

## Project Description | Progress

With increasing gun violence in America, it is imperative that emergency services are able to respond and be deployed as fast as possible.

PinPoint is a system designed to accurately detect various types of gunfire in a wide area of coverage. In addition, PinPoint is economical due to its usage of marketed consumer parts such as Arduinos and Raspberry Pi's.

Possible applications: military use, city coverage, domestic gun violence intervention, etc.

## Approach

### SOFTWARE STRUCTURE



- Additional research on suitable microphones for nodes is required
- Working Matlab match filter when using ideal signal
- DSP is able to notify Raspberry when match is found
- Raspberry notifies Apache Server the location and time a microphone heard it
- Most challenging aspect so far was the learning the DSP's architecture and language



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# PinPoint

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• Minimum level of hardware for two nodes has been procured: two DSP boards, two aux cords, two laptops

• Scope has been finalized: Goal of fall quarter is to get one node able to correctly identify a

non-ideal signal with an emphasis on rejecting false positives

As seen in the photo above, the DSP applies an all pass filter to the signal and outputs the waveform. Currently, the input signal is an ideal signal from the host computer via AUX cable.

# Data Analysis



MATLAB simulation of our current match filter. Signal is of a 9mm ideal source. The match filter is able to produce a similar result even when the original source is altered (noise added, scaled, shifted, etc)

### Fall Quarter:

### Winter Quarter:



## Future Milestones

• Raspberry can send a node's location and timestamp to the Server • Server stores information from Raspberry Pi or Arduino Uno

• DSP is able to multiplex between left and right channels • Match filter is refined to account for non ideal signals • Match filter is able to distinguish between different kinds of gun fire