Options
Title: ALS162 Channel
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Output Language: Python
Generate Options: QT GUI

Complexity: 970ubal

Variable
ID: samp_rate
Value: 192k

QT GUI Range
ID: NoiseGain
Label: Noise Gain
Default Value: 250m
Start: 0
Stop: 2.5
Step: 50m

QT GUI Range
ID: fading_freq
Default Value: 3.5M
Start: 1M
Stop: 6M
Step: 100k

low frequency => slow erfades
high frequency => faster fades

Variable
ID: v
Value: 833.333m

speed

Variable
ID: c
Value: 300M

speed of light

QT GUI Range
ID: range_uniform
Default Value: 327.68M
Start: 0
Stop: 327.68M
Step: 1

range of values for
uniform source

QT GUI Range
ID: impulse_thres
Default Value: 327.68M
Start: 0
Stop: 327.68M
Step: 1

high threshold => less interference
threshold must be below range_uniform

QT GUI Range
ID: interference_gain
Default Value: 500
Start: 0
Stop: 1k
Step: 10m

multiplicative gain for
interference signals

Null Source (out) → **Throttle** (in / out, **Sample Rate:** 1) → **Null Sink** (in)

TCP Source
Address: 127.0.0.1
Port: 55.553k
Mode: Client

Fading Model
Num Sinusoids (SoS model): 12
Normalized Max Doppler (fD*Ts): 50.636...6n
LOS Model: Rayleigh/NLOS
Seed: 0

configuration inspired by:
https://www.bastibl.net/rayleigh-autocorrelation/

Selector
Enabled: Enabled
Number of Inputs: 2
Number of Outputs: 1
Input Index: 0
Output Index: 0

QT GUI Toggle Button
ID: fading_toggle_button
Label: Fading (on/off)
Default Value: 0
Initial State: Released
Pressed: 1
Released: 0

enable/disable
fading effect

Add (in0, in1, in2 / out) → **TCP Sink**
Mode: Server
Port: 55.554k

Signal Source
Sample Rate: 192k
Waveform: Cosine
Frequency: 1
Amplitude: 0
Offset: 0
Initial Phase (Radians): 0

Virtual Source
Stream ID: 1

synthetized interference

Selector
Enabled: Enabled
Number of Inputs: 2
Number of Outputs: 1
Input Index: 0
Output Index: 0

QT GUI Toggle Button
ID: interfere...toggle_button
Label: Interference (on/off)
Default Value: 0
Initial State: Released
Pressed: 1
Released: 0

enable/disable
impulsive interference effect

Fast Noise Source
Noise Type: Gaussian
Amplitude: 250m
Seed: 0
Variate Pool Size: 8.192k

Note
Note:

This block creates the
impulsive interference
(roughly a sine cardinale
waveform)

Random Uniform Source
Minimum: 0
Maximum: 327.68M
Seed: 1

produce a rare
impulse signal

Int To Float
Scale: 1

Threshold
Low: 327.68M
High: 327.68M
Initial State: 0

FFT Low Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 192k
Cutoff Freq: 100
Transition Width: 55
Window: Hamming
Beta: 6.76
Num. Threads: 1

Multiply Const
Constant: 500

to scale the signal
with a selectable gain

Virtual Sink
Stream ID: 0

Virtual Source
Stream ID: 0

Stream to Vector

FFT
FFT Size: 1.024k
Forward/Reverse: Forward
Window: window.blackmanhar...
Shift: Yes
Num. Threads: 1

Multiply
Vector Length: 1.024k

FFT
FFT Size: 1.024k
Forward/Reverse: Reverse
Window: window.blackmanhar...
Shift: Yes
Num. Threads: 1

should provide a
waveform similar to
a sine cardinale

Vector to Stream

Fading Model
Num Sinusoids (SoS model): 12
Normalized Max Doppler (fD*Ts): 52.083...3u
LOS Model: Rayleigh/NLOS
Seed: 0

similar to the intended
signal this signal is subject
to fading

Virtual Sink
Stream ID: 1

Signal Source
Sample Rate: 192k
Waveform: Constant
Frequency: 1
Amplitude: 150
Offset: 0
Initial Phase (Radians): 0

Stream to Vector