

Modulate Internet Radio Into FM Using GNU Radio

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Outline.

- Fm in gnu radio
- Audio Streams in Internet Radio
- Gnu & Audio Files
- Sox command
- Playlist “.pls”
- Recording internet radio

Project description

- Using gnu radio to modulate internet radio into fm.
- Using usrp to transmit fm signal
- Use a radio device to receive radio signal and listen to it.

FM in gnu radio.

- Gnu radio provides a lot of blocks that can be used in FM.
- In this project the most important block used is `wfm_tx` which is wide band fm transmitter.
 - It is called wide band because radio channels need more bandwidth to contain information.
- `Wfm_tx ()`; takes as input an audio stream and creates an FM modulated signal.

Audio Streams in Internet Radio

- Internet radio stations uses a lot of different audio formats:
 - MP3
 - Ogg Vorbis
 - Windows media audio
 - Real audio
 - Etc...

Gnu & Audio Files

- Gnu radio takes .raw files as input audio files.
- Challenge: how to convert the audio stream coming from the internet radio to a .raw file that is easily manipulated by GNU.
- The plan was save the audio stream in an mp3 file and transmit that mp3 file.
- How to transform the mp3 file into a .raw file?
Found a Linux command called “sox”.

Sox- Sound eXchange : universal sound sample translator.

Sox: Linux command that translate audio file to different formats.

- Takes as arguments:
 - Input file
 - Output file
 - Extension of output file (raw: in this case)
 - Sampling rate
- “sox test.mp3 -r 32000 -t raw -l -c 1 test.raw”

Major steps in gnu

- Import the .raw file to gnu:
 - set the raw file as the source file:

```
- src=gr.file_source(gr.sizeof_float, filename, False)
```
- Create a transmission block:

```
- fmtx = blks.wfm_tx(self.fg, self.audio_rate, self.usrp_rate,max_dev=75e3, tau=75e-6)
```
- Connect the source file to the transmission block:

```
- self.fg.connect(src, fmtx, gain, self.u)
```

Playlist “.pls”

- “.pls” files: popular playlist files usually used in audio software's especially in Linux.
- Some internet radio that uses “real player” use it.
- Easy to read
- May contain URL

```
[playlist]
NumberOfEntries=3

File1=http://streamexample.com:80
Title1=My Favorite Online Radio
Length1=-1

File2=http://example.com/song.mp3
Title2=Remote MP3
Length2=286

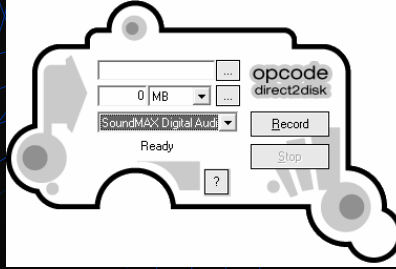
File3=/home/myaccount/album.flac
Title3=Local album
Length3=3487

Version=2
```

- Tried to modify the code to import .pls files
 - Specify URL of internet radio.
 - Did not work because we don't know what is the codec used by the internet radio.
 - Sox command works only on files: back to the same problem saving before transmitting.
 - The code transmit a playlist of mp3 files instead of just one song.

Recording internet radio

- A lot of products on the internet.
- Most of them record outputs from sound card.
- Freeware “OpD2d”:
 - Name the file
 - Specify size(MB) or length (m)
 - (did not work)



Questions?

References are available upon request.