

sonora

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.

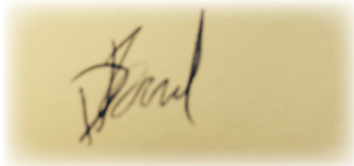
I understand that design often is a collaborative process, and that I have worked collaboratively with the following people over the course of this project:

Activity

Branding

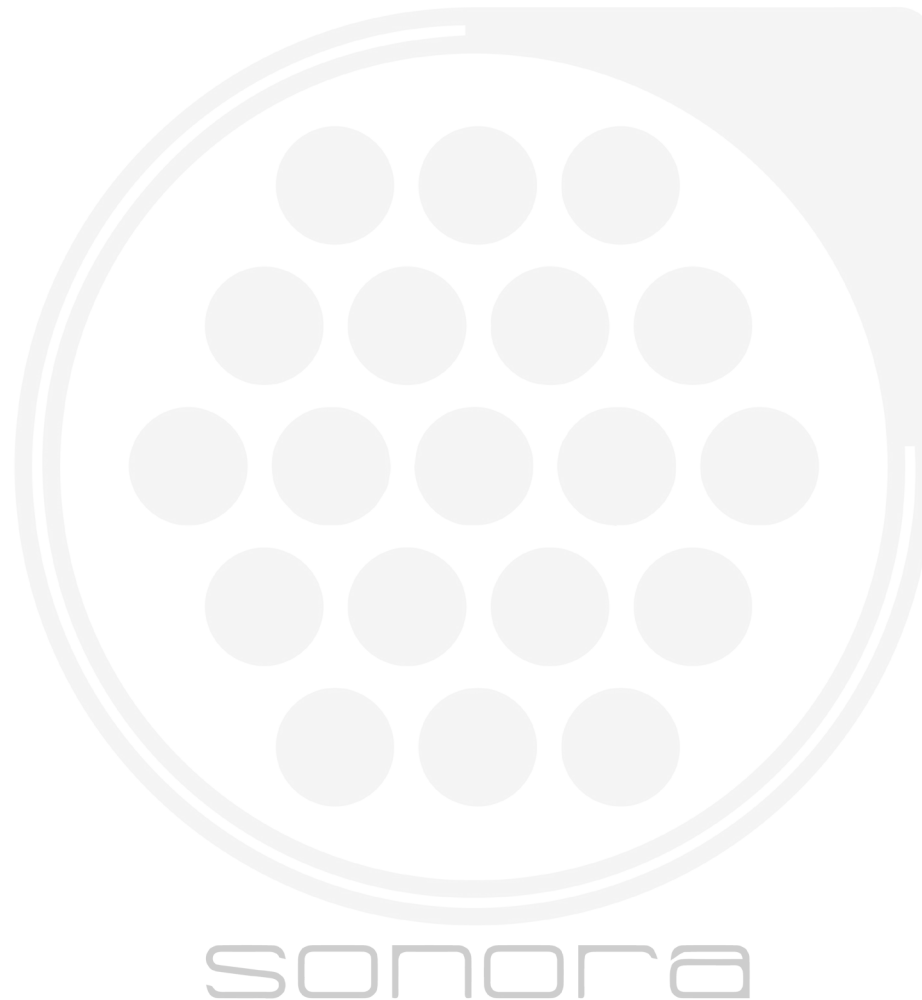
Collaborator

Curtis Bean

A rectangular area containing a handwritten signature in black ink. The signature appears to be 'Curtis Bean' written in a cursive style.

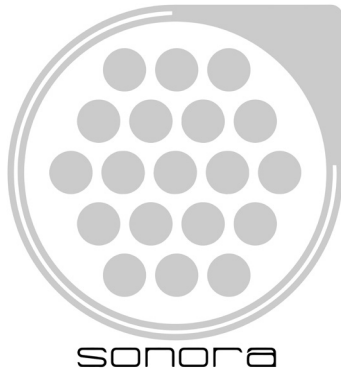
Signed

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Concept Overview



Sonora is a directional speaker producing a narrow beam of sound through the 37 ultrasonic drivers creating a spotlight of sound for one or two users.

With foam added to the internal structure and spikes off the tripod legs it significantly reduces vibration produced so that disturbances are minimal from this product.

Sonora is a sociable solution to sound within the home, with no more need for headphones to avoid disturbing others around you.

It is fully height and angle adjustable to put the sound where you want, whenever you want it.



Design Brief/ The Problem

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 arising out of this is noise. 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.

The opportunity

There is an opportunity here to revolutionise the way we listen to music and sound in general, allowing people to be closer together without disturbances to one another. Such as listening to two TV channels at once without having the sound crossover.

The Idea

The idea is to design a product that has third party benefits as well as to the user creating a better environment. And to improve life within multigenerational homes

Concept Outline

The outline of the concept looks at the various ways to set up a directional speaker to create a sound bubble and minimize the impact of vibrations and soundwaves. They will also draw upon the anti-wave side of the research looking at ways to eliminate or isolate music or sound without significant adjustments to the room.

Target Market

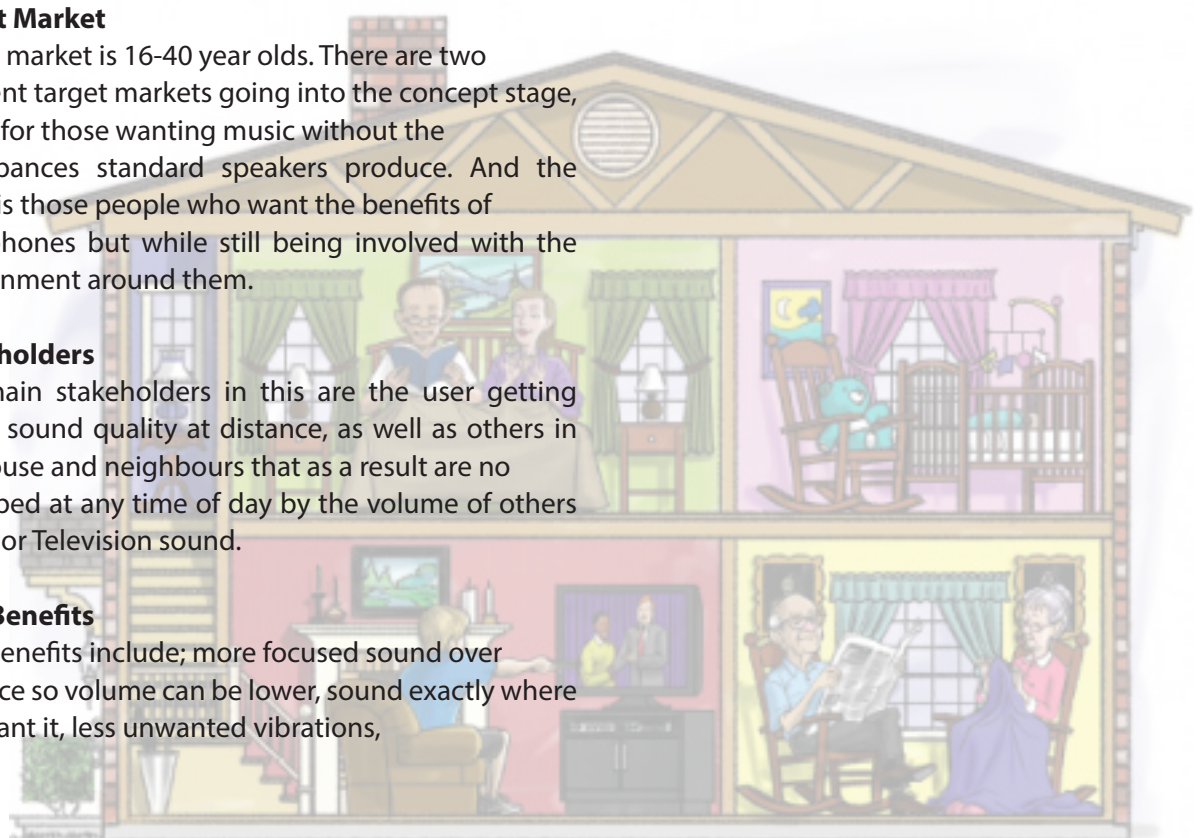
Target market is 16-40 year olds. There are two different target markets going into the concept stage, one is for those wanting music without the disturbances standard speakers produce. And the other is those people who want the benefits of headphones but while still being involved with the environment around them.

Stakeholders

The main stakeholders in this are the user getting better sound quality at distance, as well as others in the house and neighbours that as a result are no disturbed at any time of day by the volume of others music or Television sound.

User Benefits

User benefits include; more focused sound over distance so volume can be lower, sound exactly where you want it, less unwanted vibrations,



Specification

Performance

- Able to project sound clearly to a distance of at least 5m
- Be able to minimally hear the sound from the speaker with 1m of its sides

Environment

- Dust proof
- Suitable for indoor use only

Ergonomics

- Speaker aimed at ear height to maximise directional waves
- Mean ear height when standing is 151.61cm for females and 163.39cm for males
- Mean ear height when sitting is 72.83cm for females and 78.30cm for males

Service life

- Product life span of approximately 10 years

Customers/consumers/end users

- Target market of 16-40 year olds,
- Main users of music listeners, gamers and movie lovers
- Ergonomics for fully grown adult

Target manufacturing cost/Factory gate price

- RRP- £150 or less
- Main competition of Holosonics consumer model products

Size

- Weight 1.1kg for speaker only,
3.9kg for speaker and tripod together
- Speaker and Tripod Size: Height – 1180mm to 1700mm, Width – 212mm, Depth – 255mm
- Speaker only size: Height - 333mm, Width - 212mm, Depth - 255mm

Shipping

- Product packed in a secure box with protection for transporting
- Shape of the box to maximise numbers that can be shipped in one go and to maximise amount that can be stacked on an instore retail shelf

Market constraints

- Need for different mains socket attachments to enable it to be distributed worldwide

Materials

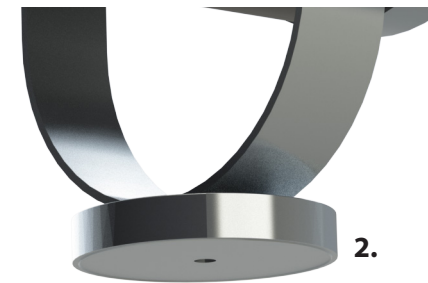
- Aluminium
- Polypropylene
- ABS
- Neoprene rubber
- Mineral wool
- Acoustic foam

Features and Benefits



1. Laser guided aiming for adjusting where you want the sound.

Upon pressing the power on button on the top of the speaker a laser point will turn on for one minute to be able to see where the speaker is aimed and make adjustments.



2. The base features a small rubber ring around its circumference that comes to a point to reduce surface contact and vibration transferred.

3. Twist to loosen and tighten bolt on the right side of the speaker allowing the angle to be adjusted to suit the user position.

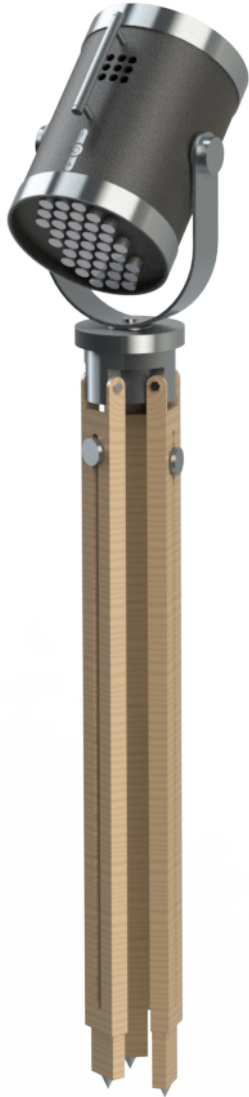
4. Handle located on the top of the speaker to add to the ease of adjusting the speaker angle and direction.

5. Arm and speaker body are fully rotational around the base to change the direction the sound is projected.



Features and Benefits

Fully foldable to create a storage solution for when either the tripod only or the whole system is not in use.



Height extendable from 1.18m to 1.7m

Adjustable Tripod with extending legs to meet different room and seating requirements allowing the sound to always reach the users ears.



The bottom of the Tripod features Spikes to lower the contact area with the floor its on and reduce vibrations being passed through it.



BOM And Costing

Due to the majority of parts for this product being completely custom a full manufacture cost was not possible at this stage of the project.






The solution to this to be able to gather a rough estimated cost was to find similar elements of the same material on the online wholesale site Alibaba.

Parts were sourced of a similar size and weight to create as close as estimate as possible to the manufacturing cost of the product. links to which can be found in the references.

The tables on the following pages show the cost per component following the Alibaba estimations leading to an estimated product cost.



BOM and Costing

Component	Material	Quantity	Similar product on Alibaba	Cost
Casing	Polypropylene	1		\$2 <i>a</i>
Arm	Aluminium	1		\$10 <i>b</i>
Base	Aluminium	1		\$10 <i>c</i>
Handle	Aluminium	1		\$0.85 <i>d</i>
On button	Polypropylene	1		\$1.50 <i>e</i>
Volume buttons	Polypropylene	2		\$1 x2 <i>f</i>
Rubber washer	Neoprene Rubber	4		\$0.10 x4 <i>g</i>
Arm bolt	Stainless steel/ Aluminium	1		\$0.39 <i>h</i>
Bolt cap	Aluminium	2		\$0.04 x2 <i>i</i>

BOM and Costing

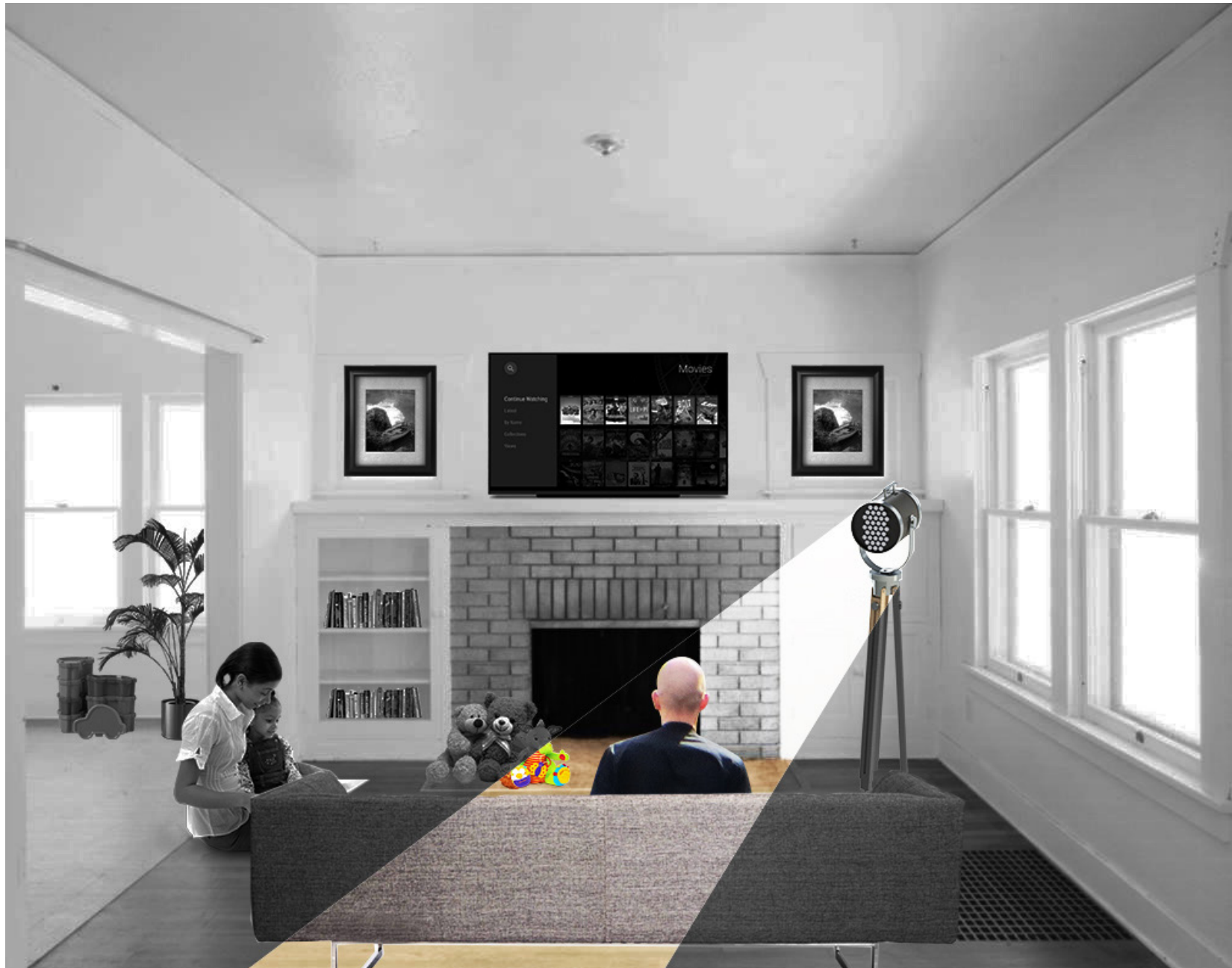
Component	Material	Quantity	Similar product on Alibaba	Cost
Tripod base	Aluminium	1		\$10 <i>j</i>
Tripod legs	Birch	3		\$2 <i>k</i>
Tripod leg spike	Aluminium	3		\$0.10 x3 <i>l</i>
Back Panel	Polypropylene	1		\$0.50 <i>m</i>
Ultrasonic Transducers	Aluminium	37		\$0.20 x37 <i>n</i>
Foam	Packaging Foam	1		\$0.59 <i>o</i>
Motherboard	PCB/ DSP	1		\$20 <i>p</i>

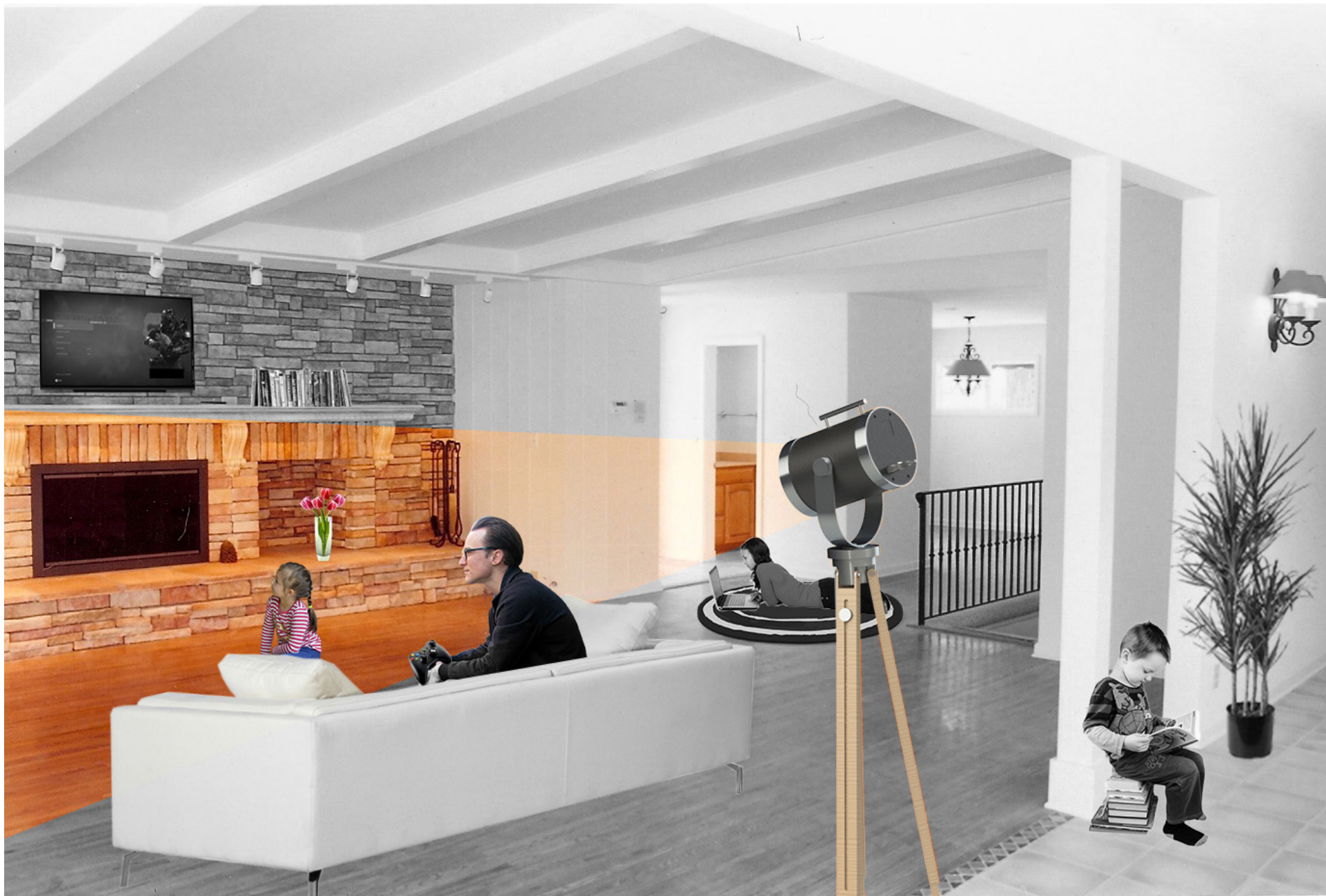
Total estimated Manufacture cost \$68.01
£53.01
£53.01 with Tripod included
Or £43.48 for Speaker alone

Speaker only manufacture cost £43.48
With 60% markup for storage and distribution cost
of £113.04
Adding on a 50% margin again due to self selling
instead of a retailer, to get RRP £169.99

Speaker with the Tripod coming in at RRP of
£207





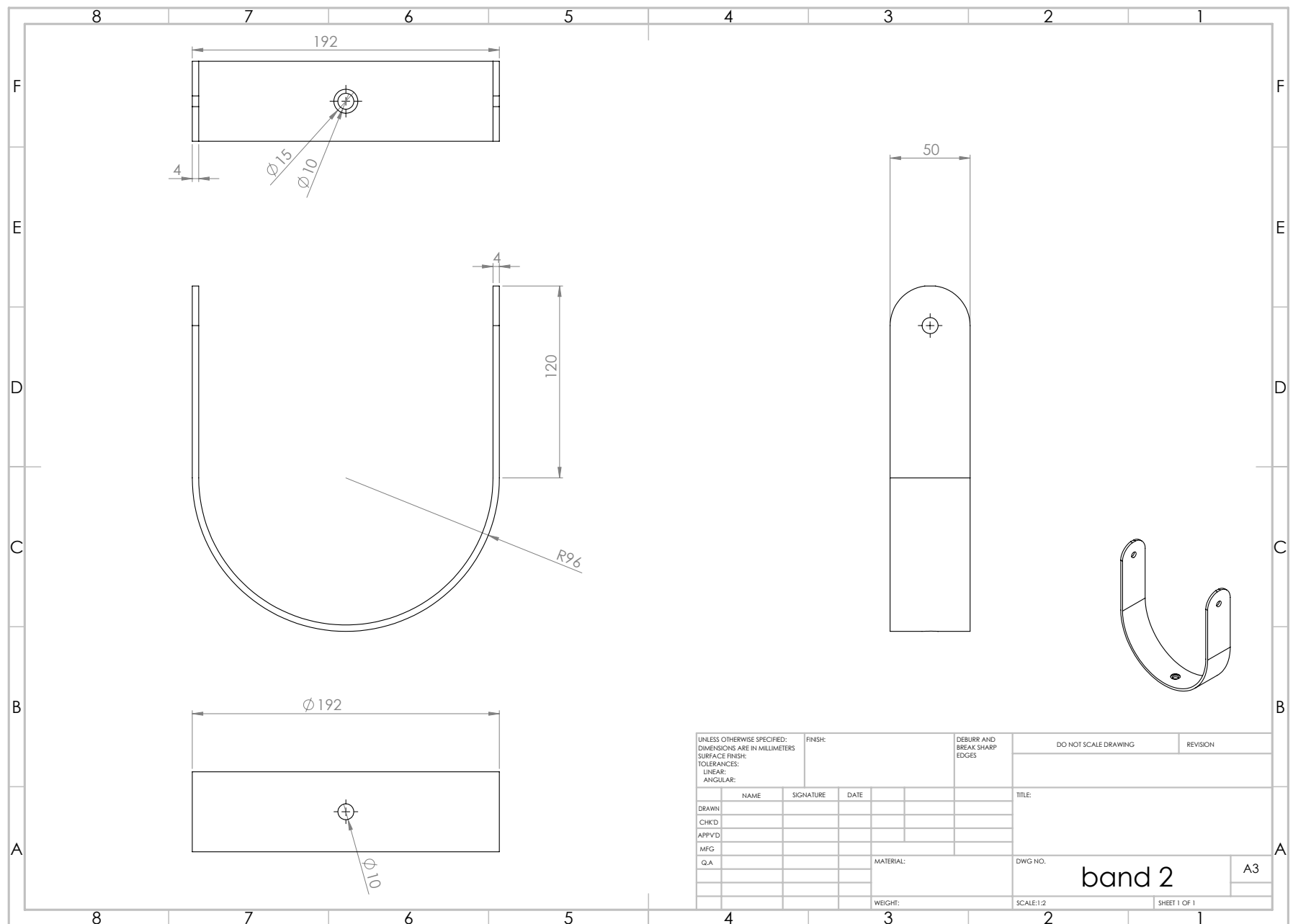


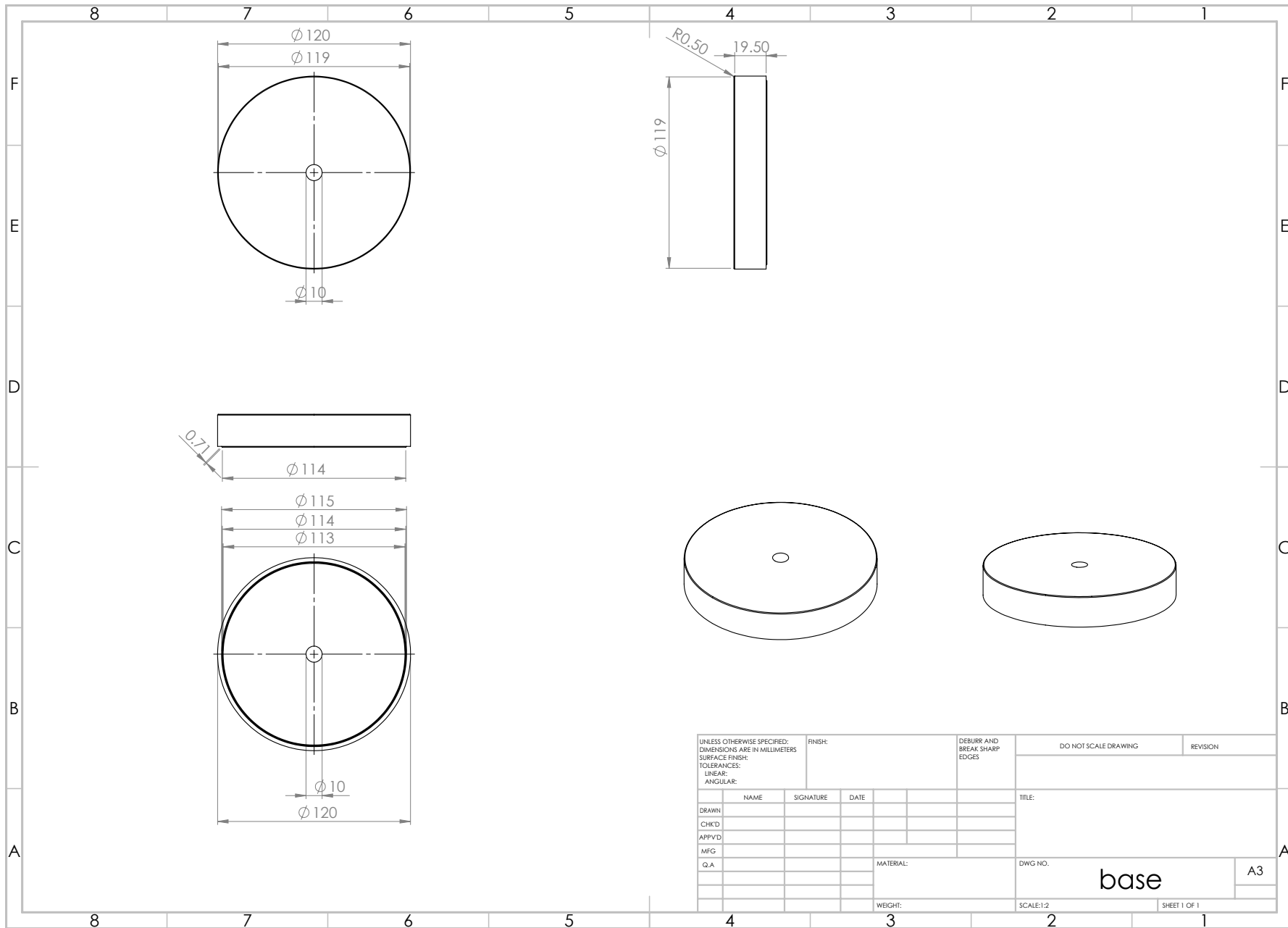




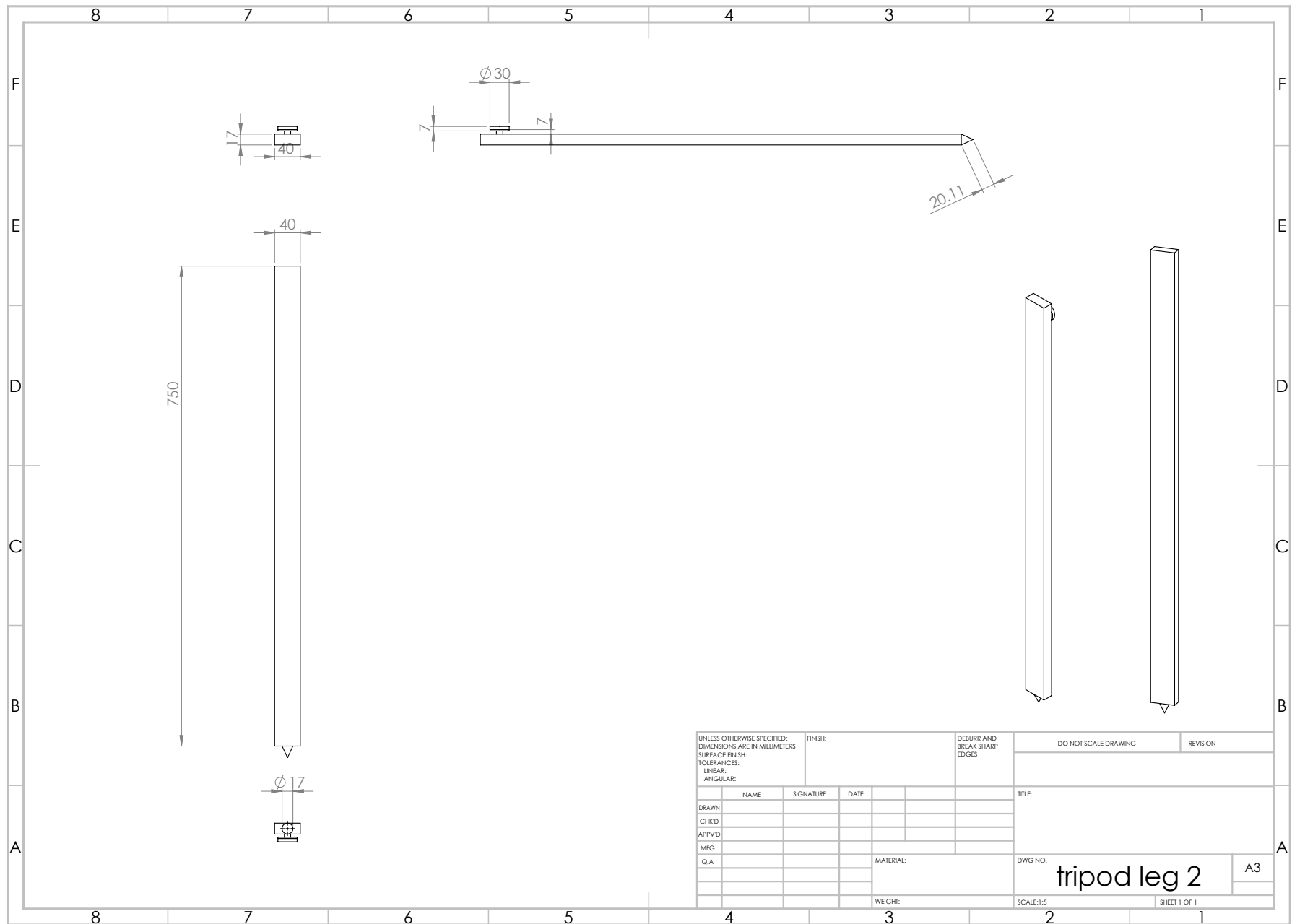
Exploded Components

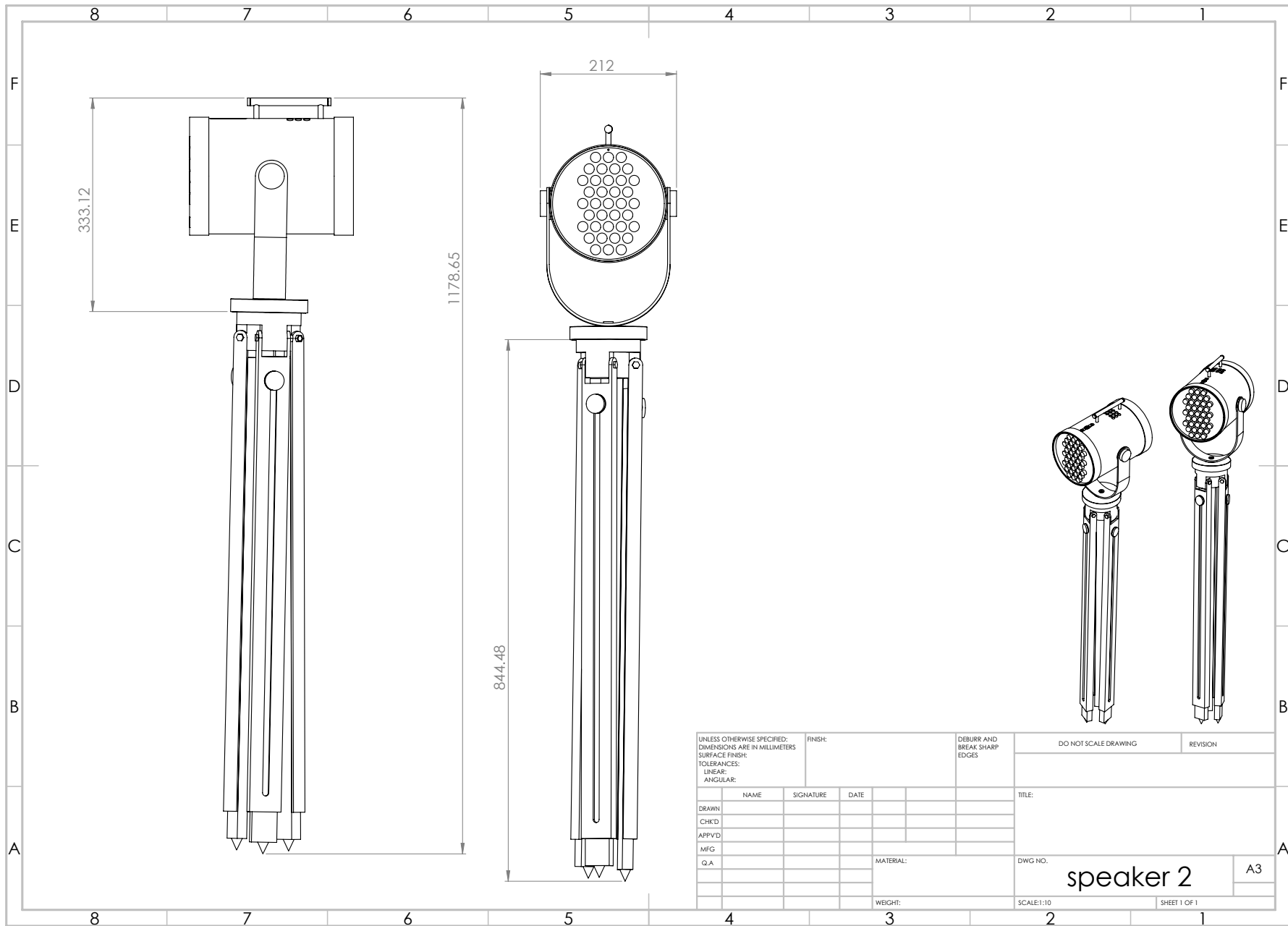




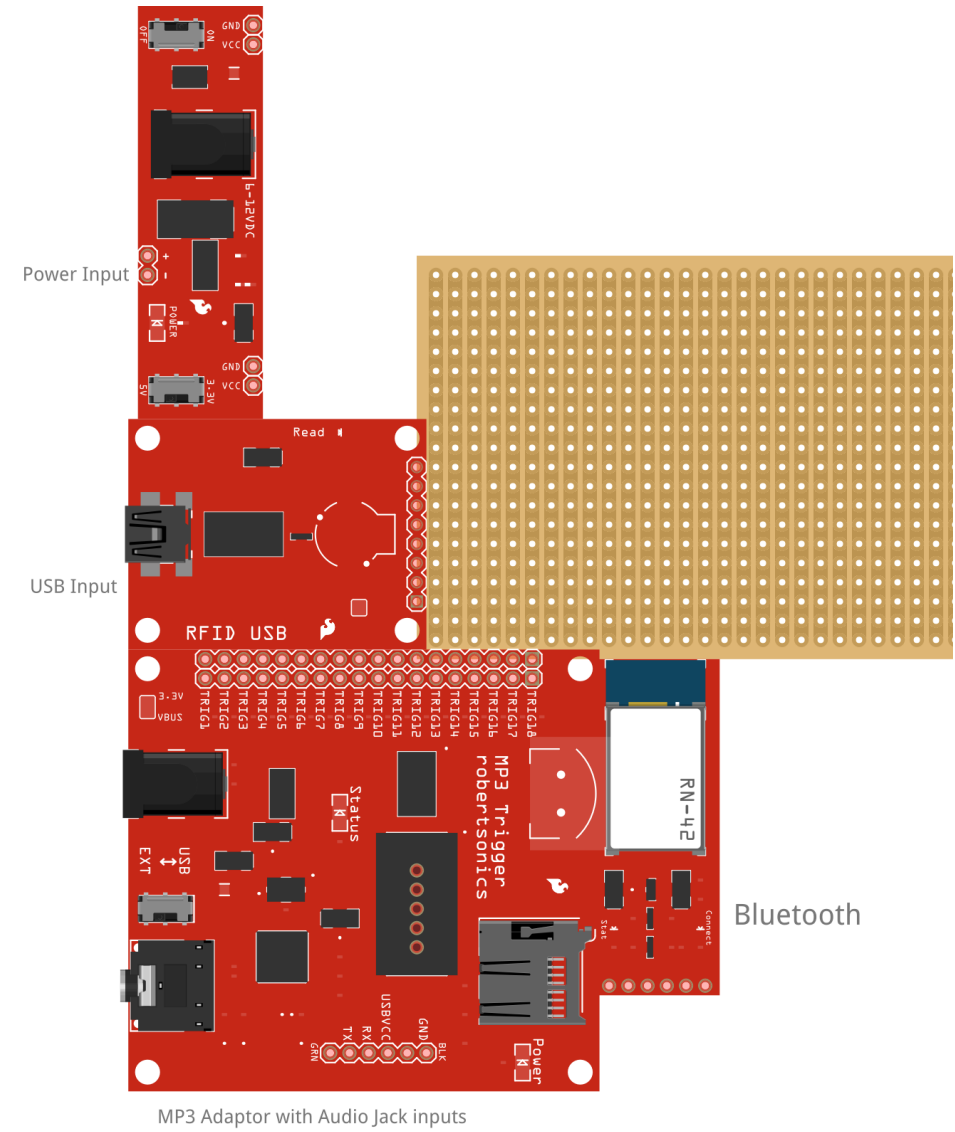
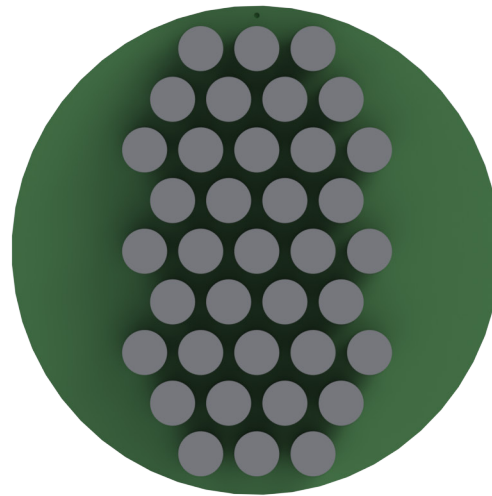
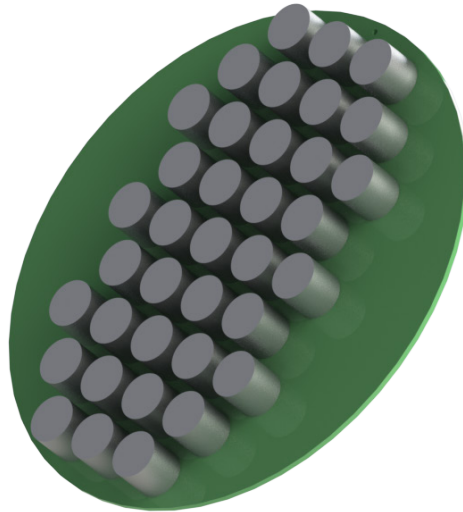








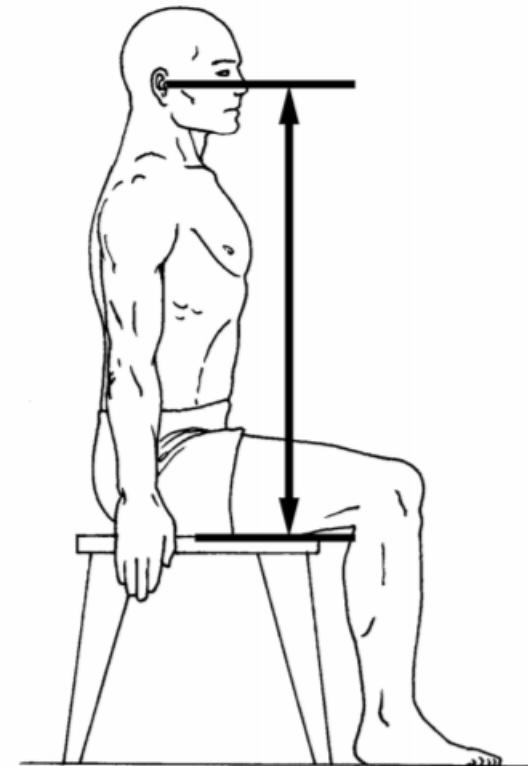
PCB Design



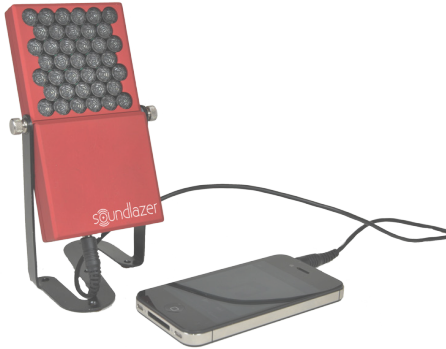
Anthropometric Data

Eye Height Approximation, Sitting

FEMALE N = 2208			MALE N = 1774		
<u>Centimeters</u>		<u>Inches</u>	<u>Centimeters</u>		<u>Inches</u>
72.85	Mean	28.68	78.30	Mean	30.83
3.31	Std Dev	1.30	3.38	Std Dev	1.33
84.00	Maximum	33.07	89.30	Maximum	35.16
63.00	Minimum	24.80	67.70	Minimum	26.65
Percentiles			Percentiles		
65.48	1 st	25.78	70.14	1 st	27.61
66.27	2 nd	26.09	71.17	2 nd	28.02
66.78	3 rd	26.29	71.81	3 rd	28.27
67.48	5 th	26.57	72.66	5 th	28.60
68.59	10 th	27.01	73.93	10 th	29.10
69.37	15 th	27.31	74.77	15 th	29.44
69.99	20 th	27.55	75.43	20 th	29.70
70.54	25 th	27.77	76.01	25 th	29.92
71.03	30 th	27.96	76.52	30 th	30.13
71.49	35 th	28.15	77.00	35 th	30.31
74.93	40 th	28.32	77.45	40 th	30.49
72.36	45 th	28.49	77.89	45 th	30.66
72.79	50 th	28.66	78.32	50 th	30.83
73.22	55 th	28.83	78.75	55 th	31.01
73.66	60 th	29.00	79.19	60 th	31.18
74.11	65 th	29.18	79.65	65 th	31.36
74.59	70 th	29.37	80.13	70 th	31.55
75.11	75 th	29.57	80.64	75 th	31.75
75.69	80 th	29.80	81.22	80 th	31.97
76.36	85 th	30.06	81.87	85 th	32.23
77.19	90 th	30.39	82.68	90 th	32.55
78.41	95 th	30.87	83.83	95 th	33.01
79.17	97 th	31.17	84.53	97 th	33.28
79.71	98 th	31.38	85.02	98 th	33.47
80.52	99 th	31.70	85.71	99 th	33.74



Market Competitors



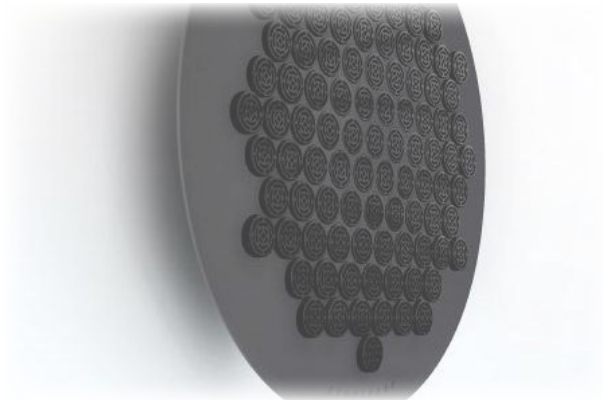
SoundLazer \$269.00



Holosonics, Audio Spotlight 168i



Directional Audio, Solo Mini Localizer Sound Dome



Ultrasonic, Acouspade Classic

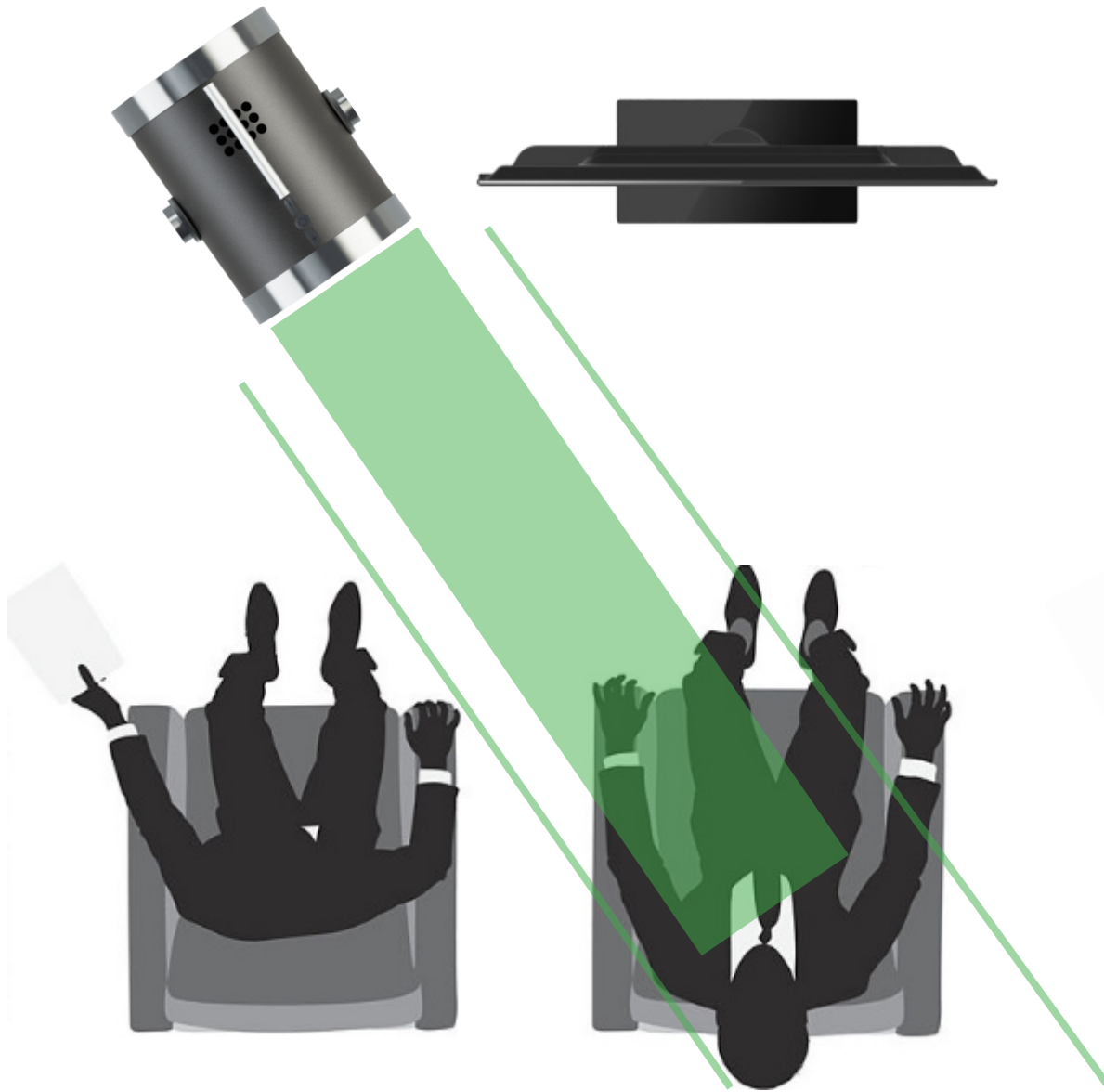


Ultrasonic, Acouspade



Soundlazer VR \$269.00, Kickstarter

Sound Spread



Sound spread heard within 30cm each side of the speaker diameter (18cm).

Allowing others to be left undistracted while in the same room.

References

Costing Links

[o](https://www.alibaba.com/product-detail/luxury-eva-foam-insert-electronic-packaging_60197108581.html)
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[e](https://www.alibaba.com/product-detail/anti-vandal-16mm-flat-head-ring_60154064361.html)
https://www.alibaba.com/product-detail/anti-vandal-16mm-flat-head-ring_60154064361.html

[f](https://www.alibaba.com/product-detail/HBD16-series-electronical-ip67-illuminated-push_506483976.html)
https://www.alibaba.com/product-detail/HBD16-series-electronical-ip67-illuminated-push_506483976.html

[g](https://www.alibaba.com/product-detail/Factory-custom-made-heat-resist-round_60114230887.html)
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[a](https://www.alibaba.com/product-detail/Single-polypropylene-thermal-spray-fibre-membrane_60416795503.html)
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[m](https://www.alibaba.com/product-detail/Polypropylene-disc-0-8um-90mm-pvdf_60524690856.html)
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[p](https://www.alibaba.com/product-detail/FR4-electronic-card-circuit-card-development_60315486216.html)
https://www.alibaba.com/product-detail/FR4-electronic-card-circuit-card-development_60315486216.html

[d](https://www.alibaba.com/product-detail/High-quality-aluminium-door-handle-furniture_1776543721.html)
https://www.alibaba.com/product-detail/High-quality-aluminium-door-handle-furniture_1776543721.html

[b](https://www.alibaba.com/product-detail/Taizhou-OEM-221-330-03-07_60303572676.html)
https://www.alibaba.com/product-detail/Taizhou-OEM-221-330-03-07_60303572676.html

[h](https://www.alibaba.com/product-detail/High-Quality-Half-Thread-Hex-Long_1489655589.html)
https://www.alibaba.com/product-detail/High-Quality-Half-Thread-Hex-Long_1489655589.html

[k](https://www.alibaba.com/product-detail/Factory-lighting-Chinese-birch-tripod-floor_60609609295.html?spm=a2700.7724838.0.0.HBBv94)
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Context Render Page 12

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