MSc Thesis Task Description

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candidate for MSc degree in Computer Engineering

Power Consumption Management of LPWAN Networks via Machine Learning

IoT is about extending the power of the Internet beyond computers and smartphones to a whole range of other things (humidity sensor, heartbeat monitor, smart lock, etc.) connected to gather information, send information back or both. These devices can be connected through different IoT connection methods (Wi-Fi, LPWAN, Cellular, Satellite, Bluetooth…). The key challenges in these networks are the battery life and the ability of devices to communicate over a long-range, often referred to as low power wide area network (LPWAN). One of the most promising LPWAN technologies today is LoRa.

The focus of this thesis, will be the power consumption and the management of LPWAN networks as well as implementing embedded machine learning algorithms with LoRa to compress the transmitted data and to extend the battery life on the edge devices. Furthermore, low power transmission through LoRa will be performed and power consumption for LoRa will be analyzed and optimized, the energy performance will be managed. Accordingly, to obtain the best result we use input parameters such as bandwidth, payload size, spreading factor, coding rate and range (distance), comparing the use of non-cellular LPWAN and Cellular Network for IoT applications. For the implementation of the algorithm C++ and Python programing languages will be used.

Tasks to be done by the MSc candidate:

* Study, analyze and classify IoT and LPWAN networks.
* Explain the power consumption factors of LoRaWAN.
* Explain the basic principles of machine learning, and propose a model.
* Optimize the power consumption of LoRaWAN by reducing the duration of data transmission using machine-learning.
* Compare the use of non-cellular LPWANs to the use of Cellular Networks for IoT applications.

**Supervisor at the department:** Tibor Cinkler, DSc, full professor

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/ Dr. Gábor Magyar /

head of department