

## Background

Electronic health record (EHR) documentation occupies a significant portion of physicians' workloads, with surgery residents spending 24 hours per week on charting [1]. Automating intraoperative and postoperative documentation offers an opportunity to reduce this burden and return valuable clinical time to surgeons. ORAI Solutions proposes the Operating Room Control Assistant (ORCA), a voice-activated system that isolates a healthcare professional's speech and uses integrated speech recognition and large language models (LLMs) to automatically generate surgical documentation.

## Mission Statement

At ORAI Solutions™, we empower surgeons with reliable voice-powered documentation, so they can focus on patients, not paperwork.

## Design Inputs

Customer Need	Metric
Report Accuracy	>99.5% Agreement
HIPPA Compliance	0 Violations
Documentation Time Reduction	>50% Reduction of Total Time
Cost-Efficiency	<\$50,000 Initial Cost

## Project Planning

### Gantt Chart



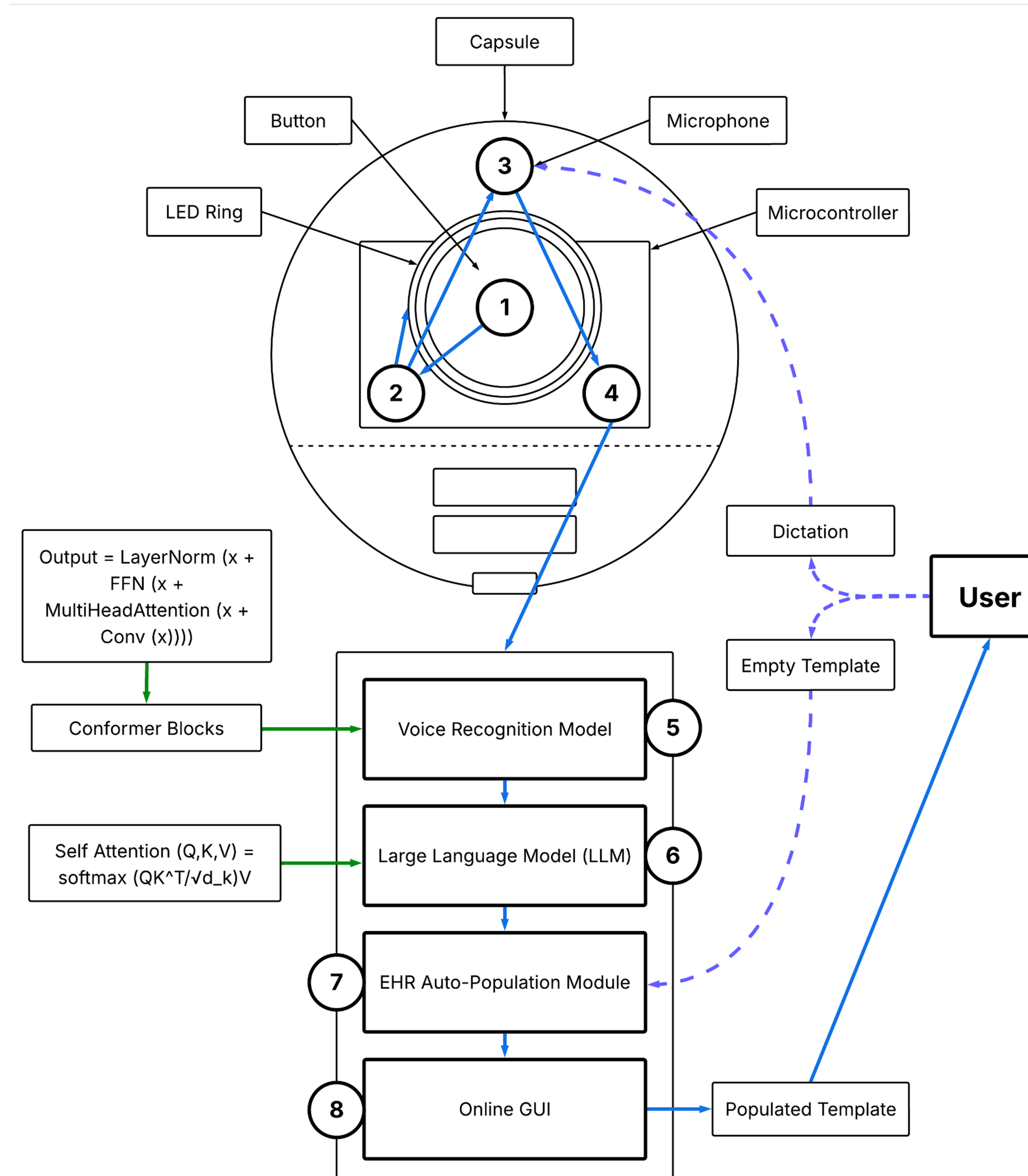
### Product Architecture



### References



## Product Design



## Modeling

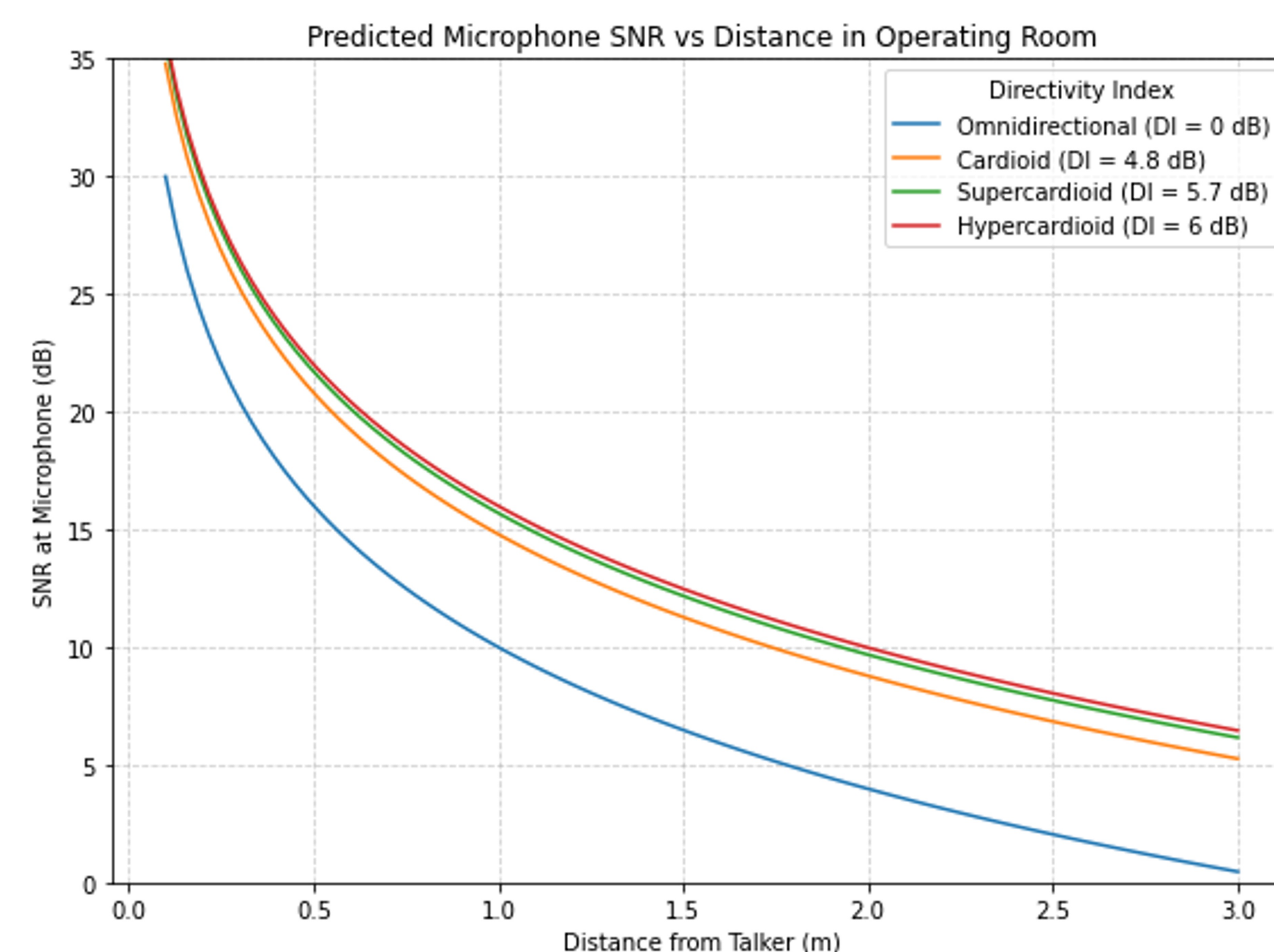


Figure 1. **Microphone SNR vs. Distance.** The predicted SNRs of different microphones models were compared across as a function of distance, simulating speech recording in the OR.

## Manufacturing Cost

Component	Price Range
Open Source Training Data [4]	\$0
Directional Microphone [5]	\$25 - \$70
Microcontroller [6]	\$10 - \$35
3D Printed Casing	\$0
<b>Prototype Total</b>	<b>\$35 - \$105</b>
<b>Clinical Grade</b>	<b>\$3,000 - \$6,000</b>

## Product Specifications

Specification	Metric
Report Accuracy	>99.5% Agreement
Microphone Quality	>25 dB SNR
Speech Recognition Accuracy	>99.5%
Data Minimization	Files Deleted After 24 Hours
Processing Time	<1 Minute (Following Dictation)

## Future Directions

Moving forward, we aim to partner with a clinical mentor to gain operating room insight on factors such as background noise, device mounting possibilities, and workflow integration. We will also evaluate state-of-the-art speech-recognition and LLM technologies, with a focus on open-source models, to identify the most effective tools for developing our initial ORCA prototype.

## Acknowledgements

We would like to thank Dr. Bradley Greger, Dr. Brent Vernon, and Professor Michael Sobrado for their mentorship and guidance throughout the design process.