**Mobile LoRaWAN Gateway Utilized on Drone**

**Abstract:**

Low-power WAN (LPWAN) is a wireless wide area network specification that interconnects low-bandwidth, battery-powered sensors with low bit rates over long ranges. To meet the challenges of long range, low power consumption and secure data transmission, the sensors are based on LoRa Technology and on LoRaWAN media access control (MAC) layer protocol that manages communication between LPWAN sensors and the Gateway. Not in all circumstances it's possible for an end node sensor to communicate with the outside world. This requires to use mobile gateway utilized on drone. The drone on its flight path can reach the remote location where the sensor device is running and collect its data. The challenge in this solution is to establish a communication link with every sensor node, by being at the correct location at the right sensor duty cycle time.

**Goals:**

1. Learn about LoRa and LoRaWAN.
   Refer to:
   - [https://www.lora-alliance.org/](https://www.lora-alliance.org/)
   - [https://www.link-labs.com/blog/what-is-lorawan](https://www.link-labs.com/blog/what-is-lorawan)
2. Bring-up the LoRaWAN development and working environments (sensor-gateway-server) based on P-NUCLEO-LRWAN1 Single-Channel Gateway. Refer to instructions in: https://gitlab.cs.technion.ac.il/lccn/S2018-LoraWan

3. Equip a drone with the single-channel LoRaWAN Gateway (use Wi-Fi connection to cloud) and demo data collection while sensors are in duty-cycle. This task will be done by collaborating with Intelligent Systems Research Lab.

4. Implement energy-efficient drone data collection application. Refer to: http://www.mdpi.com/1996-1073/11/3/573. This task will be done by collaborating with Intelligent Systems Research Lab.

5. Implement end-node firmware upgrade (requires drone to be close as possible and so change sensor mode to lowest energy consumption).

Requirements:

Introduction to Networking (236334)

C Programming

Guided by:

Itzik Ashkenazi – for the NATO Research Project

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