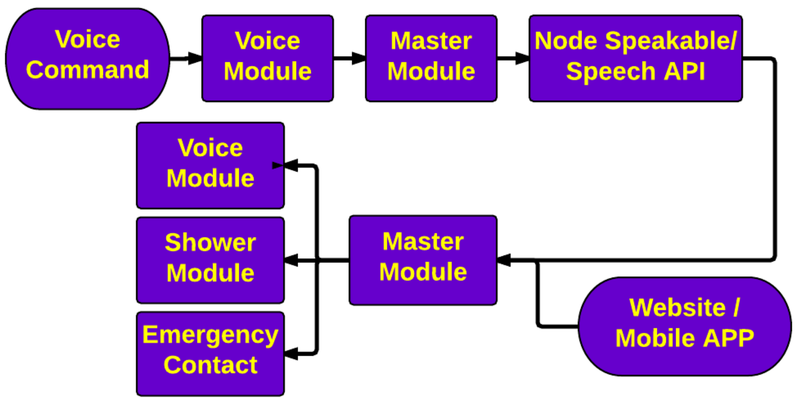
Voice Controlled Home Design

Objective

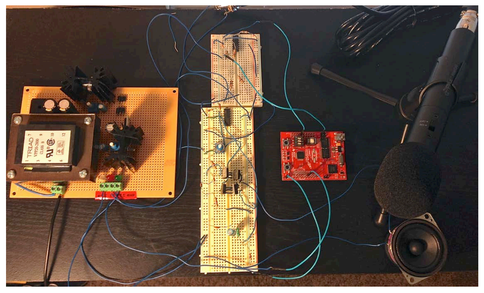
Allow users to control a shower via vocal commands and a digital interface and to contact designated individuals in the event of an emergency by voicing a command.

Behavior Model



Voice Module

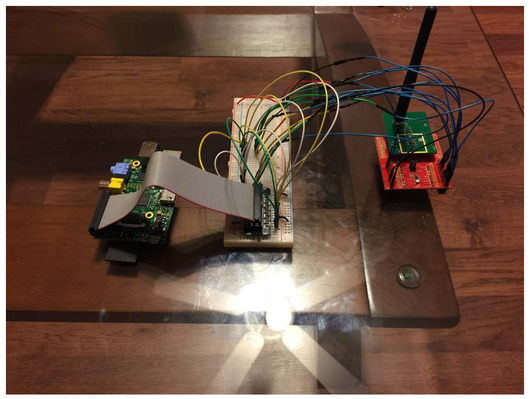
The Voice Module's tasks are to collect voice commands via a microphone, send the command to the master module for further processing, and play back audio to the user to indicate a command's completion. The commands should only be sent after the word "Jenkins" has been spoken.



- A cardioid pattern microphone was chosen to easily collect all sounds in a room from a corner
- A 5W speaker was chosen to ensure the system's responses could be heard clearly
- A TI C2000 F28027 was selected as the microprocessor
- A CC8520 was selected as an audio streaming chip to stream audio to the master module
- A power supply capable of providing appropriate voltages and currents for the speaker's amplifier, the microcontroller, and wireless chip from a 120VAC wall outlet was designed

Master Module

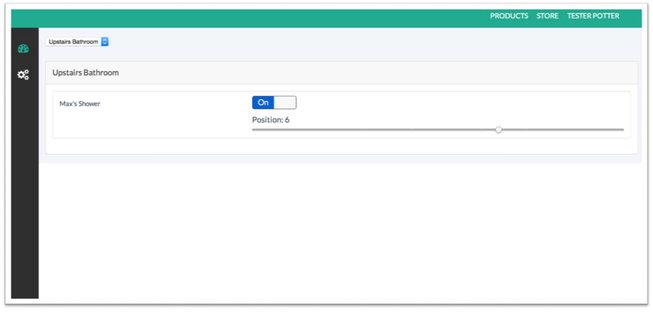
The Master Module acts as the central hub of the entire system.



- Paired with TI cc2520 for Zigbee Communications to act as coordinator in the network.
- Paired with TI cc8520 for Wireless Audio Streaming for receiving voice commands from Voice Module.
- Connected via Websockets to cloud hosted backend server.

Website

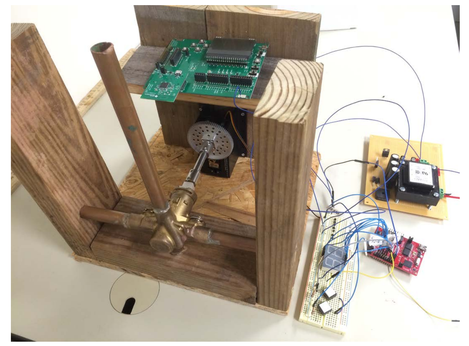
The website tasks are to provide the ability for the current user to control and configure a Jenkins system that he/she has been provided access to.



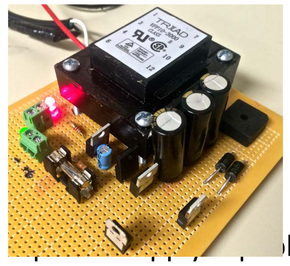
- Angular.JS Single Page Application
- User Sign-In with Persistent Sessions
- Socket.io Interface with Jenkins through backend server which shares connection with on-site hardware.
- Real-time updates to any changes that take place in the home.

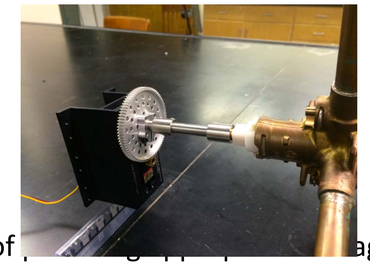
Shower Module

The Shower Module's task is to receive commands from the master module via RF communications, or from the user via a digital interface, pertaining to desired relative water temperature and to adjust to the desired value.



- A TI C2000 was selected as the module's microprocessor
- The C2000 polls for button input, controls the LCD display, and controls a motor that can turn the shower valve
- A CC2538 RF communications chip established communications with the master module
- A bottom mount servo gearbox was coupled to the shower valve stem to allow control over the relative water temperature via pulse width modulation signals from the microcontroller





- A power supply capable of providing appropriate voltages and currents for the servo motor, the microcontroller, and wireless chip from a 120VAC wall outlet was designed

Results

The final system design does not work perfectly as intended, however many individual successes were made. These include: operational power supplies, audio amplification, software recognition of the word "Jenkins," precise control of a servomotor with an MCU, website creation, contacting individuals from a website, and many more outlined in the final document. All of these accomplishments are absolutely necessary for the system to work perfectly as intended.

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