



Andrea Audio Test Labs

# **Andrea's Audio Filters on the Raspberry Pi VS Amazon Echo**

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Andrea Electronics Corporation  
620 Johnson Ave  
Suite 1B  
Bohemia NY 11716  
(631)-719-1800  
[www.andraelectronics.com](http://www.andraelectronics.com)

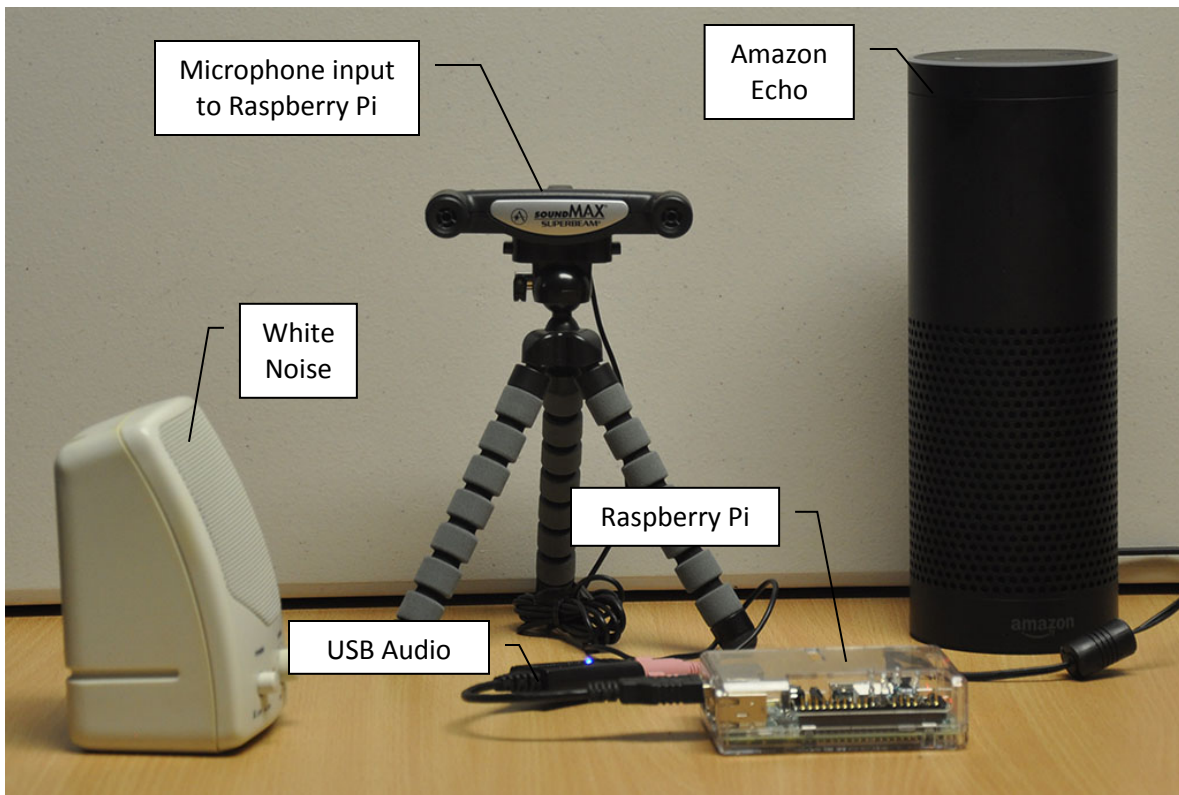
This report documents the performance of Andrea's audio filters compared to the Amazon Echo in far-field operation.

### Andrea Setup:

- Andrea's audio filters are running on a Raspberry Pi.
- Microphone is an Array 2s connected to a Andrea PureAudio USB device, which is connected to the Raspberry Pi.
- The following audio filters are use:
  - Beam forming (DSDA)
  - Noise reduction (NR)
  - Far-Field Enhancements (FFE), which compensates for weak audio signals when speaking from long distances.

### Amazon Echo Setup:

- No special setup is needed for the Amazon Echo.



**Test Description:**

- The trigger is spoken for each device - “Hello blue genie” for the Raspberry Pi and “Alexa” for the Amazon Echo.
- The distance between the spoken trigger and the test device varies from 2 feet (0.6 meters) to 18 feet (5.5 meters).
- White noise is played at an angle of 45 degrees from a distance of 18 inches (0.46 meters)
- Tests consists of speaking the trigger 10 times at each distance for each noise level. To get a success score the trigger has to be recognized.
- Tests performed with five different noise levels:
  - Quiet room with no additional noise
  - 55dB of white noise
  - 60dB of white noise
  - 65dB of white noise
  - 70dB of white noise
- For each distance and noise level, the Andrea Setup is tested with the following filter combinations:
  - No Filters – all audio processing is turned off allowing the raw audio from the microphone to be passed to the trigger detection. This simulates the results that would be obtained by using a standard microphone.
  - Beam Forming, Noise Reduction and Far-Field Enhancements.

**Results:**

The following graphs show the percent of successful trigger detections under the stated noise conditions from 2 feet (0.6 meters), 6 feet (1.8 meters), 10 feet (3.0 meters), 14 feet (4.3 meters) and 18 feet (5.5 meters).

