SDR -B

Software Defined Radio

FEATURES

- Software Define Radio single Input single Output (SISO)
- Unleash the power of GNU Radio ecosystem.
- System allows to make telecommunication block diagram and equations comes to life using simple building blocks.
- Open-ended system for real-time communication experiments

SPECIFICATIONS

RF Agile Transceiver

- One Transmit, One Receive Channel (with separate Tuning Frequencies)
- Tuning Range : 70 MHz - 6 GHz
- LO step size: 2.4 Hz
- Tunable Channel Bandwidth : 200 KHz – 20 MHz.
- Integrated DACs (Tx) : 12-bit
- Integrated ADCs (Rx) : 12-bit
- Variable Output Data Rates : 61.44 MSPS - 65.1 kSPS
- Modulation Accuracy (EVM) : ≤−40 dB (typical)
- RX Gain Control : 0 to +74.5dB (800 Mhz)
- Received Signal Strength : 100 dB (±2 dB)
- Internal I/Q Correction and Calibration

Antenna

- Frequency Range : 824-894 MHz and 1710 - 2170MHz
- Connector Type : SMA

FPGA

- Logic Cells : 28k
- Block RAM : 2.1Mb
- DSP Slices : 80

SDR Processing System

- Single-core ARM® Cortex™-A9 MPCore™ @ 667 MHZ
- Streams up to 4MSPS with no dropped samples

Memory

- DDR3L
- 1066 Mbps (16-bit Interface) , 512 Mbytes

Serial Flash

- 32 Mbyte
- Quad I/O provides throughput up to 54 Mbps

Required Software Stack

- Operating System: Linux / Ubuntu
- GNU Radio (3.10.x with Python 3)

Required Computer Configuration

- 8 GB RAM, Intel processor
- USB: USB 2.0 supported (USB2.0 A to B Cable - M/M)
- Display: 14" with Mouse and Keypad provided

START WITH MATH OR THEORY

$S(t)=Vc\,[1+ka\,m(t)]\cos(2\pi fct)$

AM=(DC+Message)xCarrier

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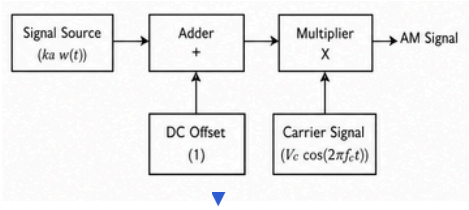
REPRESENT IT AS A BLOCK DIAGRAM



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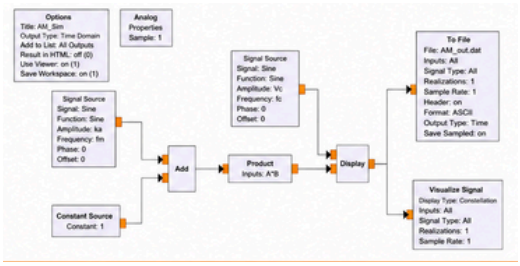
SIMULATE IT FOR IMPLEMENTATION



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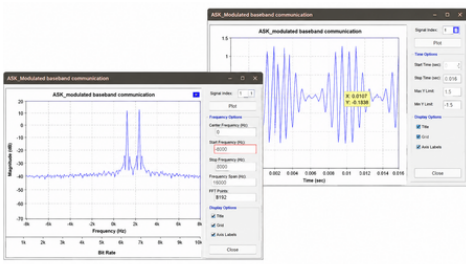
TRANSFER CODES ON HARDWARE PLATFORM FOR REAL TIME RESULT



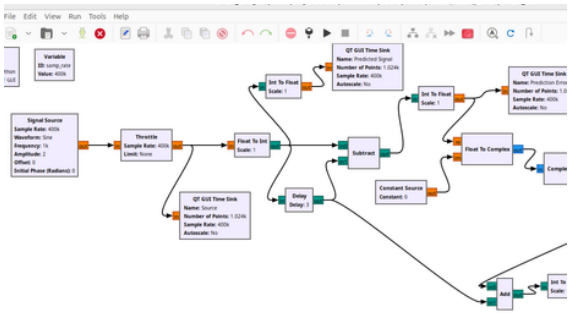
EXPERIMENTS

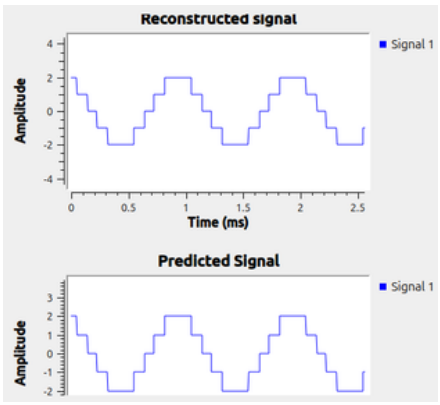
Analog Communication

- Amplitude Modulation & Demodulation
- Double Side Band with Suppressed Carrier (DSBSC) Modulation & Demodulation
- Receiver Selectivity using Band pass filter with DSBSC
- Single Side Band with Suppressed Carrier (SSBSC) Modulation & Demodulation
- Frequency Modulation & Demodulation
- Pulse Amplitude Modulation & Demodulation

Digital Communication

- Sampling and Quantization
- Amplitude Shift Keying (ASK) Generation & Demodulation
- Frequency Shift Keying (FSK) Generation & Demodulation
- Binary Phase Shift Keying (BPSK) Generation & Demodulation
- Quadrature Phase Shift Keying (QPSK) Generation & Demodulation
- Differential Phase Shift Keying (DPSK) Generation & Demodulation
- Digital Quadrature Amplitude (DQAM) Modulation & Demodulation
- Differential Pulse Code Modulation (DPCM)
- Frequency Hopping Spread Spectrum (FHSS)
- Orthogonal Frequency Division Multiplexing (OFDM)





FUNCTIONAL BLOCKS

- Audio
- Boolean Operators
- Byte Operators
- Channel Models
- Channelizers
- Coding
- Control Port
- Debug Tools
- Deprecated
- Digital Television
- Equalizers
- Error Coding
- FCD
- File Operators
- Filters
- Fourier Analysis
- GUI Widgets
- Impairment Models
- Instrumentation
- Level Controllers
- Math operators
- Measurements Tools
- Message Tools
- Modulators
- Networking Tools
- OFDM
- Packet Operators
- Peak Detectors
- Resamplers
- Stream Operators
- Stream Tag Tools
- Symbol Coding
- Synchronizers
- Trellis Coding
- Type Converter
- UHD
- Variables
- Video
- Waveform Generators
- ZeroMQ Interfaces
- Industrial I/O
- Mapper
- Many More