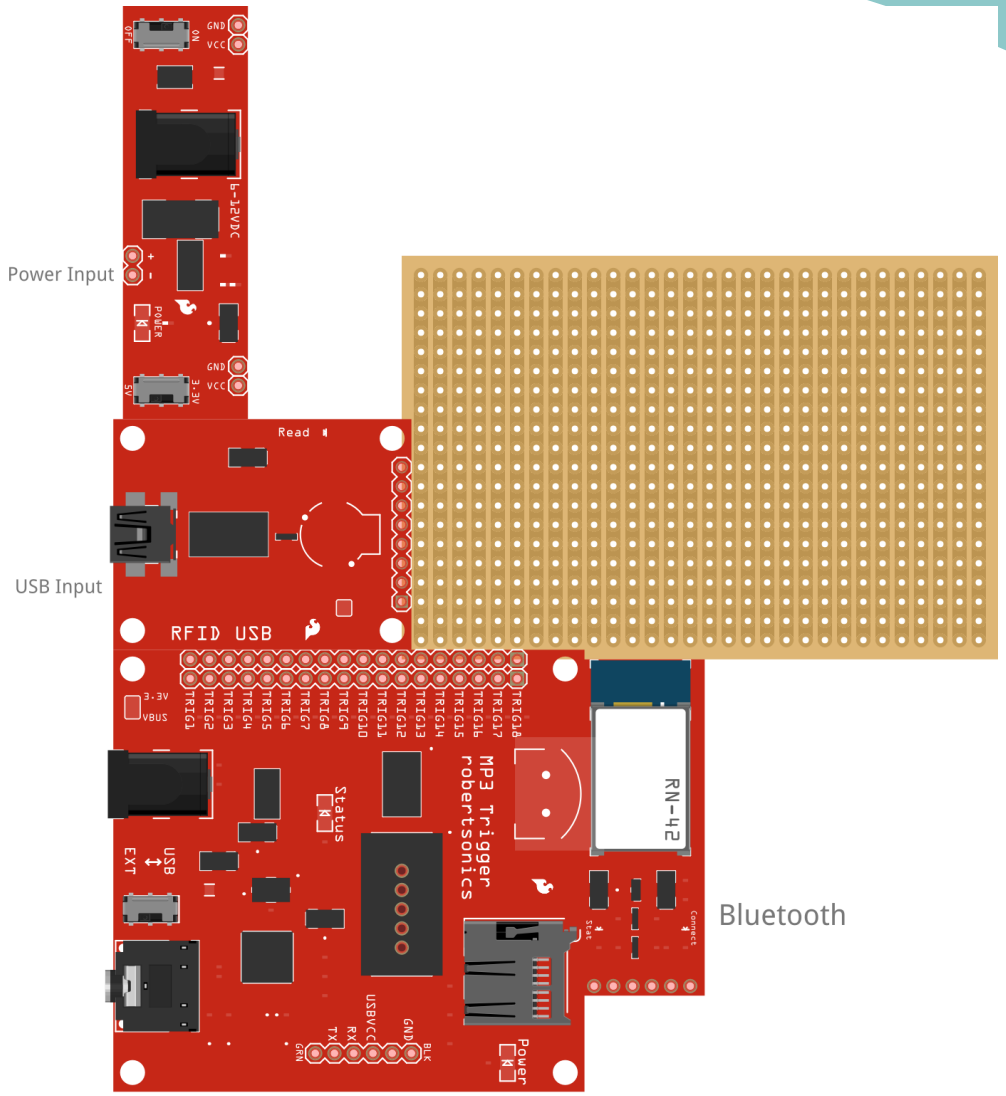
The first prototype I developed was a rough idea of size and form playing on the idea of a spotlight.
The aim was to see how the transducers could arrange for a circular front panel rather than squared, as well as how it might be adjusted for direction and angles.

However the base element proved too small and was easily toppled with the slightest of knocks and the arm being placed towards the front meant its balance was even more off.

This then lead to the second prototype which fetaured further detailing. A handle was added to aid the adjusting angle and direction process. The transducer array was changed to maximise output in a drirectional method, as well as the front panel that holds them being extended in diameter.
Cut outs were added to the model to show where buttons would be placed as well as ventilation for the main circuit board that would be at the back of the casing.
The base was made more simple and larger to make the product more stable as well as counter the weight of the main casing.

Development (Prototypes)

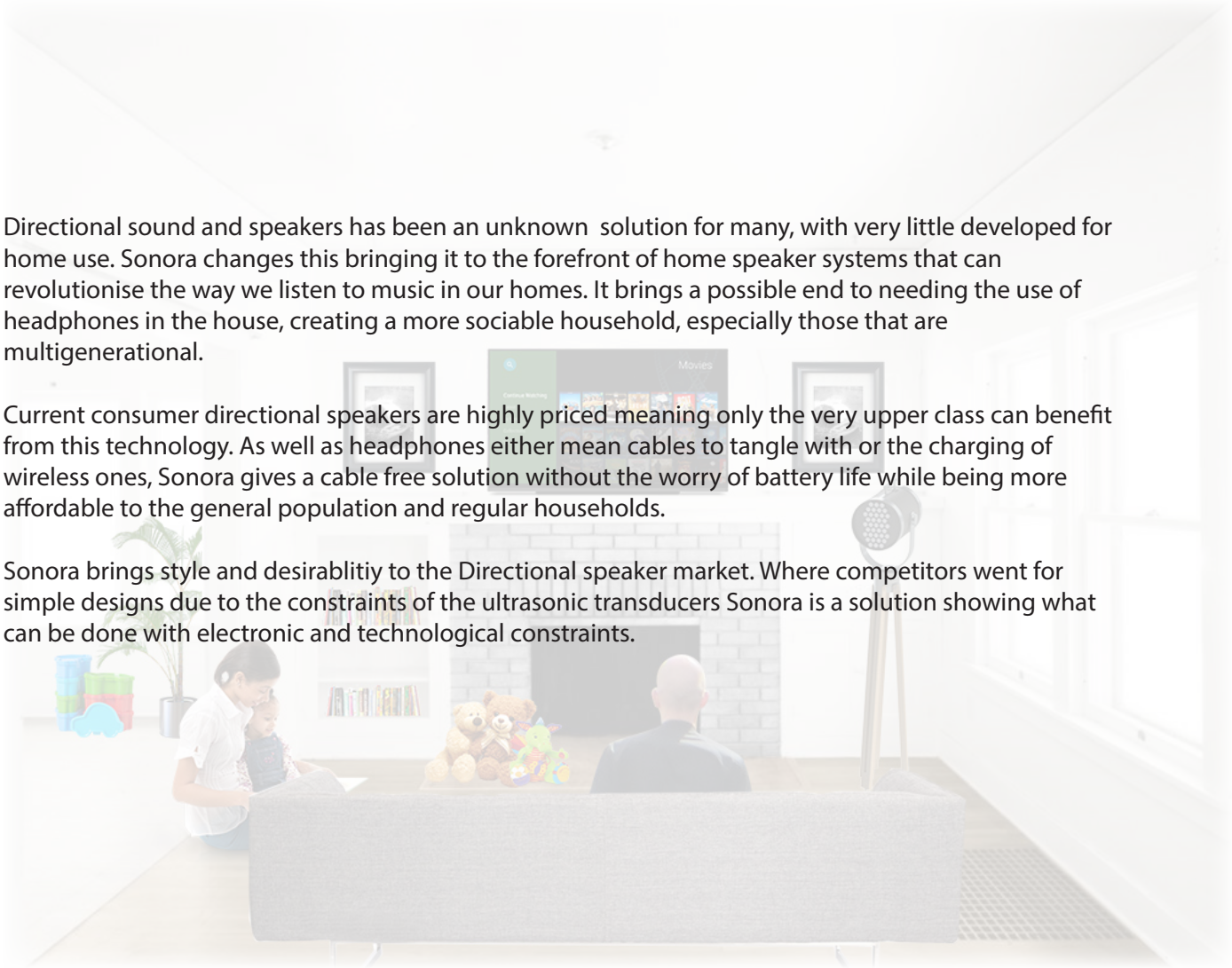




MP3 Adaptor with Audio Jack inputs

Development (Testing)

Conclusions

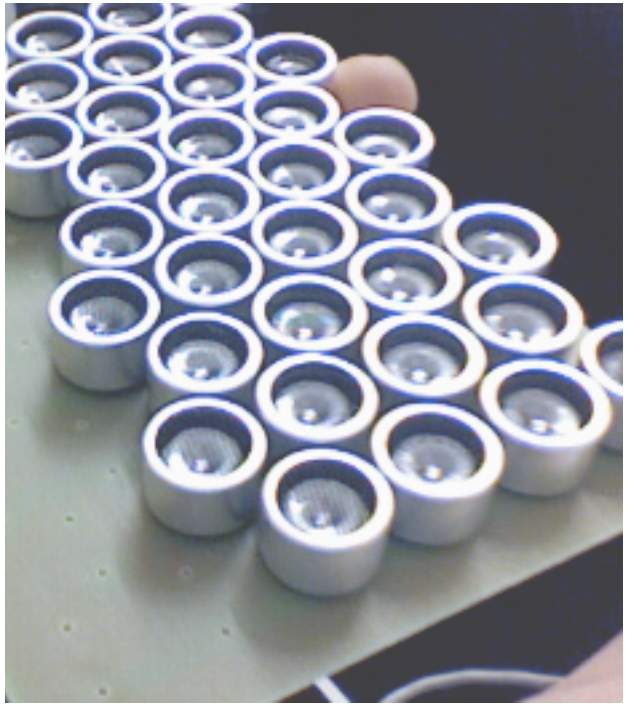


Directional sound and speakers has been an unknown solution for many, with very little developed for home use. Sonora changes this bringing it to the forefront of home speaker systems that can revolutionise the way we listen to music in our homes. It brings a possible end to needing the use of headphones in the house, creating a more sociable household, especially those that are multigenerational.

Current consumer directional speakers are highly priced meaning only the very upper class can benefit from this technology. As well as headphones either mean cables to tangle with or the charging of wireless ones, Sonora gives a cable free solution without the worry of battery life while being more affordable to the general population and regular households.

Sonora brings style and desirablitiy to the Directional speaker market. Where competitors went for simple designs due to the constraints of the ultrasonic transducers Sonora is a solution showing what can be done with electronic and technological constraints.

The Next Steps



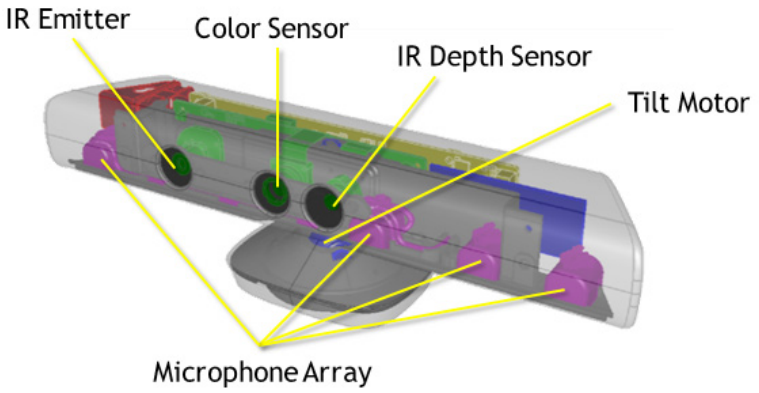
The next steps in devloping this idea and product are to get a working electronic prototype to develop the directional sound and the quality of the output.

The digital signal processor and amplifier that needs to partner the transducer array has to be modified to get the right wavelength to effect the sound quality that is emitted as well as an algorithm to calculate this.

While the array could simply be attached to a regular speaker amplifier board it would produce poor quality sound as well as limiting its capabilities.

A future development for this product was brought about in the prevoius report and also expert talks. There was possibility with this product to add room mapping and user tracking technology similar to that of an Xbox Kinect sensor bar.

Using cameras and servos the speaker could map the room and follow the user as they walk or move around. Allowing them to change seating or standing constantly without having to manually readjust the direction the speaker faces.



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