OSES Assignment #1

Specification

An embedded system shall be developed to supervise a Weather Station, which provides the following instruments:

REQ#1: *Wind Anemometer*, it operates in the range 0 to 60 m/s. The wind anemometer produces as output a digital square waveform with output frequency linearly proportional to the wind speed, where 1 Hz is equivalent to 0.75 m/s, thus 0 m/s = 0 Hz, and 60 m/s = 80 Hz;

REQ#2: *Rain Sensor*, it operates in the range 0 to 20 mm. The Rain Sensor produces as output an analog voltage from 0 to 3.3 V linearly proportional to the sensed rain level, where 0 mm = 0 V and 20 mm = 3.3 V;

REQ#3: *Thermometer*, it operates in the range -20˚C to +60˚C. The thermometer produces as output an analog voltage from 0 to 3.3 V linearly proportional to the sensed temperature, where -20˚C = 0V, and +60˚C = 3.3 V.

REQ#4: The Weather Station samples the Wind Anemometer every second, while the Rain Sensor and the Thermometer every 60 seconds.

REQ#5: The acquired data are transmitted every second to a serial port configured as 1152008N1 using the following format:

<timestamp> <wind speed [m/s]> <rain [mm]> <temp [C]>

As an example, see the following log:

```
<0> <20 [m/s]> <0 [mm]> <15 [C]>
<1> <15 [m/s]> <0 [mm]> <13 [C]>
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REQ#6: The embedded system shall be implemented using FRDM K64F and Micrium µC/OS-III.

REQ#7: The serial port shall be mapped to the virtual serial port of the FRDM K64F.

REQ#8 (optional): The Weather Station uses the accelerometer available on the FRDM K64F to detect earthquakes. The Weather Station samples the accelerometer every second, and transmits the data (accelerations in [g] over X/Y/Z axes) through the serial port along with the other sensed data.

REQ#9 (optional): The Weather Station sends the acquired data through the Ethernet port of the FRDM K64F instead of the serial port.

Requirements

Specifications from REQ#1 to REQ#7 shall be implemented. The evaluation achievable with this implementation is up to 27/33.

Implementing the specification REQ#8 will allows up to 3 additional points.

Implementing the specification REQ#9 will allows up to 3 additional points.

The deadline for delivering the assignment is set to December 22nd, 2017 at 24.00.

The delivery consists of:

- ZIP file loaded on the Portale della didattica containing the workspace with the Micrium project. Please perform a clean project operation to remove temporary, and binary files before creating the ZIP (this will allow reducing the ZIP file size);
- A pdf file loaded on Portale della didattica describing the developed project (max 5 pages, including cover page).

In case other file formats are used (e.g., 7z, ARJ, TAR, GZ, DOC, DOCX, TXT, RTF, …), the assignment will be rejected.

In case of late delivery, the assignment will be rejected.

Published in Torino on November 18th, 2017.