

# Computer Science Senior Design Project Proposal

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<http://coen.boisestate.edu/jconrad/cs481sponsors>

## Contact Information

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*Contact's name	
*Contact's eMail	

\*Note: The contact identifies who will serve as the student team's contact.

## Abstract

Briefly introduce the product to be developed (e.g. Build an uber for landscaping services)

### At-home speech therapy device

For children and adults with speech disabilities, speech therapy can be very expensive and time consuming, especially for those who do not live in close proximity to a therapist. Micron would like to enlist a student team to build a user interface and database for an at-home speech therapy assistance tool that will prompt for a specific word or phrase, record the response, use an open-source automatic speech recognition toolkit to score the response, display the score to the speaker, and then store the recorded audio and scoring information in a database.

The database management system and ASR toolkit will be selected from off-the-shelf open source software. Your task will be to develop an interface between the user, the ASR, and the database.

## User Needs

Describe the most significant needs of the end users of this product

Users fall into four categories

### **Speaker**

1. Respond to prompts by speaking words or phrases into a microphone

### **Researcher/Developer**

1. Collect and analyze speech data and ASR output to improve the accuracy of the device. *This is the primary user need that you should focus on.*

### **Therapist**

1. Enter the words and phrases that should be prompted during a session
2. Access scoring data to review the results of each session

### **Caregiver**

1. Launch the program and teach a user how to interact with it

### **The critical user needs of this project are**

- 1) a user interface to provide prompts, record responses, input the responses to an off-the-shelf ASR tool, display the ASR output and store it in a database
- 2) a database to store responses and ASR results for retrieval and analysis

Note: It is expected that using off-the-shelf ASR toolkits will not provide accurate enough results for most people with speech disabilities. Your software will be used as a research tool to enable the collection and analysis of data that could lead to improving the accuracy of ASR so that an at-home speech therapy device might be possible one day.

## End Users

Briefly describe the end user of this product (e.g. homeowners)

Please see user needs ...

## Prior Art and Competitors

Describe how the end users' needs are addressed today by your or your competitors' existing products

Micron does not compete in this market. This project is offered as a learning experience for students. The code from this work should be made open source as a tool for those who are doing research in this area.

## Proposed Solutions

Describe, if known, any proposed technical solutions. If the product will be constructed over an existing product/interface/service/database, explain that here

Students should use an open-source automatic speech recognition toolkit for this project. CMU-Sphinx is recommended because it can provide feedback at the phoneme level, but students are encouraged to explore other toolkits and do a comparative analysis.

An off the shelf database management system should be used for this project. Building a custom database and securing it to meet HIPPA requirements is outside the scope of this project

## Schedule

Please describe known scheduled constraints

No constraints. This project can follow the general schedule requirements of the senior design program. Students will be required to give a presentation at Micron sometime in late April. Exact date will be determined about 3 weeks in advance.

## Deliverables

If you have known deliverables (e.g. iOS App, Android App, Web Server, installers, tests, documentation, etc) in mind, enumerate them here

Software design documentation, user guide, user interface and database.

## Required Hardware, Software and Data

If the project requires specific hardware (e.g. a phone or a tablet, an embedded system, graphics processor, etc), software or data that the students may not have, enumerate these here along with your plan for making it available to the student team

The program can run on a standard PC with microphone and speakers, no specific hardware is required.

## Intellectual Property

Note: Unless you hire them, Senior Design students are not your employees, and Senior Design Projects are consequently not a *work-for-hire*. In most cases, this means student teams own their intellectual property (e.g. their source code) unless you make other arrangements with them.

*Will this be an “Open Source” Project?	Yes
Will students need to sign a Non-Disclosure Agreement?	No
Will students need to assign ownership to you?	No

\*Note: An *open source* project is one that allows other programmers to study, modify and distribute the resulting software subject to a license chosen by the copyright holder (e.g. you). There are many open source licenses available off-the-shelf; for more information, visit <http://creativecommons.org>. Contrast with a proprietary license restricting others from studying, modifying or distributing the software. The open source model is widely used in software development but may not be suitable when it provides your competitors with an advantage.