WWTF Project NXT17-013

Unleashing finite-alphabet implementations of LDPC decoders (UNFOLD)

Abstract

Designing efficient VLSI hardware that achieves the designated performance of modern digital communication systems is a major challenge associated with huge development costs for semiconductor companies. The UNFOLD project will contribute to mastering this challenge by realizing the full practical potential of finite alphabet decoders for low-density parity check (LDPC) error correcting codes. This decoder type is a recent innovation, for which theoretical foundations and preliminary hardware architecture aspects have been investigated in the context of the previous WWTF project TINCOIN. UNFOLD takes a leap forward and lifts the TINCOIN results to the next application level by creating a complete development and design flow for finite-alphabet LDPC decoders in the form of a software suite and soft-IP cores. These ready-to use tools will be transferred to the telecom industry, which represents UNFOLD's new target group. The transfer will be achieved via an online platform that hosts a download area and a discussion forum to engage interested companies. The advantages for industry include an advance in know-how as well as economic benefits resulting from VLSI circuits with unrivaled efficiency. The UNFOLD project will be carried out at the Institute of Telecommunications of TU Wien under the direction of Prof. Matz in close collaboration with the Telecommunications Circuit Lab at EPFL, headed by Prof. Burg. The team has a successful collaboration history and unifies internationally competitive top expertise in signal processing, communications, and circuit design.

Keywords:

LDPC Codes, digital communications, receiver implementation, chip design

Principal Investigator:	Gerald Matz
Institution:	Vienna University of Technology
Further collaborators:	Prof. Andreas Burg (École Polytechnique Fédérale de Lausanne (EPFL))

Status: Completed (01.08.2017 - 31.03.2018) 8 months

Funding volume: EUR 50,000

Further links about the involved persons and regarding the project you can find at

https://archiv.wwtf.at/programmes/new_exciting_transfer_projects/NXT17-013