ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

School of Computer and Communication Sciences

Handout 18   Principles of Digital Communications

Project   Apr. 17, 2015

Goal: The purpose of this PDC project is to complement the theory with a hands-on experience. What you do in this project is not very different from what a communication engineer might do to test the feasibility of a concept.

Assignment: Develop a proof of concept to show that we can exchange files "over the air" between two laptops, by using the speaker of one laptop as the transmitting device and the microphone of the other laptop as the receiving device.

More precisely, on one laptop you should implement a transmitter that reads a text file and transmits it by means of playing sound waves from the computer's speaker. On the other laptop, you implement a receiver that records the transmitted sounds from the other laptop from the microphone and reproduces the text file.

Rules and Recommendations:

(a) You work in teams of two.

   Please choose your teammate at latest by **Wednesday, April 29** and send an email to `mani.bastaniparizi@epfl.ch` in order to register your team.

(b) We recommend that you use MATLAB as the programming language, but any other satisfactory solution is also accepted, as long as all the code pertaining to the transmitter and receiver is produced by your team.

(c) During the las class session (May, 29), each group presents their project in a few minutes and gives a demonstration by transmitting a file that we provide (one sentence in bits). The two laptops will be at a distance of roughly 3 m from each other.

(d) Reliability plays the most important role in the evaluation. Hopefully the communication will be error-free. The data rate and the implementation details play a secondary role.

   Decoding need not be real-time, i.e., you can sample and store the received signal and process afterwards.

Note: This project is meant to be instructive and enjoyable. It accounts only for 15% of the points that you can accumulate towards your final grade. Do not let it become a major time investment unless you can afford to do so. In particular, we strongly recommend that you do not let the project keep you from fulfilling the other assignments (for PDC and other classes). Remember that the final exam accounts for 50% of the points.