Karlsruhe Institute of Technology

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The Inspector (gr-inspector)

A Signal Analysis Toolbox for GNU Radio

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Introduction

gr-inspector is an out-of-tree module for GNU Radio. The target was to develop a signal analysis toolbox with the following real-time capabilities:

- Automatic signal detection
- Automatic Signal Classification (AMC)
- OFDM parameter estimation and synchronization
- GUI feedback

This project was part of Google Summer of Code and ESA Summer of Code in Space programs.

Components

Signal Detector Is able to perform energy detection on an input signal.

Inspector GUI The GUI block visualizes the detected signal edges. Users can select signals manually and feed analysis messages to be displayed in the GUI.

Signal Separator Uses FIR filters for every detected/selected input signal to mix, filter and decimate this signal out of the input spectrum.

Signal Extractor Passes one signal from the Separator output as complex stream. The input samples can be resampled to satisfy a constand output sample rate.

AMC Block TODO

OFDM Estimator Estimates OFDM parameters subcarrier spacing, symbol time, FFT lenght and CP length.

OFDM Synchronizer After performed estimation, the signal can be frequency synchronized and stream tags can be inserted at OFDM symbol beginnings.

Flowgraph

The toolbox was developed with the following main flowgraph in mind.

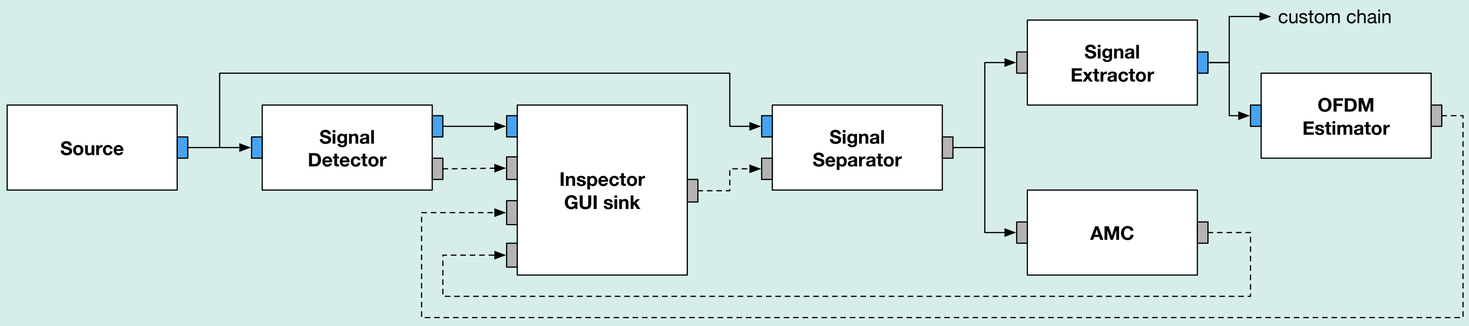

Figure: Example flowgraph

The **Signal Extractor** block assures the ability to append custom signal processing chains for users. Each analysis block can have a feedback message to the **Inspector GUI** to print their results there.

GUI

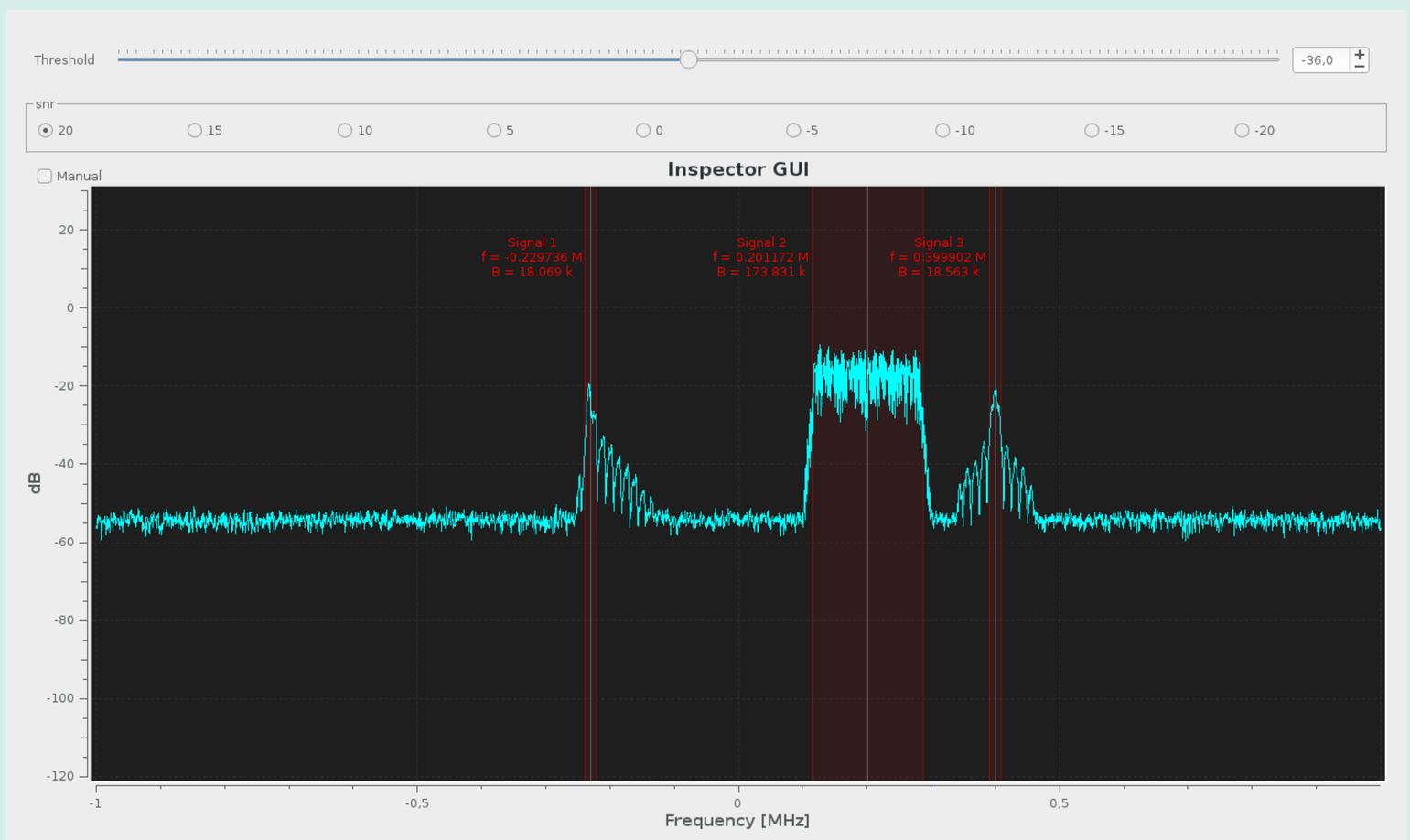

Figure: Inspector GUI

The GUI displays the input spectrum along with markers for all detected signals. Next to the graphical markers, information text is displayed. Each signal has a number and estimated **center frequency** and **bandwidth**. Distinct analysis toolboxes can provide **additional information** for specific signals, which will be appended to the info text.

References

Some additional info

Contact

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