

VisAural

A wearable sound-localisation device for people with impaired hearing

PROBLEM + MOTIVATION



1 in 6 people

Action on Hearing Loss Information 2011 (UK)

People with impaired hearing often cannot locate the direction of a sound source as well as those with typical hearing.

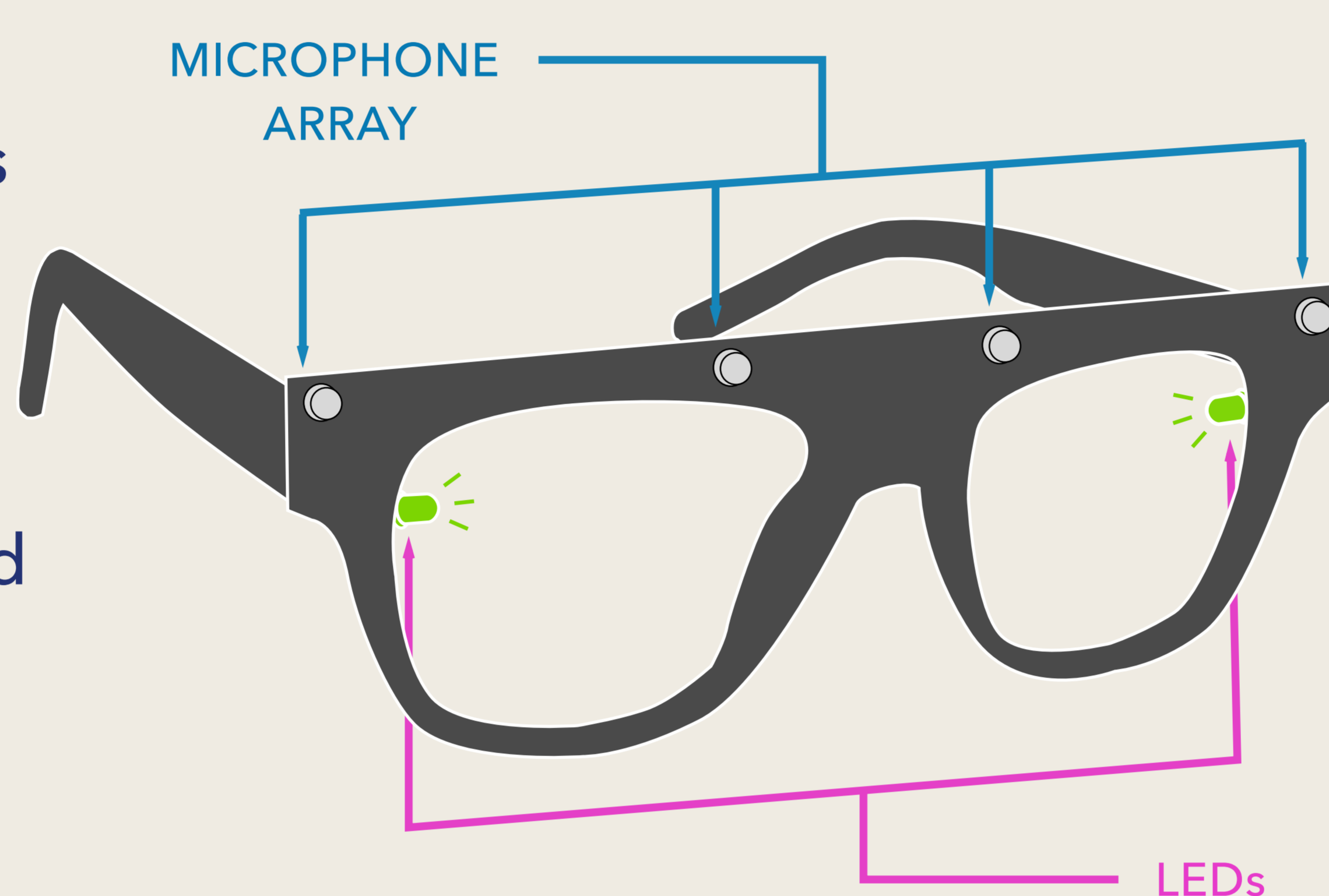
Inability to localise sounds has a range of implications, from daily to safety critical situations.



SOLUTION

Our solution is a wearable device which converts sounds into simple visual cues.

Through preserving spatial information individuals should be able to overcome the challenges outlined above.



Using a **microphone array** the difference in arrival time of sound waves to each microphone is processed to estimate the direction of a sound source.

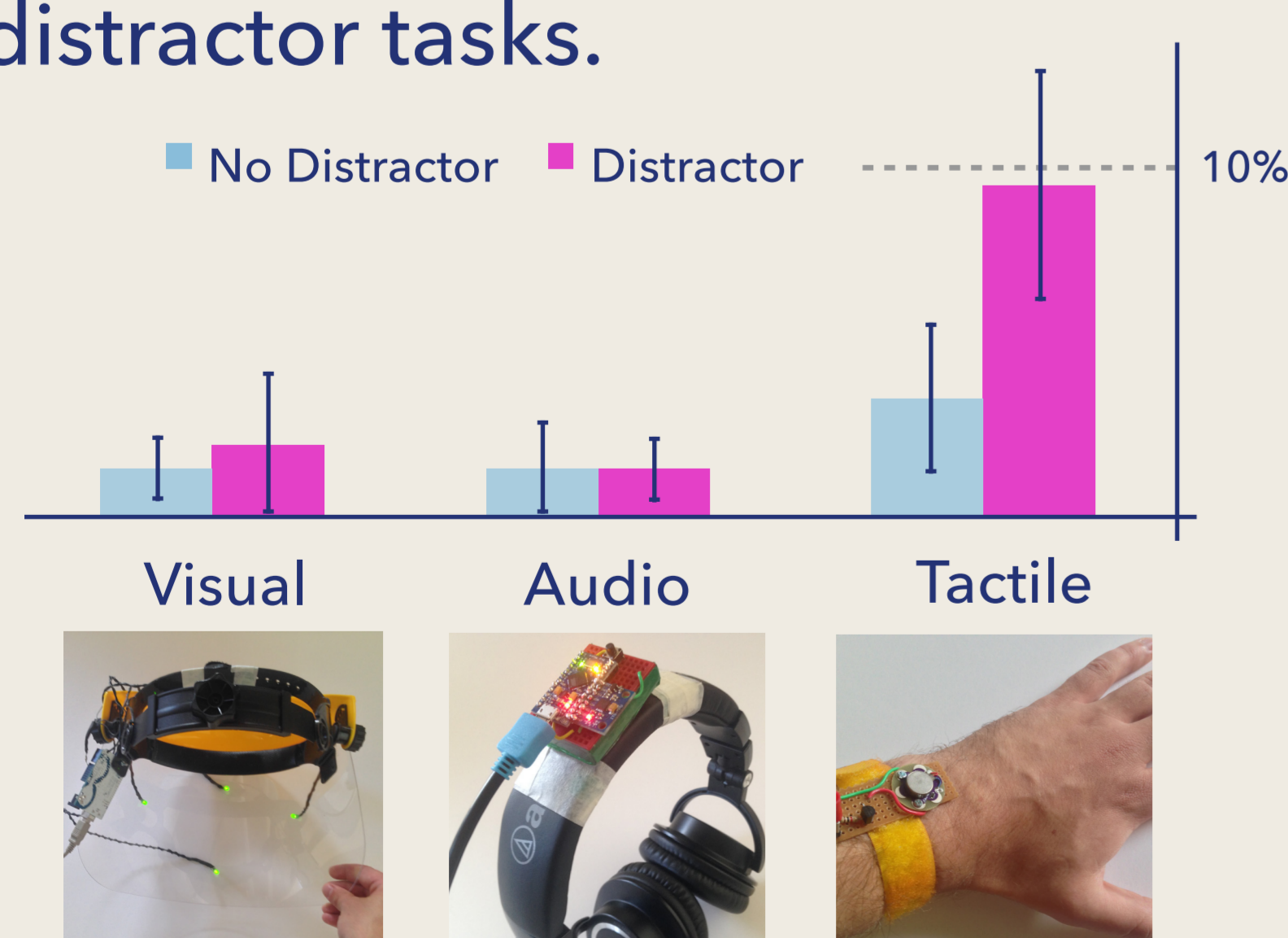
LEDs located in the peripheral vision guide the wearer to the source of the sound.

SOLUTION STEPS

1. Formative Study - 14 Participants with impaired hearing evaluated a prototype through a sound localisation task. User feedback was positive. Areas of improvement were the input and output of the system.

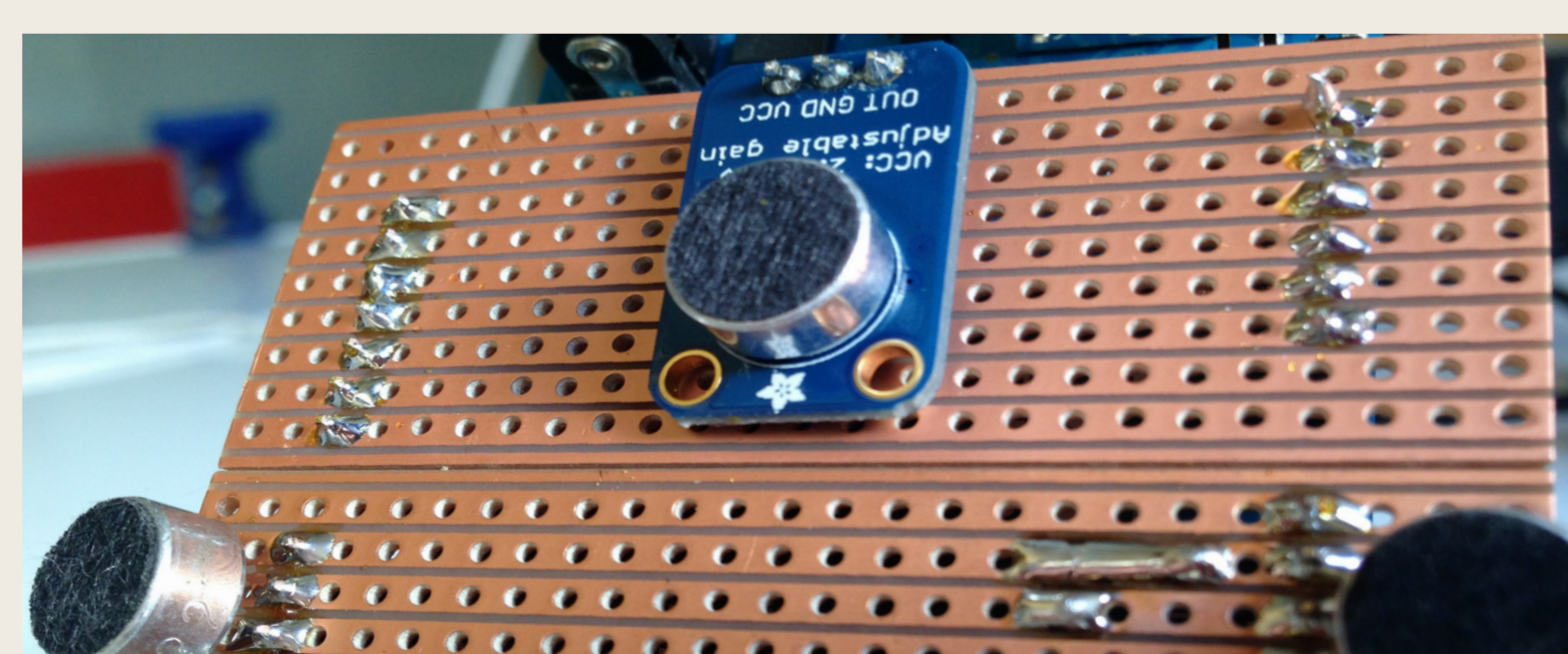


2.A Output - 12 participants took part in a target acquisition task using head tracking. Three methods of feedback were evaluated with and without distractor tasks.



Mean error percentage (\pm s.e) for each feedback technique, split by absence or presence of distractor task

2.B Input - Participants will evaluate a system where a microphone array is connected to a mobile device during a sound localisation task. The aim of this study will be to evaluate the effectiveness of a user directed microphone array.



Work-in-progress microphone array which makes use of electret microphones and an arduino microcontroller

3. VisAural - Results of input and output evaluations will be combined to form a full working solution outlined above.

EVALUATION

Evaluation of our solution will involve participants with and without impaired hearing.

Participants will complete a sound localisation task in a controlled environment.



Participants with impaired hearing will perform the task twice; once with the device and once without. Participants with typical hearing will perform the task once without the device, serving as a baseline.



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