

Digital Communications

An Open Communications Design Project

Introduction:

In the Design Project you will first organize a team of three and select your topic from the list below.

- Phase Locked Loops and applications – including simulation of pull-in and tracking performance as a function of the loop filter.
- Superhet single and dual conversion receivers including identification of spurious responses – their causes, simulation and elimination techniques.
- Analysis and simulation of the FM capture effect – vary the limiter bandwidth and clipping level to plot results.
- Analysis and simulation of ISI in baseband digital communication systems. Include sources of ISI in your system as well as efforts to minimize ISI.
- Analysis and simulation of large “constellation” modulation techniques.
- Error correcting codes and their performance as a function of signal/noise. Analysis and simulation of several options.
- Direct Sequence Spread Spectrum communication system – benefits, drawbacks and simulated performance.

Deliverables (Team uploads to Blackboard):

1. **Project Definition:** Identify your team (~3 members) and define your communication system choice. **Email me the team membership and the choice of your communication topic so that I can establish the teams in Blackboard.** Upload this information after the teams are defined.
2. **Simulation Files:** so that your simulation can be run from the uploaded files.
3. **Full Project Report:** including plots of your simulation results as well as documenting your design objectives, chosen solutions, and the performance of your system. Include a section describing problems encountered and how they were resolved.
4. **PowerPoint-based presentation:** covering your system and results. All team members should take part in the presentation. Teach the class about your topic.

The presentations will take place in-class before and during Finals week.

Make certain that all material used from references is cited, any plagiarism (it will be detected) will result in significant project grade penalties.