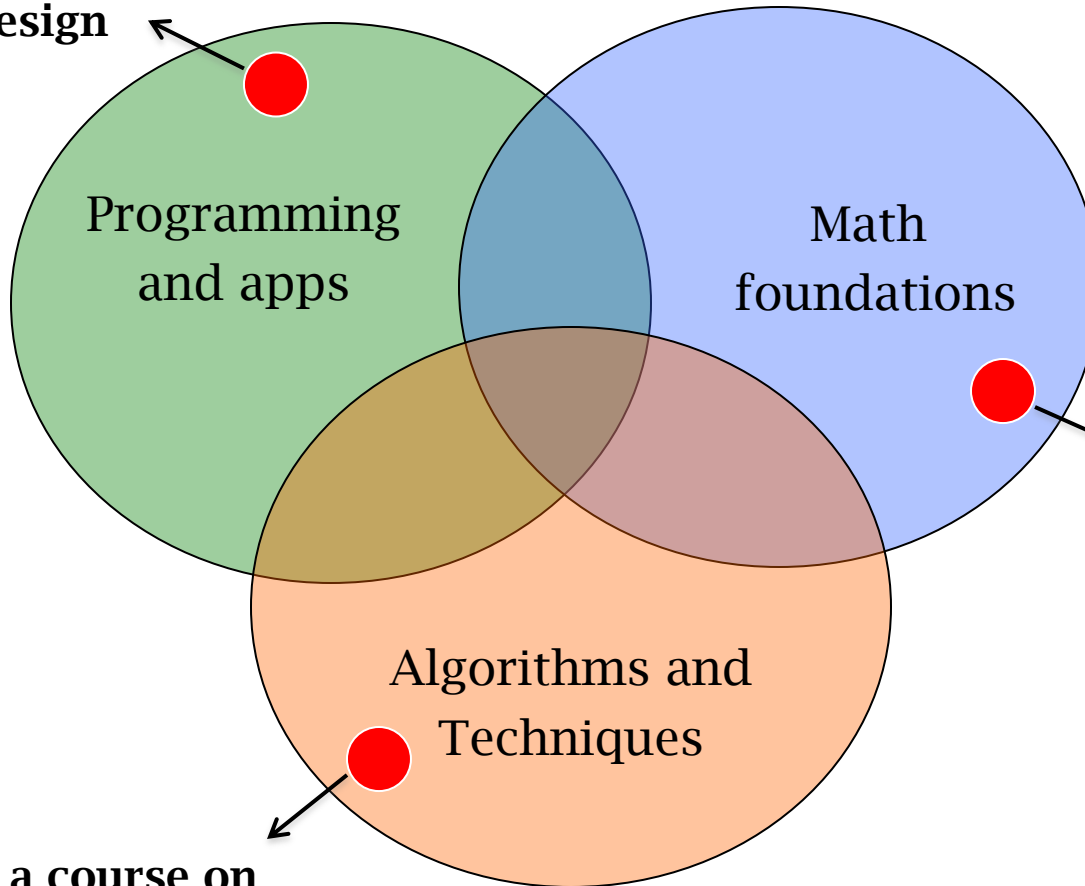


**Not a course on
programming
or app design**

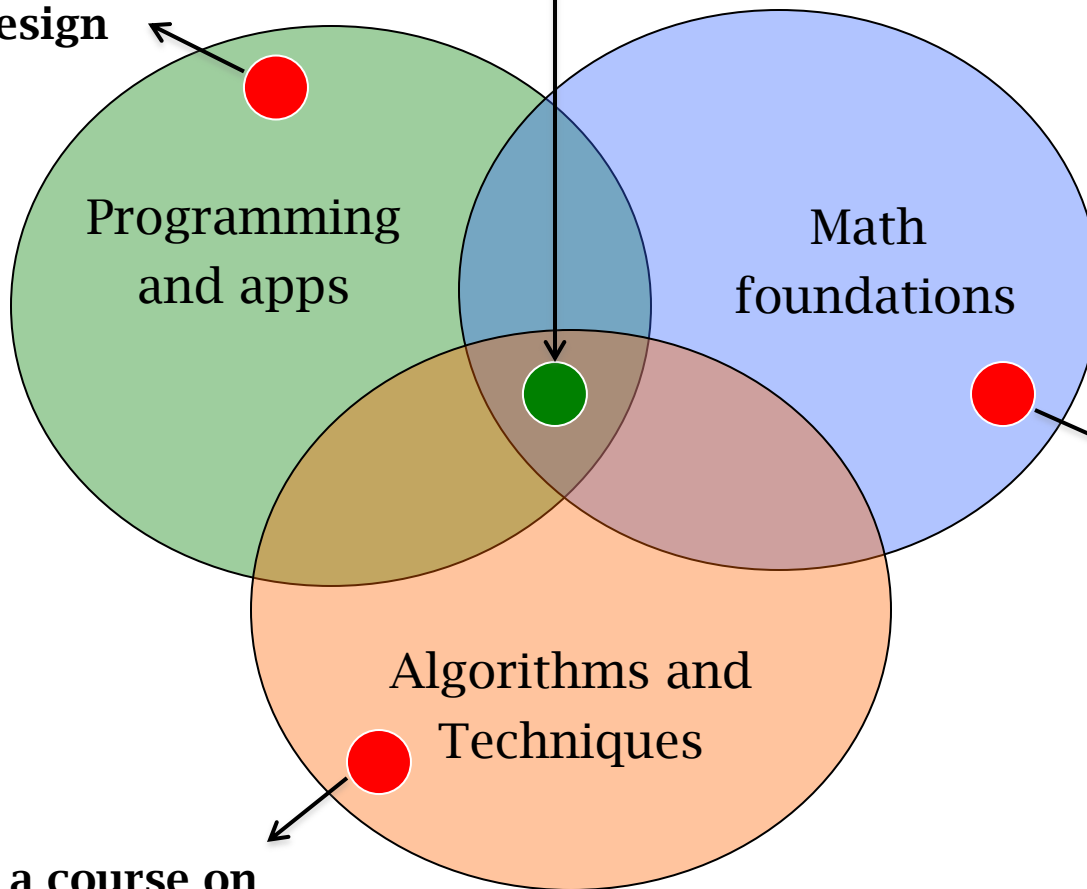


**Not a course on
linear algebra,
probability, DSP**

**Not a course on
Algorithms**

**Not a course on
programming
or app design**

This ECE 434



**Not a course on
linear algebra,
probability, DSP**

**Not a course on
Algorithms**

For Example ...

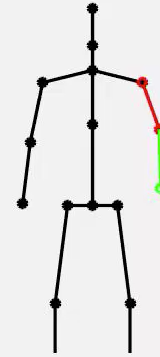
Indoor Localization



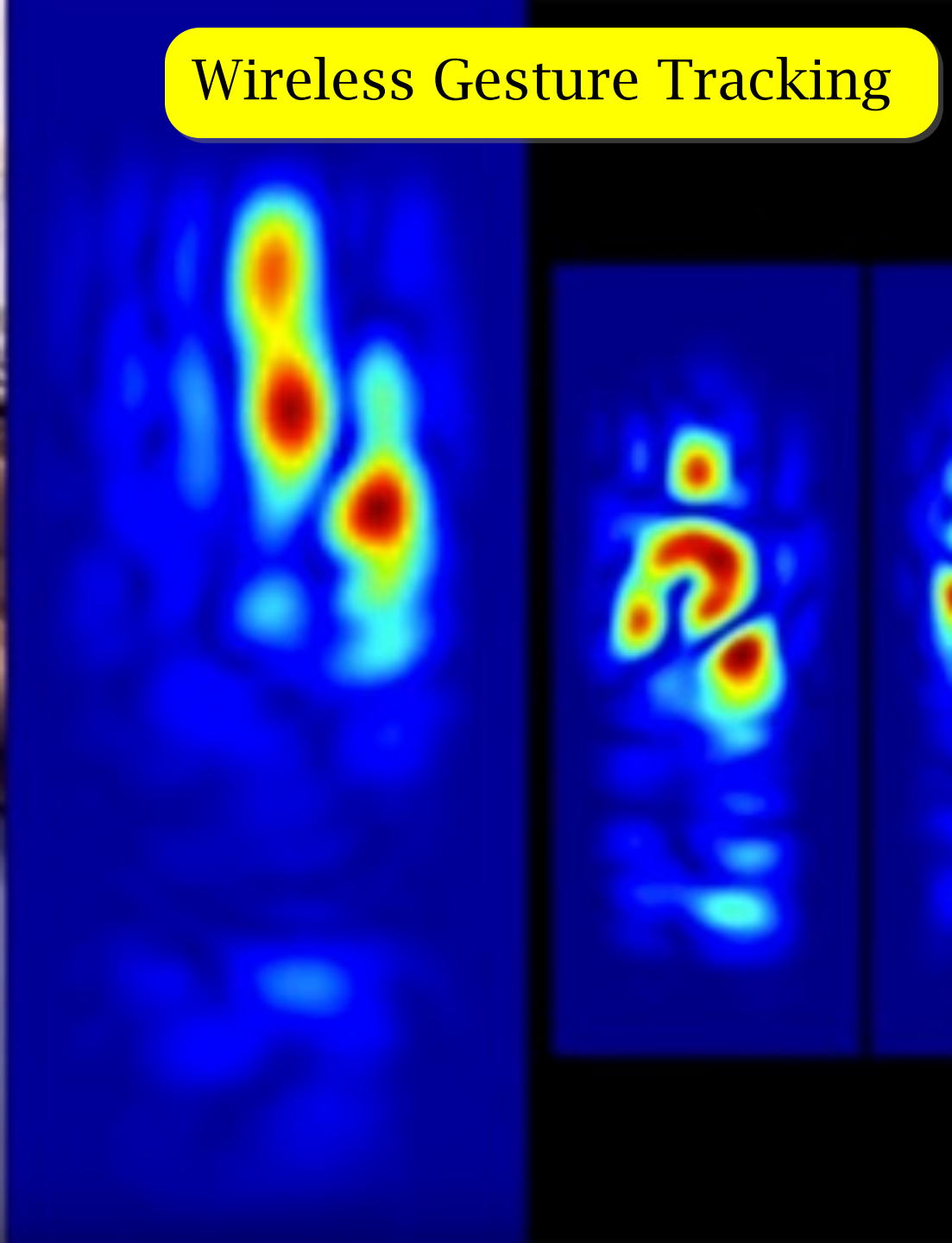
Smartwatch Gesture Tracking



Smartwatch Gesture Tracking



Wireless Gesture Tracking



Sports Analytics



Motion sensors



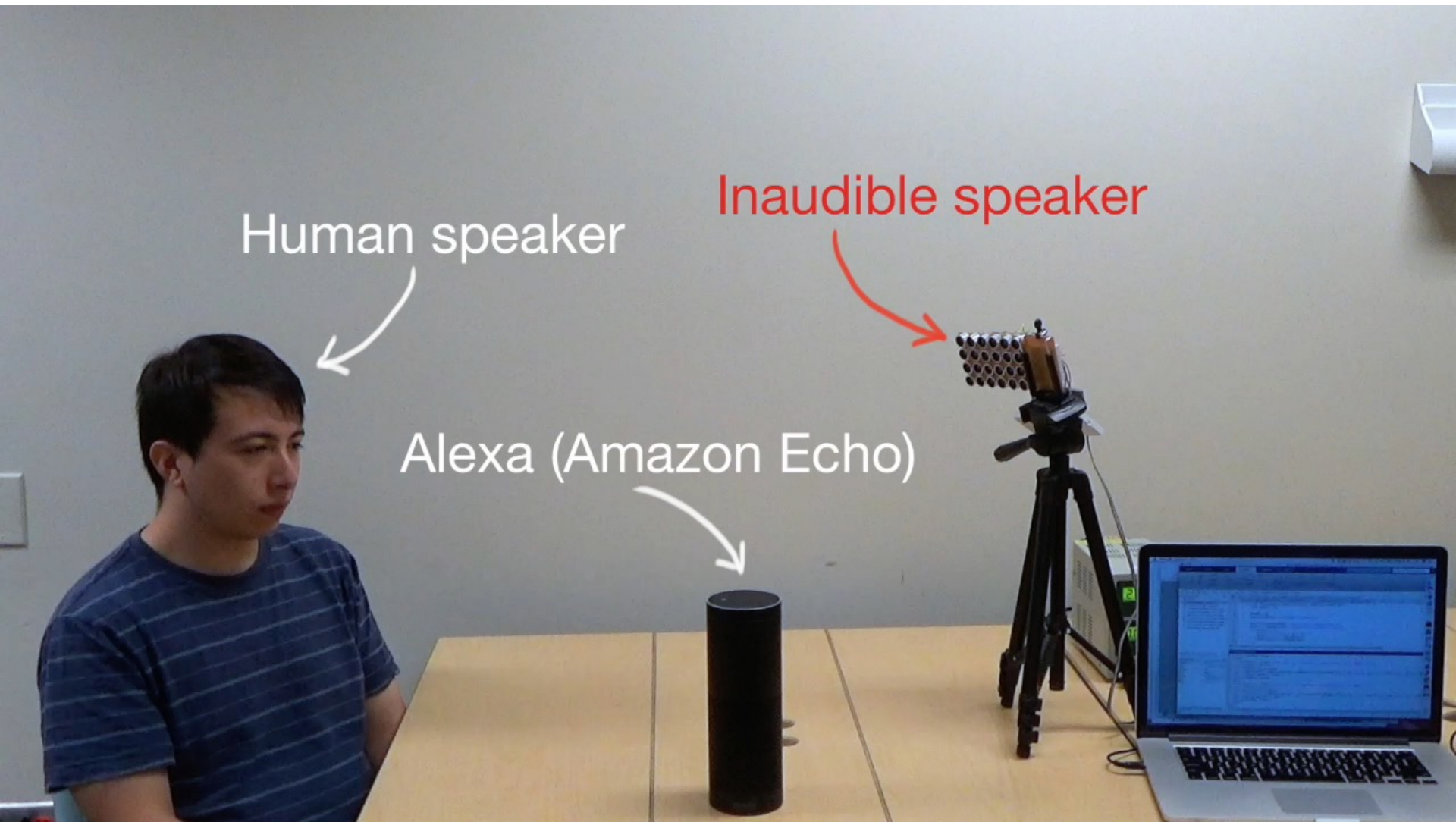
Security and Privacy

Inaudible to humans

Audible malicious commands to Alexa



Inaudible Acoustics



Earphones and Acoustics



2005

2015

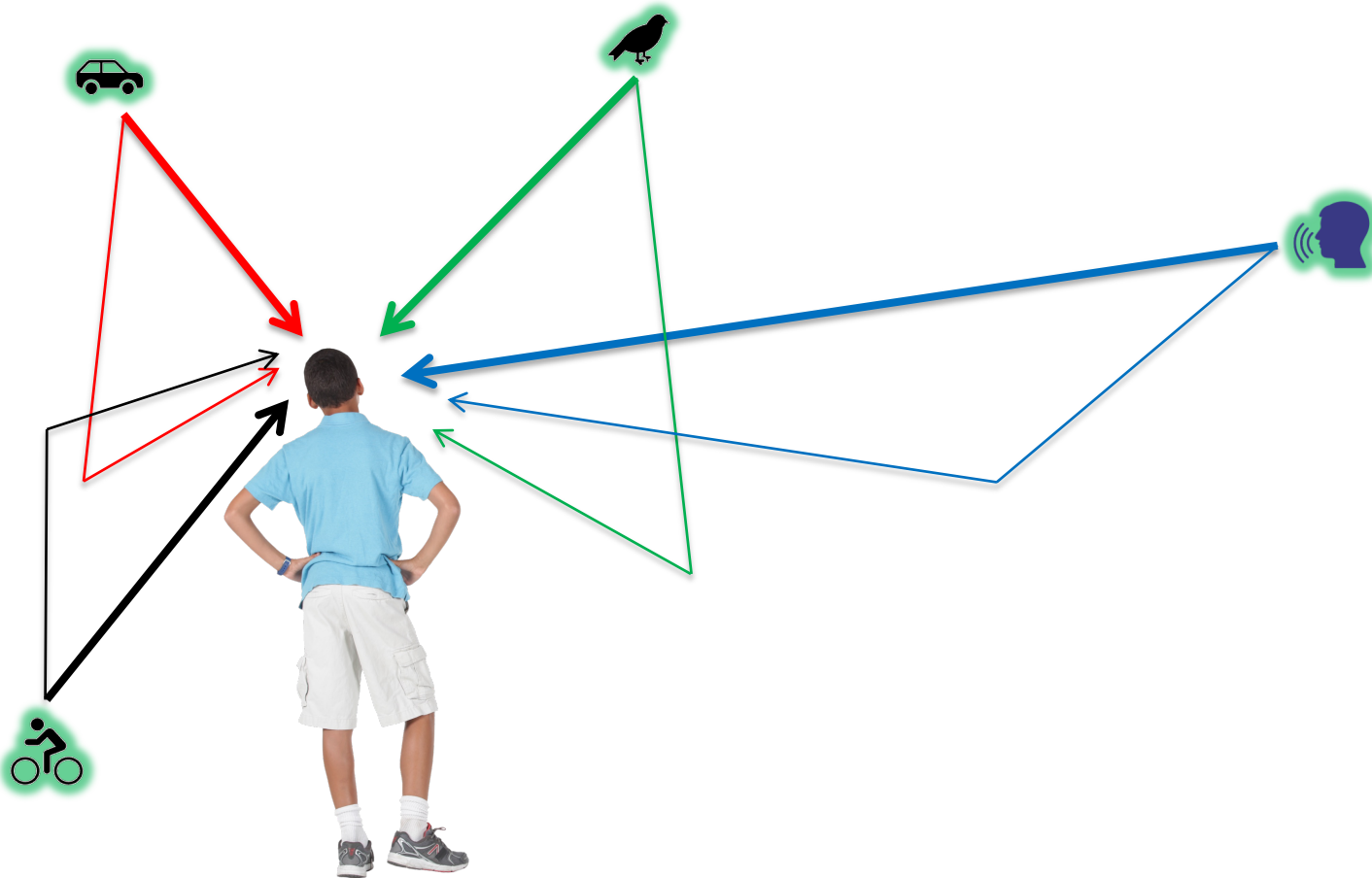
2018

2023

Source separation

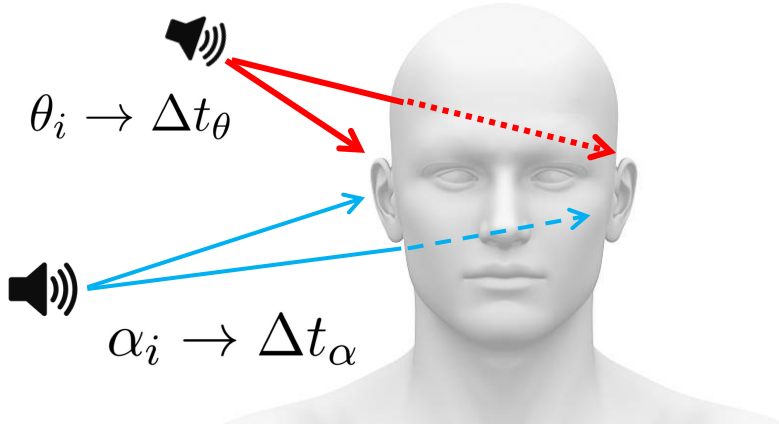


Source separation



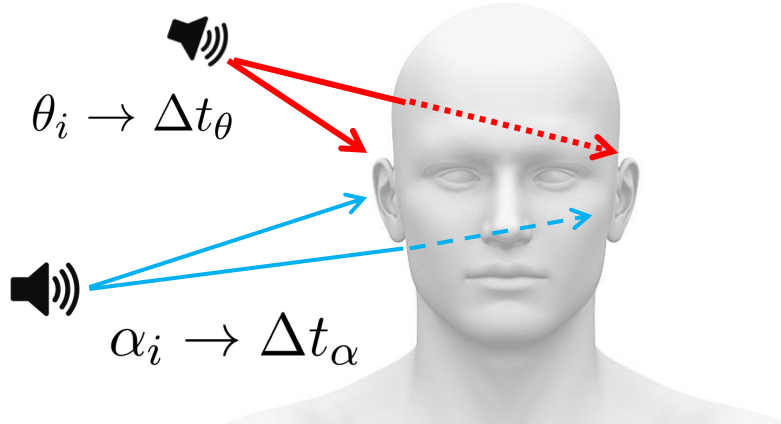
Spatial Acoustics

Different propagation delays at two ears

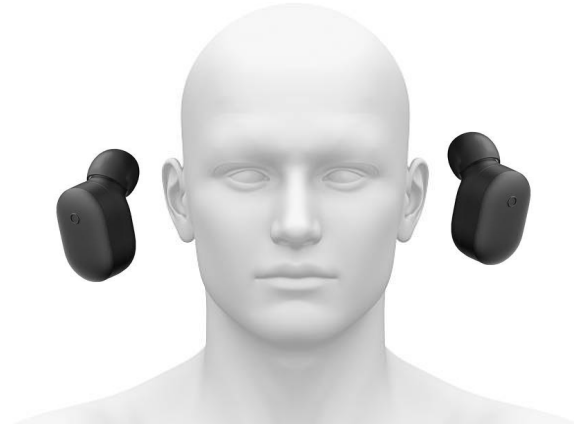


Spatial Acoustics

Different propagation delays at two ears

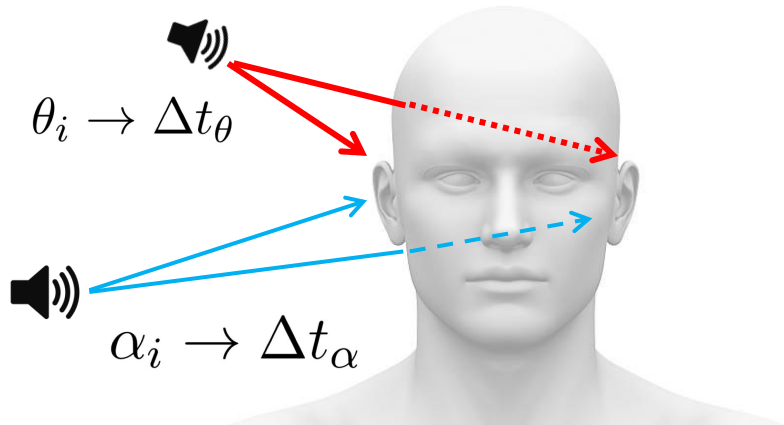


Inject **artificial delays** as if sounds coming from a specific direction

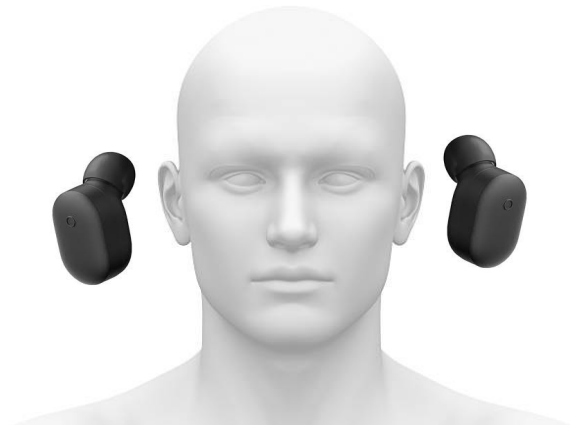


Spatial Acoustics

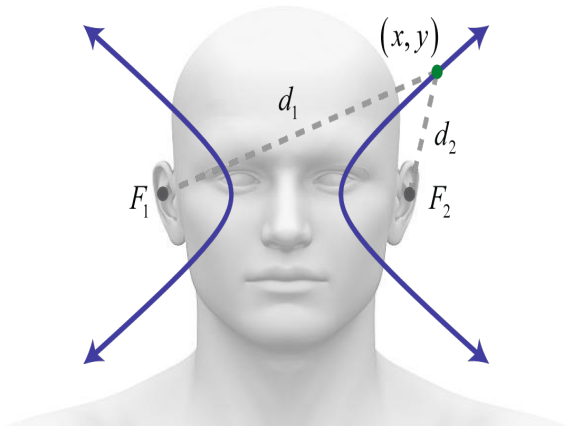
Different propagation delays at two ears



Inject **artificial delays** as if sounds coming from a specific direction



But delays are not unique along **hyperbola**



Spatial Acoustics

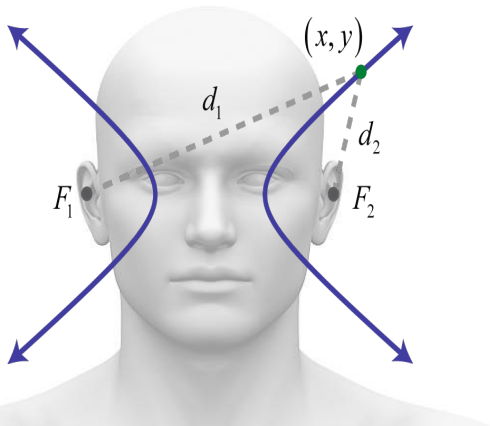
Different propagation delays at two ears



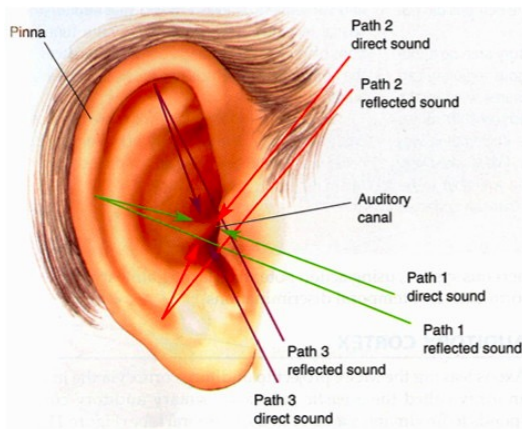
Inject **artificial delays** as if sounds coming from a specific direction



But delays are not unique along **hyperbola**

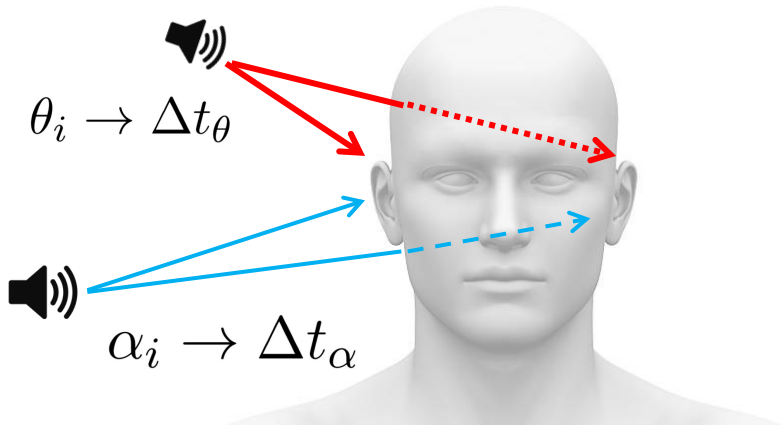


Personal Transfer Function

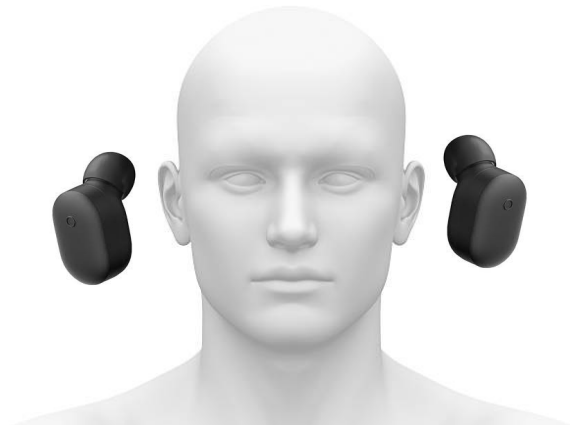


Spatial Acoustics

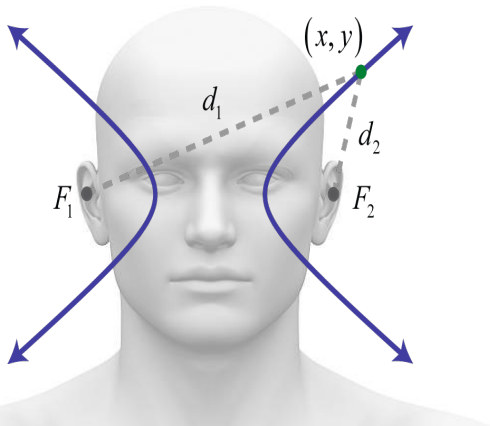
Different propagation delays at two ears



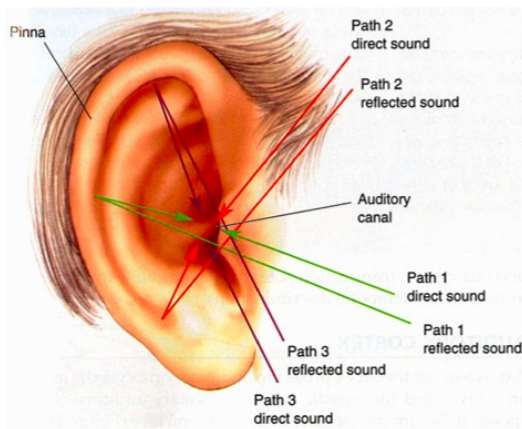
Inject **artificial delays** as if sounds coming from a specific direction



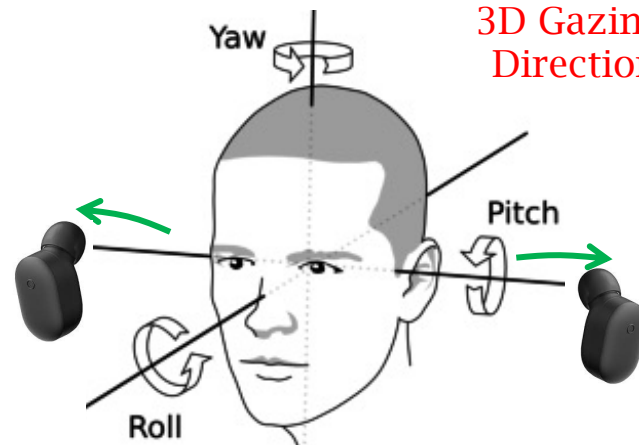
But delays are not unique along **hyperbola**



Personal Transfer Function



3D Gazing Direction





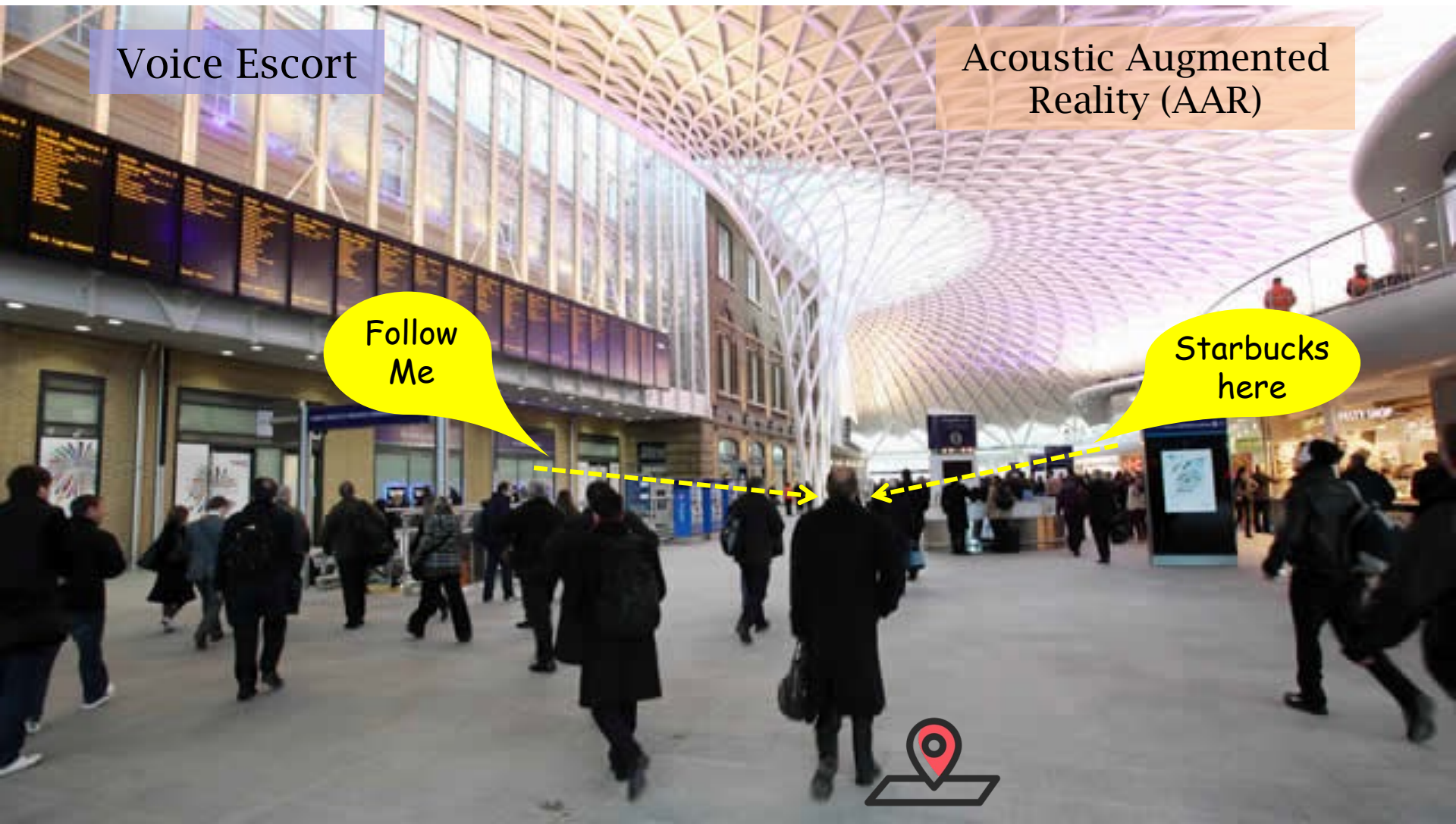
Spatial Acoustics

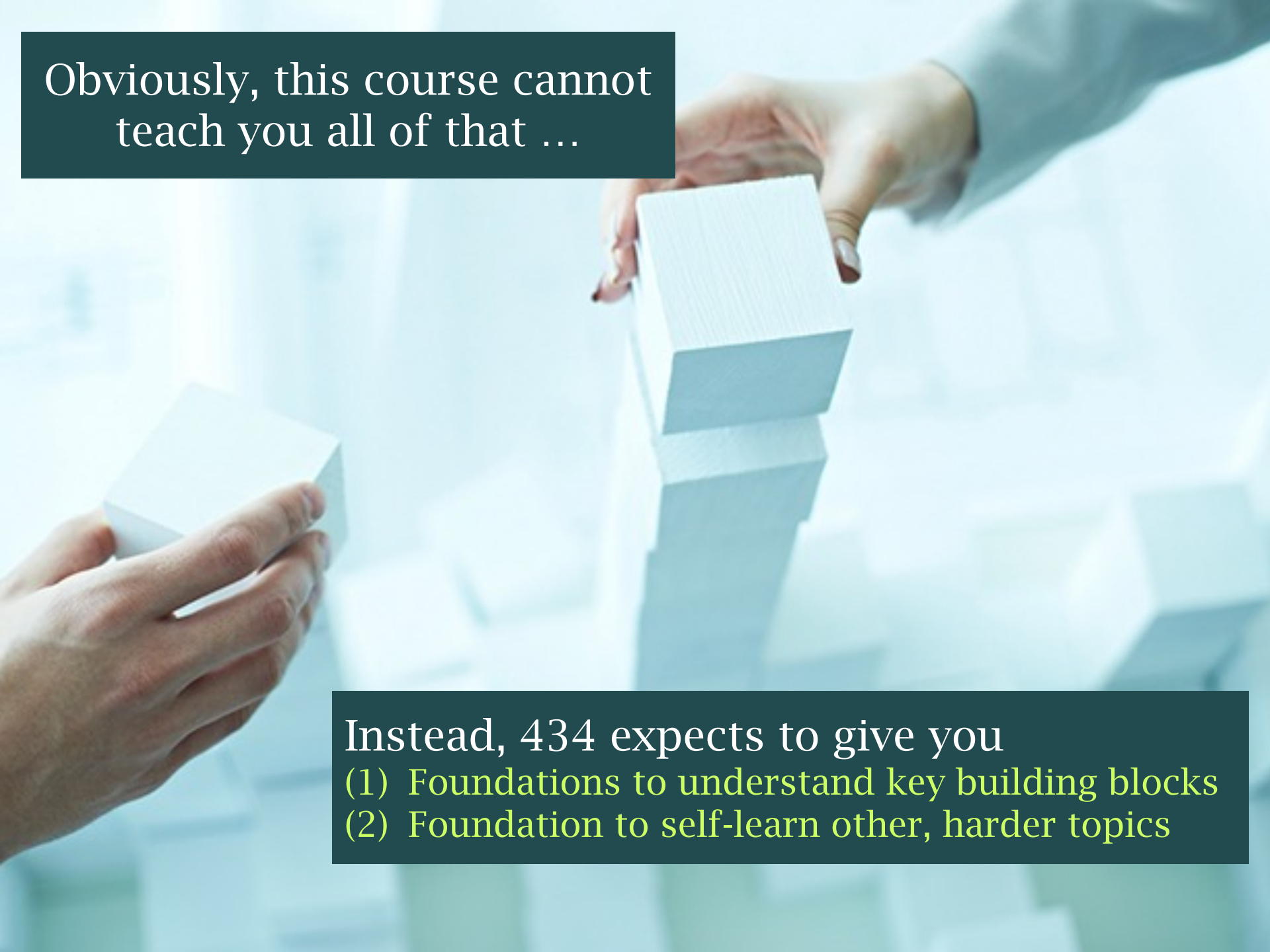
Voice Escort

Acoustic Augmented Reality (AAR)

Follow Me

Starbucks here



A close-up photograph of a person's hands stacking white, rectangular blocks. The person is wearing a light blue long-sleeved shirt. The background is filled with many more of these same blocks, creating a sense of depth and abundance. The lighting is bright and even, highlighting the texture of the blocks and the skin of the hands.

Obviously, this course cannot teach you all of that ...

Instead, 434 expects to give you

- (1) Foundations to understand key building blocks
- (2) Foundation to self-learn other, harder topics