Final Project Guideline: SDR (Software Defined Radio)

CSE 310, Fall 2020 Instructor: Prof. Jihoon Ryoo Due date: End of Semester

Project

You will complete a research project during the semester. The research project serves two purposes. One is to gain hands-on experience and solidify what you have been learning in class; the other is to apply your innovative thinking to solve an interesting problem in the broad space of software defined networking which can be the starting point of your thesis topic or a cool application that can lead to further entrepreneurial endeavor.

The projects will be done in teams of 2. Together with your team members, you will complete two example projects. If you willing to complete an extra project, you may need additional devices, therefore you need to complete two projects then you can check out the new devices from me.

Timeline

To ensure you are on track for a successful project, I have set the following deadlines.

- **November 2:** A 5-minute presentation which outlines the problem and basic solution that your team is going to solve. (10 points)
- **November 23:** Final check-up and Demo in class. (50 points + extra 30 points)
- **November 25:** Overleaf report and YouTube link of your project (10 points each)

All the above write-ups are due mid night on their deadline day. In between each deadline, I will be meeting with each group on a regular basis, to ensure your timely progress.

Two example projects and a extra SDR projects

First example: MINI RF JAMMER (https://github.com/PentHertz/Modmobjam)

Radio Frequency or RF Jamming is one of the easiest methods of defeating a wireless system – the wireless equivalent of cutting the wires on a traditional wired system. Wireless security systems – and anything that runs off a wireless signal – communicates via radio frequency (RF). Jamming is when those signals are overpowered by an even stronger signal – essentially a signal that is "louder" and drowns out the regular wireless frequency.

Tasks to do: test the code and run it – it will require a multiple of configurations that require understanding of CSE310 materials. If your device can disable your phone's WiFi connection (15 points) and disable LTE connection (15 points).

Second example: FM Radio Receiver (https://github.com/henrythasler/sdr/tree/master/FM-Radio)

FM radio is a method of radio broadcasting using frequency modulation (FM). Invented in 1933 by American engineer Edwin Armstrong, wide-band FM is used worldwide to provide high fidelity sound over broadcast radio. FM radio is capable of higher fidelity—that is, more accurate reproduction of the original program sound—than other broadcasting technologies, such as AM radio. Therefore, FM is used for most broadcasts of music or general audio (in the audio spectrum). FM radio stations use the very high frequency range of radio frequencies.

Tasks to do : test the code and run it – it will require a multiple of configurations that require understanding of CSE310 materials. If your device can receive and process FM radio (20 points).

Extra Project: DMB(Digital Multimedia Broadcasting) Receiver
(https://github.com/Oleg-Malyutin/sdr_receiver_dvb_t2) or
SDRangel: https://github.com/f4exb/sdrangel

Digital multimedia broadcasting (DMB) is a digital radio transmission technology developed in South Korea as part of the national IT project for sending multimedia such as TV, radio and datacasting to mobile devices such as mobile phones, laptops and GPS navigation systems. This technology, sometimes known as mobile TV, should not be confused with Digital Audio Broadcasting which was developed as a research project for the European Union. DMB was developed in South Korea as the next generation digital technology to replace FM radio, but the technological foundations were laid by Prof. Dr. Gert Siegle and Dr. Hamed Amor at Robert Bosch GmbH in Germany. The world's first official mobile TV service started in South Korea in May 2005, although trials were available much earlier. It can operate via satellite (S-DMB) or terrestrial (T-DMB) transmission. DMB has also some similarities with the main competing mobile TV standard, DVB-H.

Tasks to do : test the code and run it – it will require a multiple of configurations that require understanding of CSE310 materials. If your can receive DMB signal (10 points) and transmit DMB signal (20points).

Great guide for your projects

ADALM-PLUTO for End Users: https://wiki.analog.com/university/tools/pluto/users

SDRangel: https://github.com/f4exb/sdrangel