Voice Command Object Localization with Spatial Audio and IoT Devices

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ABSTRACT

- **Spatial audio** can be especially useful for directing human attention.
- **Internet of Things (IoT)** offers more connectivity and interactions with items in an environment.
- Implementing spatial audio through speakers is difficult due to **crosstalk** issue.
- We have created an algorithm, **Xblock**, that implements crosstalk cancelation for spatial audio.
- We expand upon our existing spatial audio IoT infrastructure with **voice command features** for object finding.

MOTIVATION

Navigation	Guiding users to a destination
Memory Recall	Helping users remember where they placed items
Internet of Things	More connectivity and interactions between users and objects in environment

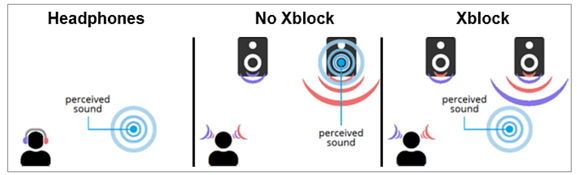
PROBLEM STATEMENT

How can we integrate a **voice command** feature into an IoT smart speaker infrastructure to use spatial audio to guide users to items in an environment?

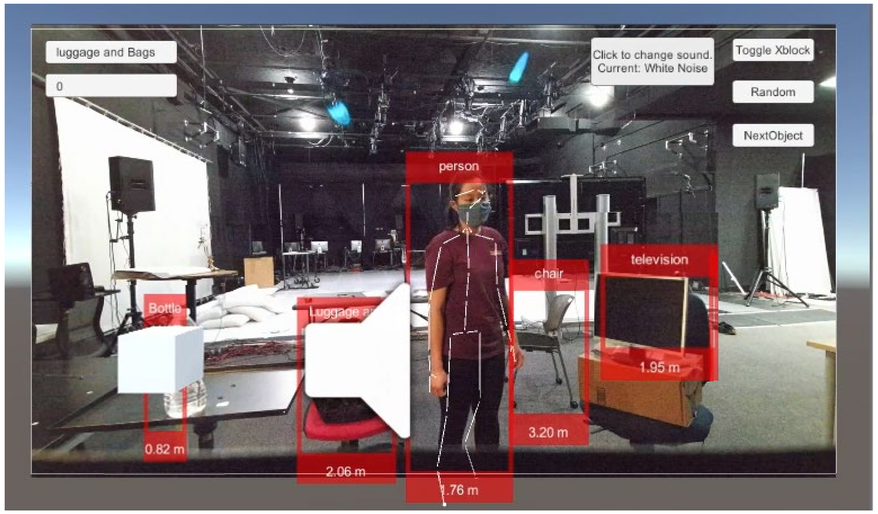
METHODS

Xblock

Algorithm that implements crosstalk cancellation technology for spatial audio.



Object Detection + Voice Commands



Example Command: "Find bag"

METHODS: MATERIALS

- Unity 3D
- Microsoft Kinect Sensor
- Raspberry Pi
- 2 Stereo Speakers
- 4 Objects (Chair, TV, Bag, Bottle)
- KeywordRecognizer

FUTURE WORK

- Integrate voice commands into user testing to validate Xblock's effectiveness.
- Explore spatial audio for narrative storytelling.

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