Lab Internships Faculty of Electrical Engineering and Computer Science

Topic:	Digital Baseband Transmission
Areas/Study fields:	Electrical Engineering, Digital Communications
Duration:	3-6 months
Deadline for applying:	February 15 for fall internship October 1 for spring internship
Supervisor:	Professor Dr. Mario Goldenbaum
Abstract:	Digital Communication is the procedure of exchanging information, messages, and ideas via digital technologies and platforms. The convenience and efficiency of digital communication have transformed how we interact, both personally and professionally. Instant messaging, video conferencing, and sharing of multimedia content are so ingrained in our daily lives that it is difficult to imagine being without. The goal of this project is to develop a simple lab experiment intended to teach 2nd year undergraduate electrical engineering students the basic principles of digital baseband communication. Towards this end, a Red Pitaya should be integrated in a simple experimental setup and controlled via Python or the open source GNU Radio environment. By varying funda- mental system parameters such as bandwidth, pulse shaping filter, and sample rate through a graphical user interface (GUI), the impact on the analog output signal should be inspected by a signal analyzer.
Tasks:	- Learn or recap the basic notions of digital baseband transmission - Become familiar with the Red Pitaya platform and the GNU radio environment - Set up a digital baseband transmitter in GNU radio and simulate numerically the expected analog output - Build a GUI that allows the students to interact with the system and to set the main parameters - Measure the analog output signal with a signal analyzer and compare the measurements with the simulation - Write down a list of instructions (lab description) based on which the students are guided through the experiment
Prerequisites:	- Basic knowledge of communication systems - Some lab experience (e.g. usage of oscilloscope and spectrum analyzer) - Programming skills (e.g. Phyton) - Ability to work in a team

Language requirements documents:	- English (minimum B2) - Transcript of Records - CV
Starting point:	October for fall internship April for spring internship Earlier/later beginnings may be possible, depending on professor's availability.
Credits:	6 ECTS
Salary:	None paid internship, HSB scholarship for none Erasmus students subject to availability. This will be announced on short term notice.