Dendrometer Overview

We saw the need for a small LoRaWAN-Node that could measure a dendrometer like the DC4 from Ecomatik. Because of a planned journey to Tambopata, one of the tower sites where a need for dendrometers is, the time to develop the first prototype was limited. So these were the given goals:

- Only as big as it really needs to be
- Compatible with the Ecomatik DC4
- LoRaWAN
- Use as many off-the-shelf parts as possible

After 5 working days (not consecutive) we had a prototype ready. The first test was made at Eric Cosio's lab at the PUCP in Lima.

Fig. 1

The prototype consists of a custom-made PCB and housing by Spelsberg which already had the cable gland preinstalled.

The LoRaWAN part is handled by the Heltec CubeCell Module which includes both a microcontroller for running the code and the SX1262, needed for LoRaWAN. To accurately measure the dendrometer, a 16-bit analog-to-digital converter is used. This enables the node to read the dendrometer with a resolution of 1.6 µm. The accuracy and readings of such ICs can shift when the temperature changes. That's why an accurate temperature sensor is included on the PCB. The idea is to be able to see a shift in the dendrometer reading while also seeing the temperature change. It is to be researched if it is possible to cancel out any temperature effect in post-processing. The whole node is powered by one LS17330. It is the biggest battery that fits in the case. A bigger one would make it pretty difficult to get the cables of the dendrometer in.

Unfortunately, there are no measurements yet on power consumption. But we are guessing that the node would hold up for at least one or two years on one battery.

Fig. 2

As a reference: In photo 2 you can see the dendrometer logger that was used before. It was quite big and heavy and the main disadvantage is that the battery lasted only 2 to 3 months. Especially in remote locations, this is really hard to justify. The only advantage it currently has is that multiple dendrometers could be attached. But once the new LoRaWAN node proves itself in the field, a slightly bigger version could be developed which could accommodate multiple dendrometers if needed.

There was only one f the old loggers installed at the Tambopata tower location. This got replaced by one of the new LoRaWAN nodes. The gathered information can be found here: Dendrometer Dashboard

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