Inventing

http://www.google.com/patents/US613809
Hedy Lamarr
George Antheil
Player Piano
Piano Roll Synchronization
Piano Roll Synchronization
Frequency Hopping (Patent 2,292,387)
Frequency Hopping Spread Spectrum
Ongoing Work

“The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point.”

- Claude Shannon, “A Mathematical Theory of Communication”
List of GR apps and tools in PyBOMBS

<table>
<thead>
<tr>
<th>gr-air-modes</th>
<th>gr-drm</th>
<th>gr-ieee-802154</th>
<th>gr-osmosdr</th>
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</thead>
<tbody>
<tr>
<td>gr-ais</td>
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<td>gr-packetradio</td>
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<td>gr-compat</td>
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<td>gr-op25</td>
<td>gr-zmqblocks</td>
</tr>
</tbody>
</table>
FFT Filters vs. FIR Filters

- **Time to Process 1e+07 Complex Samples (sec)**

  - **FIR filter** (blue dots)
  - **FFT filter** (red dots)

- **Number of Taps**
  - Range: 0 to 500
Look-up Tables
Performance Trade-offs

![Graph showing performance trade-offs between fastnoise_source and noise_source](image)

- Count on the y-axis
- Value on the x-axis

Legend:
- fastnoise_source
- noise_source
VOLK and Benchmarking

Showing relative speedup for all kernels (average by fastest implementation) (click to select a kernel)
Developing support in Open Embedded

GnuRadio Companion

- USRP Source
- FIR Filter FPGA Accelerator
- WBFM Demod
- FFT Sink
- Audio File Sink

Linux Kernel Device Driver (userPeripheral.ko)

Control Data

AXI GP

Sample Data

AXI

Programmable Logic

AXI Bus Interface Blocks / AXI Datamover (ps_pl_interface.v)

Sample Data

AXI4 Stream 0

Filter Tap Config Data

AXI4 Stream 1

Spare

AXI4 Stream 2

Spare

AXI4 Stream 3

Reconfigurable FIR Filter Block (accelerator.v)

Thomas W. Rondeau (trondeau.com)
References

- *Tesla: Inventor of the Electrical Age* by W. Bernard Carlson
- *Hedy’s Folly* by Richard Rhodes
- GNU Radio: http://gnuradio.org
- My page: http://www.trondeau.com
- PyBOMBS: http://gnurad.io/pybombs
- Stats: http://stats.gnurad.io
- OE Manifest: https://github.com/balister/oe-gnuradio-manifest
- OE Cross compiler:
  https://github.com/balister/meta-sdr/wiki/CrossCompile
- Zynq install wiki: