Communication Architectures for Mobile Edge Computing 5G and Beyond

Summary

In the context of the Internet of Intelligent Things initiative (IoIT) initiative at the School of Information Technologies at Tallinn University of Technology, Estonia, there is an opening for a PhD project on communication architectures for mobile edge computing (centralized and/or distributed) and integration with 5G and beyond systems.

Research field:	Information and communication technology
Supervisors:	Muhammad Mahtab Alam Prof. Dr. Maksim Jenihhin
Availability:	This position is available.
Offered by:	School of Information Technologies Thomas Johann Seebeck Department of Electronics
Application deadline:	Applications are accepted between June 01, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

Description

Context

The IIoT and 5G allow creating a wide range a new applications and use-cases, ranging from healthcare, environment, public safety, etc., which help solving important societal issues.

Mobile edge computing (MEC) is a paradigm that helps reducing 1) the computational complexity on the higher tiers of a network-based system, 2) the bandwidth usage between devices and the higher tiers, as well as 3) reducing latency and feedback delays on the bidirectional communication links between the devices and the higher tiers. In MEC, some local computing is performed at the edge, i.e. at the device level; such computing may include signal pre-processing, signal processing and, increasingly, data analytics. The concept of MEC is now being extended to distributed MEC, whereby the computing tasks are distributed and orchestrated among the devices to make the best use, dynamically, of their available computational, energy, and radio resources.

Objectives

The objectives of this PhD project include:

1. The design and implementation of methods, techniques and hardware/software platform for 5G communication architecture split between centralized and distributed computing units and for aspects such as dynamic end to end network slicing using open RAN alliance.
2. Integration of such a system with existing 5G core networks is also essential; in the context of the IoIT initiative, it is expected that this will be done in collaboration with Estonian Telcos.
3. Build and demonstrate applications that exploit and benefit from the above platform for demonstration purposes, i.e. construct, deploy, and show-case real-life use-cases. Applications that use e.g. swarms of drones and swarm of unmanned vehicles are obvious candidates for the above MEC platform.

It is envisaged that the work conducted in this PhD project will benefit from and will contribute to open-source initiatives such as OpenAirInterface

Prerequisites

- A strong background in communication and electronics systems, in particular relevant to Communication architecture and mobile edge computing
- Significant experience and interests in algorithms developments and proof of concept
- Interest for real-life implementation and integration of embedded systems and languages such as (Embedded) C, VHDL, and/or Verilog
- Knowledge of new paradigms such as embedded machine learning and some experience with the real-life hardware/software implementation thereof
- Knowledge of networks and a specific interest for 5G

- Self-motivated and committed person who takes ownership of their PhD project
- Excellent writing skills

Tallinn University of Technology is an equal opportunity university. Female applicants are particularly encouraged to apply.

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