OSES LAB #5 – Chat with little Hal

Please read the assignment description carefully

Purpose of the lab

In this lab you will solve a simple asynchronous serial communication puzzle.

Deliverables and deadlines

You shall provide a report (pdf file only) where you describe the oil file and the code you implemented. The output produced by your solution shall also be included. Include in the report at least one SimulIDE screenshot and oscilloscope trace that clearly shows the input/output signals and data discussed in the following.

The report shall be uploaded to the *portale della didattica* using the *Elaborati* section.
The report shall be provided by December 20, 2024, 18:00.

Important note: You will need SimulIDE-1.0.0-SR1 for this lab. Older versions do not support multiple CPUs in the same project.

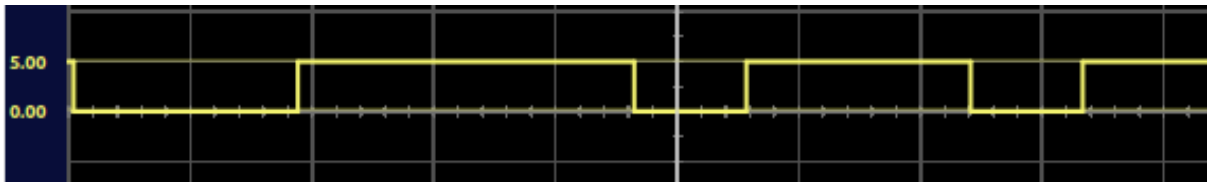
Exercise #1 (Arduino Uno on SimulIDE)

Little Hal, a distant relative of the more famous HAL 9000, is coming to town! Hal wants to make new friends and is saying something on GPIO pin 13.

- Create a new SimulIDE project with two Arduino Uno boards, H and L.
- Upload the hal_bundle.hex file to board H.
- Write your own application that runs on board L.
- Connect the boards appropriately to give board L access to board H's GPIO pin 13.
- Your application must listen to what Hal is saying and print it out on the serial console, using only software and the signal sampled by a digital GPIO input.

Hints:

- Next to Hal's pin 13, you find a scribbled note that says: "NRZ, 110, N, 8, 1". What could it possibly mean?
- Hal talks like this:



  This waveform represents the number 110_{10} ($6E_{16}$).
  In ASCII, this corresponds to a single character, the lowercase letter 'n'.
- The ASCII code defines a mapping between integers (in the range 0…127) and characters. You can assign an integer to a `char` variable. When you `Serial.print()` the variable, the corresponding character is printed.
  For instance, if you do: `char c = 110; Serial.print(c);` you get `n` on the serial console.

Bonus:

- Besides talking, Hal listens, too. Send a message to Hal's GPIO pin 12 and show how Hal reacts.