6G Radio Communication Architecture Design

Summary

6G is expected to be characterized by extreme densification of the network, a cell-free network to offer seamless quality of service and reliable coverage. At the same time ORAN alliance, its flexible and virtualized open radio access network opens up ways to innovate new methods empowered by artificial intelligence (AI) to optimize time-resources.

Research field:	Information and communication technology
Supervisor:	Muhammad Mahtab Alam
Availability:	This position is available.
Offered by:	School of Information Technologies
	Thomas Johann Seebeck Department of Electronics
Application deadline:	Applications are accepted between November 15, 2021 00:00 and December 15, 2021 23:59 (Europe/Zurich)

Description

The objective of this PhD project is to develop new research on two aspects of post 5G systems i.e., cell-free network and radio access network (RAN) intelligent Controller (RIC) for open RAN (ORAN). The specific tasks are as follows:

- For cell-free network, to redesign the procedures of cell search and random access as well as autonomous grant-free data transmission schemes;
- Based on the ORAN based RIC framework and open interface, considering both real time and near real time applications, develop AI/ML model for radio resource optimization; in addition, investigate solutions for interoperable vendors elements.
- Research focused on developing algorithms in line with real-life use-cases by generating diverse traffic patterns, various features will be researched including dynamic radio configurations, dynamic radio slicing, energy efficiency etc.;
- Contribute to dissemination i) deliverables and reporting, ii) seminars and workshops;
- Publish results as quality impact papers including impact factor journals, flagship conferences, focused workshops and in standardization activities.

Applicants should fulfil the following requirements:

- A strong background in wireless communications 4G/5G, applied data science; machine learning (supervised & unsupervised learning) and statistical learning, Reinforcement learning, Deep learning etc.;
- Experience and interest for real-life implementation, testing and validation of ML techniques;
- Excellent knowledge of languages such as, python, (Embedded) C, Java, as well as tools like R, Matlab etc.;
- Self-motivated and committed person who takes ownership of their project;
- Excellent writing skills

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