Motivations and Objectives

**Motivations**
- Convenient control of numerous household devices
- Reliable voice recognition without the need of heavy computing power

**Objectives**
- Separate multi word commands using a moving averaging filter
- Use dynamic time warping to match user speech to calibration templates
- Set up a wireless network to transmit instructions to devices

Goal

- Provide convenient control over a variety of common household devices though voice commands and wireless network communication
- Identify which command is given
- Communicate with appropriate device via wireless router

Research Challenges

- Reduce processing time of command recognition
- Finding and isolating words within commands strings
- Learning and implementing socket programming

Future Considerations

- Voice processing constantly listens to an audio queue to recognize the user issuing a command
- Expanding library of recognizable commands without diminishing performance
- Allow public access over non restricted commands

Methodology

- **Step 1:** Record reference templates of each command from the user
- **Step 2:** Separate multiple word inputs using a moving averaging filter
- **Step 3:** FFT is performed on each reference and word command and passed through a peak finding function to determine significant changes in the spectral domain
- **Step 4:** Assign each word to a proper reference group to avoid unnecessary computation using the Hidden Markov Model
- **Step 5:** Determine the best match in each word category using a dynamic time warping function
- **Step 6:** The processor and device open a message channel across a unique port (socket programming) to communicate the message from the processor to the device
- **Step 7:** Device performs function described in message from communication channel from the processor

Results

- Comparison of two time and speed varying speech signals is converted to a path finding problem
- Voice processor performs a path finding algorithm which returns a distance equating to how similar the compared signals are where the minimum is identified as the proper match
- The processor sends the message to the device with the action the user requested to be performed
- The intended device carries out the instructions spoken by the user

References