Precision agriculture in vineyards using a low-power wide-area wireless sensor network

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Content

- Thesis chapters progress
- Additional info
- Outlook

Thesis chapters progress

100%1	Introduction	
2	Literature Review	
100%	2.1	Smart Objects and Wireless Sensor Nodes
		2.1.1 Radio and wireless transmission technologies
		2.1.2 Embedded systems and Microcontrollers
		2.1.3 Sensors and serial line communication
20 %	2.2	Communication Technologies
		2.2.1 The LoRaWAN standard
TODO	2.3	Energy Management
3	Mon	itoring platform architecture
100%	3.1	Monitoring area characteristics and Devices used
100%	3.2	Network architecture
30 %	3.3	Data acquisition system
4	Ener	gy consumption model
Doing	4.1	Path loss model
		4.1.1 Measurements of RSSI and Packet delivery ratio in open-field rural areas using LoRa
Deine	4.2	End node energy consumption evaluation
Doing	4.3	End node energy cost function
TODO 5	Extending LoRaWAN capabilities	
TODO 6	Con	clusions

Additional Info

• **Network Architecture:** checking the Dragino manual, and available information, the device implements a custom UDP packet forwarder, from Semtech. The network layers for the platform would look like:



Additional Info

• Comparing the obtained results with literature:

Number of LoRa Symbols transmitted: 16 packet loss versus Avg. SNR (dB)



= 6,17E-03e^-0,298x

Simulation Results:

Number of LoRa Symbols transmitted: 10



Fig. 9. Frame error rate of the LoRa modulation for a frame length F = 10 under AWGN and same-SF interference for SF $\in \{9, 10, 11\}$ and $P_I = -3$ dB. The approximations of [29] and (63) are shown with black dotted lines.

Additional Info

• SNR probability mass function: demonstration that the noise in the channel behaves like AWGN.



Outlook

- Next steps:
 - Finish remaining chapters of the thesis.
 - Sign Frontespizio.
 - Finish SHT30 sensor driver, include data in the LoRaWAN frame.
 - Test the LoRaWAN software transmitting from the NUCLEO boards to the gateway and to the Network server (maybe deploy it in a local machine).