Machine learning framework to explore physical layer signal processing algorithms

**Type: Summer internship (2019)**

**Duration: 8 weeks**

**Mission/ General Purpose**

In recent years machine learning (ML) methods have demonstrated significant improvements in various tasks. These methods outperform human-level object recognition in some tasks and achieve state-of-the-art results in anomaly detection, machine translation, speech and image processing.

Over the last couple of years there has been increased interest to use machine learning to achieve similar state-of-the-art results in communication systems mainly targeting channel decoding, and channel estimation problems but also for MIMO beamforming and user localization. There have been also papers demonstrating end-to-end autoencoder network replacing the nicely engineered and well understood communication system blocks. From the hardware implementation perspective all the above techniques typically would need significant area/power/speed in its realization. While the advantage of ML provides certain degree of adaptability to the nature of data, easing the human effort to engineer a good algorithm to solve the task in hand. The goal of this internship is to design a machine learning framework which serves as the basis to explore these concepts and to the advance state of the art.

You will join the team of Hardware platforms research group in Nokia Bell Labs, working on the realization of strategic digital hardware building blocks for communication systems. The Hardware platforms group, as part of the world-leading Nokia Bell Labs research center, groups experts around the globe and acts as centralized research group for the entire Bell Labs community.

**Key responsibilities**

- Develop a machine learning framework (preferably in TensorFlow).

- Demonstrate the framework by recreating a state-of the art use case.

- Propose novel improvements over state of the art use case.

**Qualifications**

- Enrolled student in Master of Electrical Engineering or relevantly related area

- Experience with Machine learning

- Knowledge of DSP and digital communication systems.

- Affinity with programming with Python (TensorFlow would be plus)