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# "Sorry, I didn't get that. Could you try again?" Improving ASR within noisy environments

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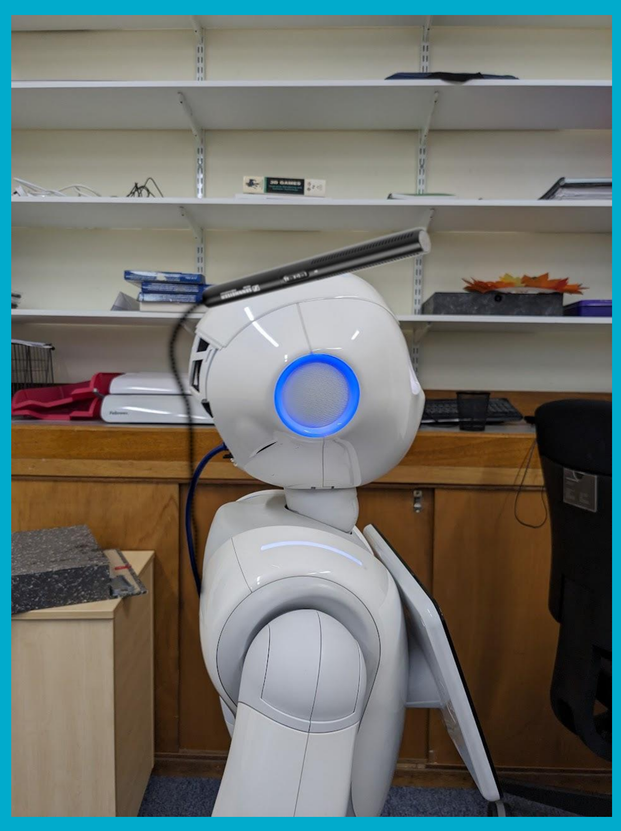
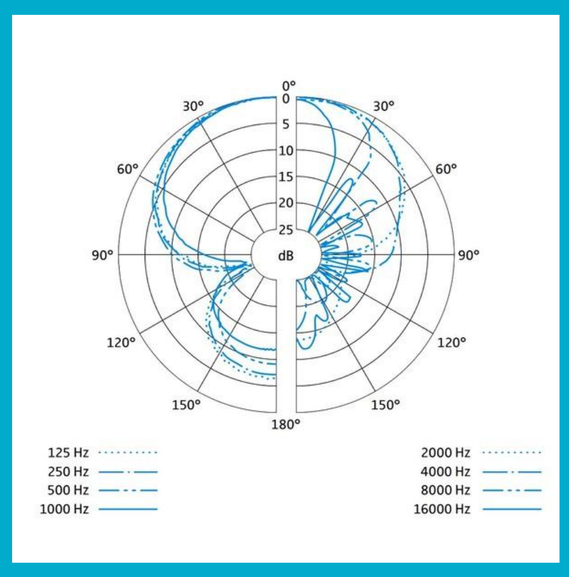
## Problem Statement

- We deployed Pepper into the real-world in a university learning and teaching building
- Even with an external microphone, ASR was unreliable (Blair & Foster, 2023)
- Literature supports these findings (F. Förster et. al, 2023), (Irfan et. al, 2020)
- Traditional recording artists would get as close as possible to the sound source; in case of robots this violates rules of proxemics – what can we do instead?

"don't be racist robot"


**User holding microphone in our deployment**



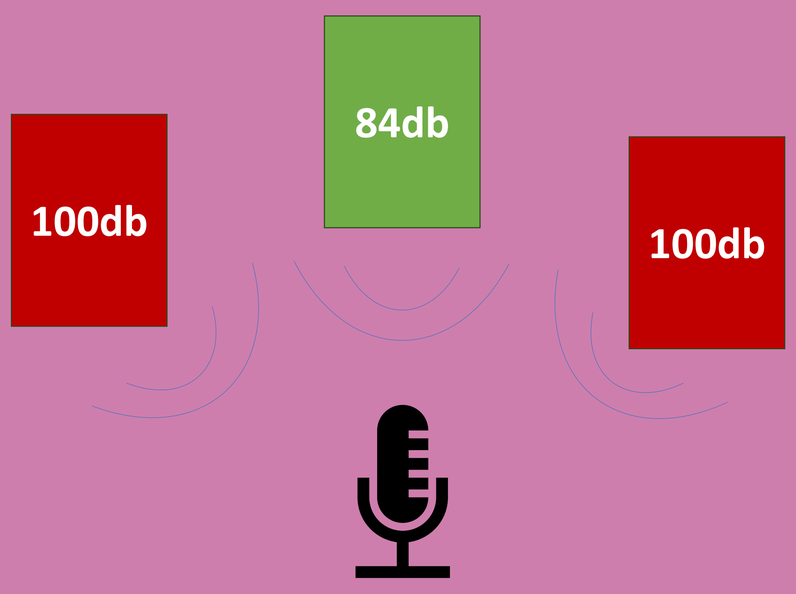



**Example polar pattern of short shotgun microphone**

## Proposed Solution

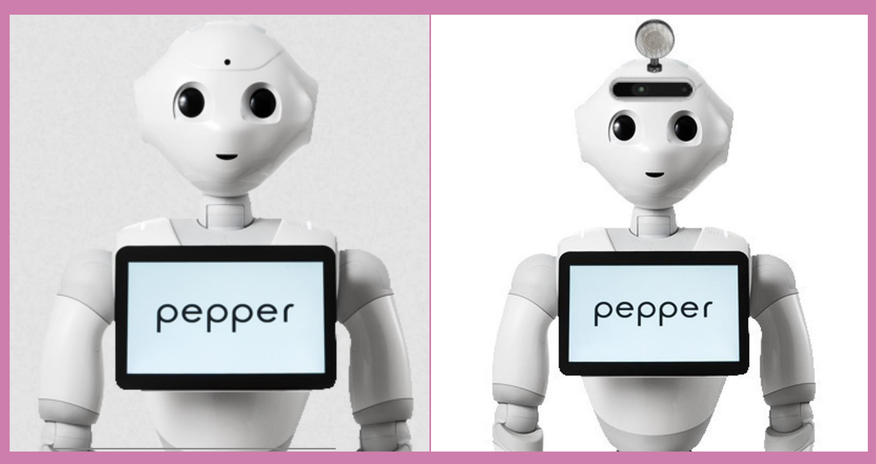
- Use of hypercardioid short shotgun microphone
- Highly directional, highly sensitive, interference tube for off axis rejection
- Use facial tracking and internal Pepper microphones for determining location of speaker
- Vary gain to attain desired signal amplitude dependent on speaker's loudness and distance from robot

## Experiment One




- Test performance of range of microphones in noisy environments
- Clean speech from a range of speakers
- Simulate background noise using BBC corpus
- Levels set as measured in real-world (Lombard effect)
- Transcribe recordings with different models, and compare to clean results

## Experiment Two




**Default** **Adapted**

- Affect of visible sensors on social acceptance of robots
- Between-subjects study
- User randomly assigned Default or Adapted
- Pre-Exposure NARS questionnaire
- Wizard of Oz for robustness and repeatability
- Post-Exposure RoSAS questionnaire