

Redes Inalámbricas de Sensores

Proyecto *Heri-Sure inc.*



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Tabla de Contenidos

1. OBJECTIVE	3
2. PROBLEM DEFINITION	3
3. TECHNICAL REQUIREMENTS/RESTRICTIONS	4
4. SUBMISSION	7
5. PUBLIC EVENT	7

1. Objective

The objective of this task is the creation of a complete and capable WSN (Wireless Sensor Network) solution for a generic application described below.

This creation effort should demonstrate both the skills acquired by the student in the subject and the capability to incorporate new knowledge derived from the topics worked in the subject.

2. Problem definition

Heri-Sure Inc. is a European spin-off company devoted to preserving cultural heritage. Heri-sure is well known in his field as a cutting-edge company able to cope with the weirdest expectations of their clients.

the most

The government of Liliput has approached it to provide a solution for the continuous real-time monitoring of the remote location of Barataria rock art shelters.

It seems that temperature variations are affecting the BIC (Bien de interés cultural), so it is decided to deploy a rapid monitoring solution independent of any other side control strategy. The implementation of such a system should follow the basic conditions (pero relajables al gusto):

- A cool dashboard for non-experts is required.
- Data must be stored in a database.
- Temperature must be measured indoors and outdoors every 15 minutes.
- There is a critical requirement for measuring temperature and relative humidity (con vuestro nodo).
- The devices measuring critical points must include an over-temperature indicator.
- (People counter???)

3. Technical requirements/restrictions

There is no commercial IoT/LPWAN available in this remote location. LoRaWAN technology is considered to be most appropriate for the case.

These are the technical requirements:

For end-node development

- Development must be in C/C++ language
- All the LoRaWAN sensors/actuators must use OTAA enrolment
- Use end-node to measure temperature and humidity critical points. Measure every 2 minutes (around 15 minutes could be a better option for a real deployment).
- For end-node, an *over-temperature indicator*? Is required: a local indicator (LED_BUILTIN or similar) is turned on when the temperature exceeds a given user-selectable point. Also, the transmission policy could be updated immediately when this situation happens.
- For end-node Cayenne LPP format to encode the payload is suggested
- The end node can be the RAK3172 or any other node previously agreed with the professor.
- For RAK3172, you can use a stand-alone radio modem slave or master of the system approach.
- Antes de ponerse como loco a desarrollar esto, mirarse muy bien qué cosas interesantes aportan los dispositivos comerciales (por ejemplo, los que tenéis a continuación).
- Consider to add extra characteristics (below ideas storm):
 - o Low-power
 - o Data Logging capability
 - o Timestamping
 - o E-ink capability
 - o Special interfaces (mod-bus, RS-485, CAN, ...)
 - o ???

For end-node commercial products

- Outdoor temperature and relative humidity are measured using a Dragino S31B-LB sensor every XX minutes



Product

guide:

http://wiki.dragino.com/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/S31-LB_S31B-LB/

MQTT access to uplink data:

- Username: wimosa-albarracin-trh-drgn-app@ttm
- Password:
 - o Name: mqtt-password-key-1733478724826
 - o Expiry date: no le he puesto nada
 - o Rights: read application traffic
 - o Value:
NNSXS.V4TWHJ4DUC5IIX6IYMDWRZ2552YDDNUZTM7WMAQ.DOWDEAM4AV7MTPAS
EBAZ73S7SVVJBWHD7CIZG76YYUEKZ6CONCEQ

- Indoor temperature and relative humidity are measured using a Milesight EM320-TH-868M sensor.



Product

page:

<https://www.milesight.com/iot/product/lorawan-sensor/em320-th>

Check TTN app ID and MQTT credentials in the subject's slides.

MQTT access to uplink data:

- Username: itaca-mlsght-em320-th-app@ttn
- End device ID: eui-24e124785d441512
- Password:
 - Name: mqtt-password-key-1733479335091
 - Expiry date: no le he puesto nada
 - Rights: read application traffic
 - Value:
NNSXS.6L2V2SVZRRVORN27QWX2NUFT5WHX6F6SSW3YBHY.UCNIYV5ZG357S
AVT5AMHEZKDBOEYPUSKUAAZT2BNOBTIVYWG5F6CA
- The measurement of all these sensors is provided through the corresponding topics in TTN community edition. Note that this LNS is not adequate for production real cases.
- Historical data on these sensors is available at the request of the professor.

Integration

- Use the MQTT protocol to connect to TTN and the user application.
- You will probably need to create a “wrapper” to convert the format between MQTT-TTN v3 and the MQTT format utilised in your app (uplink). You must decide on the right approach.
- Other protocols are feasible contacting previously the professor.

Application/dashboard

- Create a cool dashboard using your elected technology to show the values of the sensors and other goodies.
- You can use any technology or IoT stack (TIG, TICK, ELK, ...), PaaS, virtual machine on a cloud, cloud-managed services, etc.
- Show in some way the nodes that are not working correctly (timeout).
- Create all the pathways to stop the alarm indicator of the end device (downlink).
- Store data and show data in a cool way.
- Etc.

4. Submission

Submit the following results to the Poliformat task “Proyecto RIS”

- Report in English or Spanish on the work carried out. Free format (but graded). Please, at least cover table of contents and references
- Share your work by providing the access credentials in the report or the source code, if available. You must use English for the comments of the code
- Slides to defend work at a public event. Either in English or Spanish.
- AI can be utilised in any way (coding, setting up, reporting, slides ... but you must report which tools are employed and in which way). Not using AI doesn't reduce your marks.
- All this must be submitted in the task. No external sources or links are allowed.

The Poliformat task will allow you to resubmit the work, so test in advance to see if the platform will admit your draft submission because of size limitations.

5. Public event

Your work will be presented to your classmates in the classroom:

- 15 minutes maximum for the submitted slides. Penalties will be imposed if this time is exceeded.
- 5 minutes maximum for questions of the assistants.