

Master Thesis: Implementation of 5G-IoT Use-cases: Smart Waste Management

Background:

The future Internet of Things (IoT) networks will be designed to allow long range communications at a low data rate among devices (connected objects), such as sensors operated on a battery to communicate small bundles of delay sensitive data. To meet the requirements set forth by such networks, the Third Generation Partnership Project (3GPP) has introduced a new radio access technology called Narrowband Internet of Things (NB-IoT) which provides extended coverage, high capacity, low throughput, reduced device processing complexity and long battery lifetime.

NB-IoT is a long-term evolution (LTE) variant designed specifically for IoT. LTE already has a global footprint and thus supporting and driving IoT adoption through NB-IoT is considered a promising solution. The aim of this thesis is to prototype the use-case of smart waste management system using NB-IoT and to demonstrate the potential of NB-IoT technology. At the same time, address some of the main challenging issues of today's waste management systems.

"Every year humans dump a massive 2.12 billion tons of waste. If all this waste were put on trucks they would go around the world 24 times." -WorldCounts.com. The focus of this thesis is to develop smart sensor based NB-IoT node to optimize collection times, reduce operation cost, dynamically route collection trucks, resolve customer discrepancies quickly, save environment, reduction in maggot growth and other insects (improve health and safety).

Project Description:

In this thesis, the candidate will be involved in the prototyping and performance evaluation of NB-IoT node. Firstly, the candidate will be involved in establishing the connection of NB-IoT modules with the server and initial data collection. Later, integration with appropriate sensor required for the collection of information will be done. Lastly, the analysis of NB-IoT link and the interpretation of information will be performed.

Responsibilities:

- Implementation of NB-IoT module with Telia's base station and cloud server.
- Integration of sensors and collection of data.
- Data analysis and interpretation.
- Thesis writing and documentation

Requirements:

You have a Bachelor degree in electrical engineering or computer science. You have a Master degree (or undergoing) in electrical engineering or computer science. You are familiar with general concepts of wireless communication, STM32 processor, sensor integration, Arduino programming.

Learning Outcome:

Candidate will gain an in-depth knowledge of IoT and gain hand-on experience on Arduino programming, cloud server establishment, data analysis and interpretation.

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