



Andrea Audio Test Labs

Trigger Phrase Barge-In On Raspberry Pi

5 October 2017

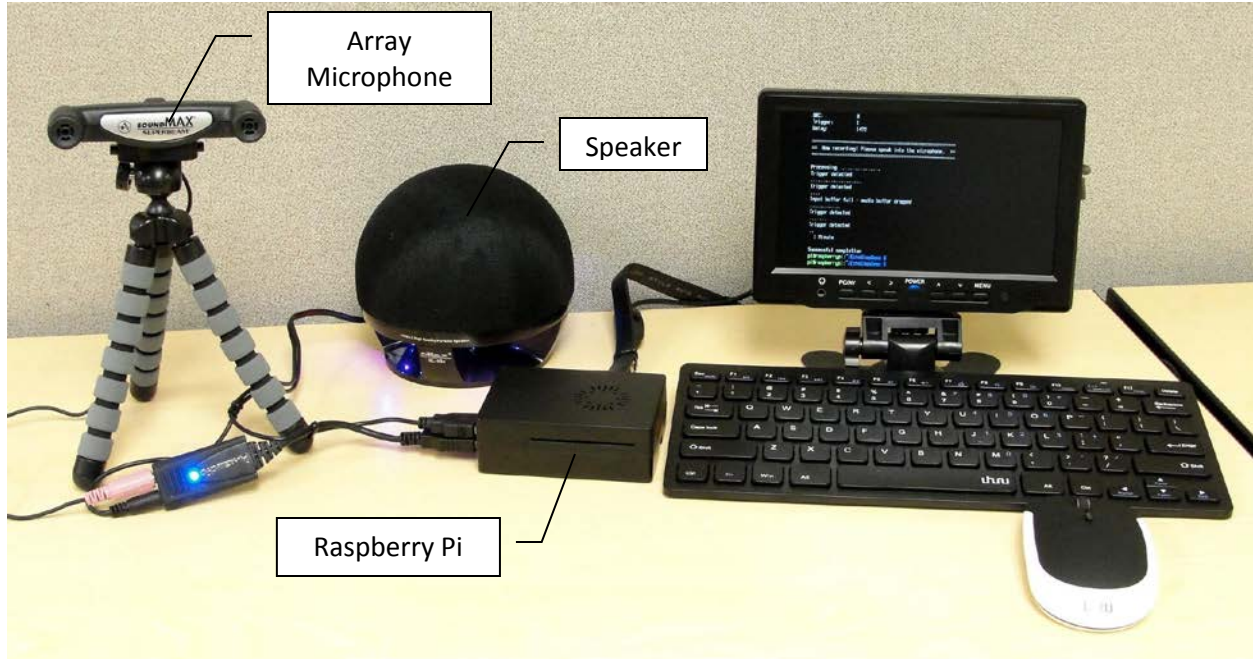
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A common problem with trigger phrase detection is being able to detect the trigger phrase detection when music is playing out of the speaker, which is located near the microphone. This is known as barging-in to the music to be able to speak commands to the device.

This report documents how Andrea's audio filters improve the barge-in performance of any speech recognition device.

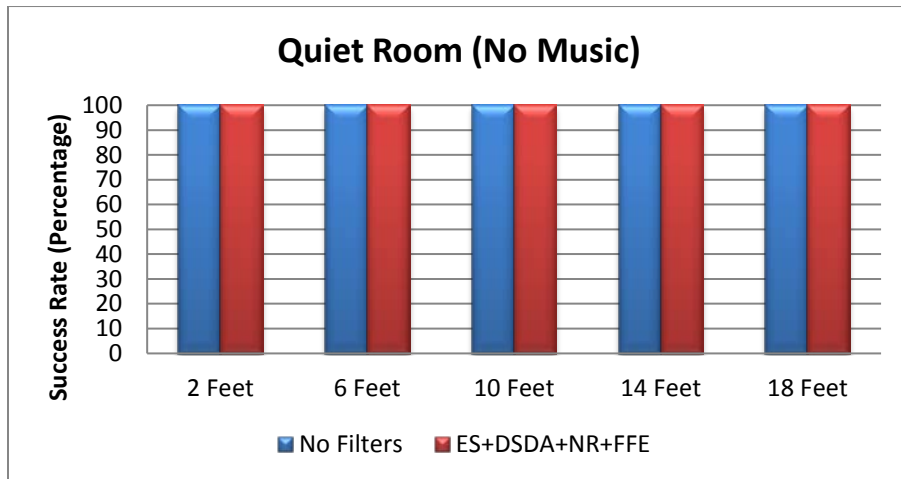
Test Setup:

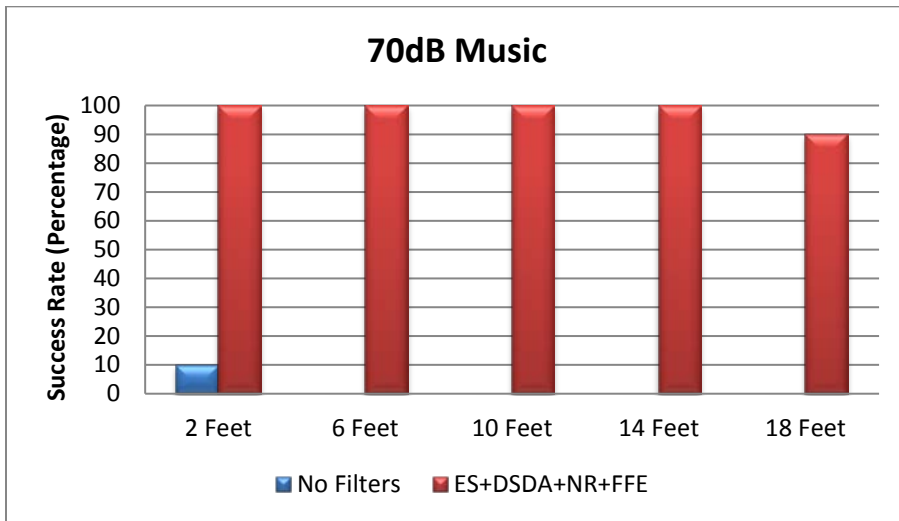
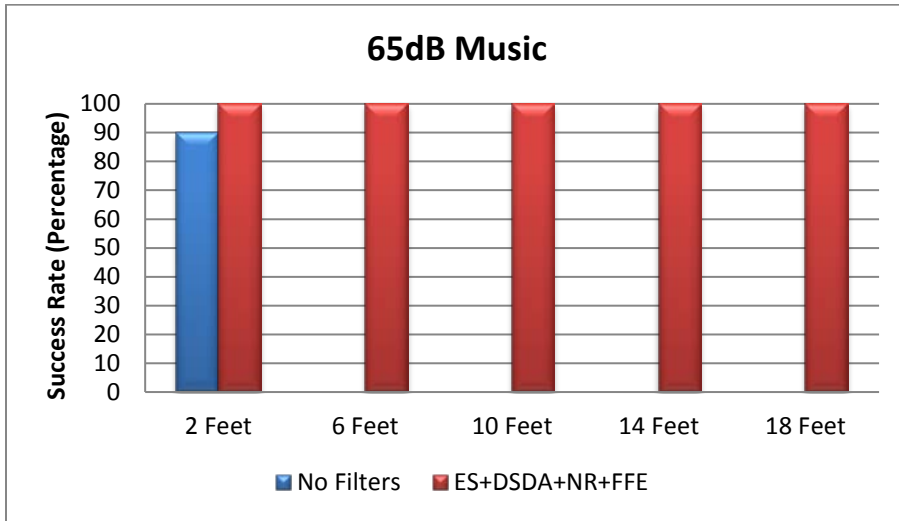
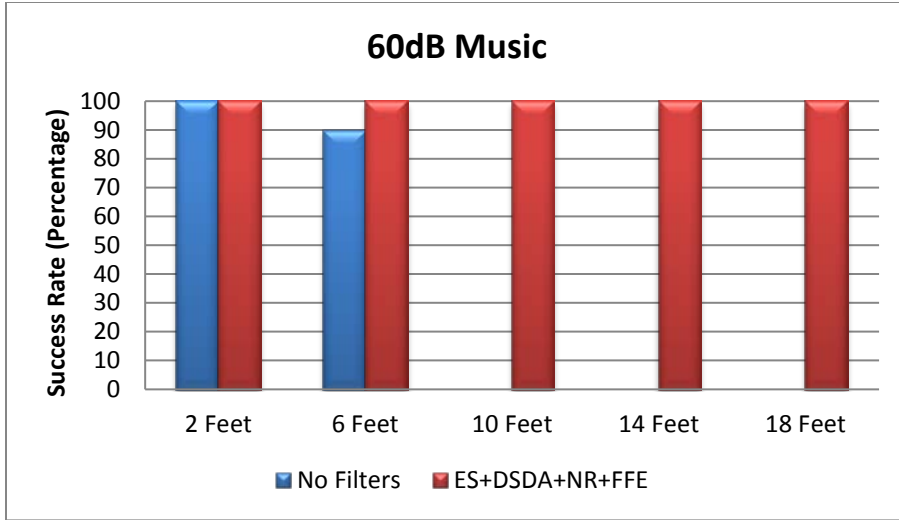
- Andrea's audio filters are running on a Raspberry Pi Model 3.
- Sensory's trigger word detection software is embedded into Andrea's audio library and performed after the audio filters.
- The distance between the spoken trigger phrase and the microphone varies from 2 feet (0.6 meters) to 18 feet (5.5 meters).
- An music audio recording is played out of a speaker at a distance of 3 inches (76mm) to the side of the microphone.
- Music is played at four different volumes, as measured at the microphones:
 - 60dB
 - 65dB
 - 70dB
 - 75dB
- The following audio filters are use:
 - Acoustic echo cancellation (EchoStop)
 - Beam forming (DSDA)
 - Noise reduction (NR)
 - Far-Field Enhancements (FFE), which compensates for weak audio signals when speaking from long distances.
- Tests consists of speaking the trigger word ("Hello Blue Genie") 10 times at each distance. The test is considered to succeed if the trigger phrase was recognized.
- For each distance, the Andrea Setup is tested with the following filter combinations:
 - No Filters – all audio processing is turned off.
 - Acoustic echo cancellation, Beam Forming, Noise Reduction and Far-Field Enhancements (EchoStop + DSDA + NR + FFE)

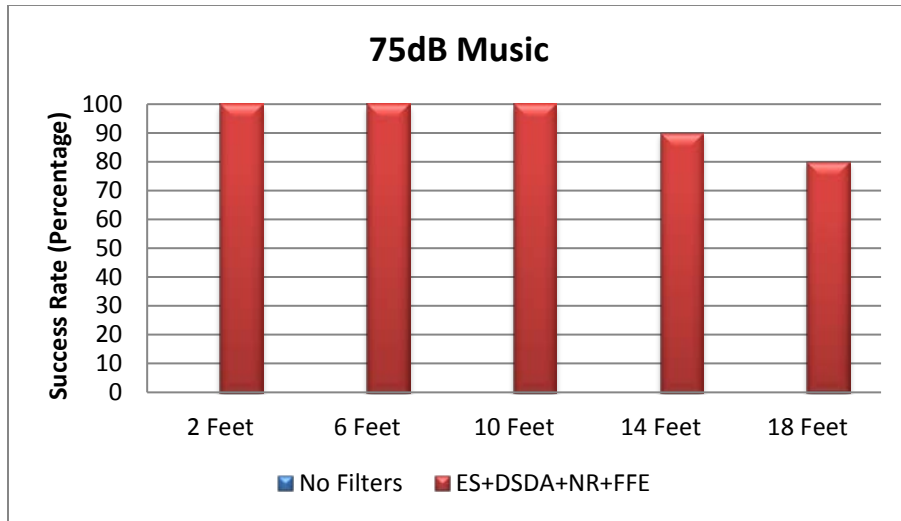


Results:

The following graphs show the percent of successful commands under the stated 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).







Conclusion:

Andrea’s audio filters significantly improve the barge-in capability of any speech recognition device.