

EEE311: Signals and Systems

Lab # 5: Cross-correlation

1 Experimental Work:

- Adjust the oscilloscope as follows:
 - Time scale: 5.0 ms/div.,
 - Vertical scale of CH1 and CH2: DC coupled, centered on 0, 500 mV/div.,
 - MATH: CH1 \times CH2, 500 mV/div.,
 - MEASURE: MATH *mean*.
- Adjust the soundcard volume to about 80 %. Connect the left and right channels into inputs CH1 and CH2 of the oscilloscope (the order is irrelevant).
- Press the windows start button, type GNU and select *GNU Radio Companion*. Some of the main toolbar buttons are detailed in figure 1.

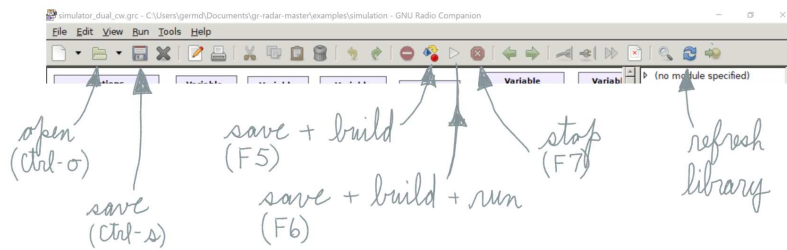


Figure 1:

- From *GNU-Radio Companion*, open the flowgraph `CrossCorrelation-NoScope.grc` (available from the course web page).
- For each of the 8 audio samples available on the web page:
 - Double-click on the *Wav File Source* block and select the audio sample file.

- (b) Run the flowgraph. The wav file is read and delays are introduced into the right and left channels as indicated by the slider widgets. The left and right channels are then fed to the oscilloscope via the computer's soundcard. The oscilloscope takes the mean (integral) of the product of the 2 channels, an operation that corresponds to the cross-correlation function at the set delays.
- (c) Slowly move the *Right Delay* or *Left Delay* sliders until MEAN MATH stays mostly positive and becomes negative only occasionally. Present your results in the form of "In signal B, the *left* channel is delayed by 0.02 s with respect to the *right* channel".

2 Report:

No lab report.