OSES LAB #5 – Help 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

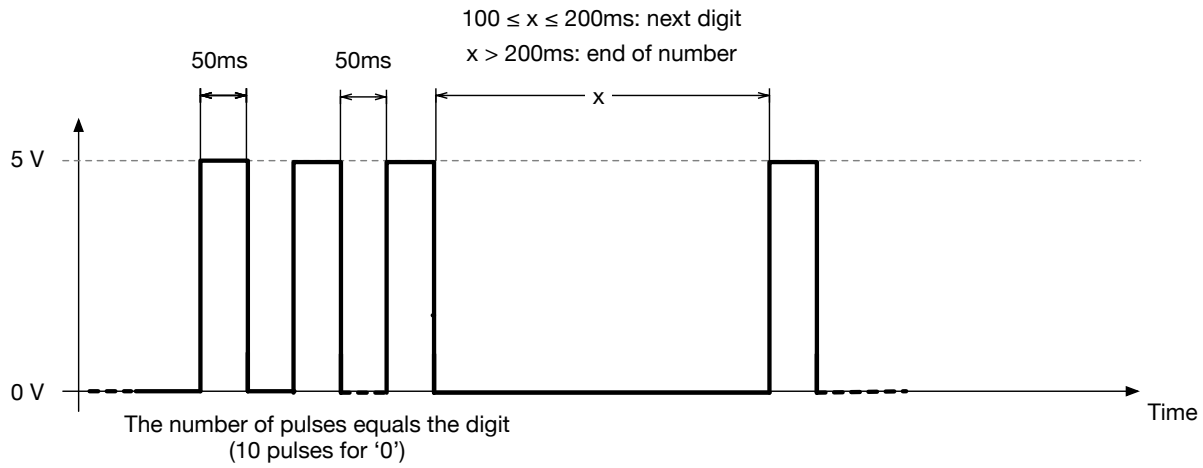
You must provide a report (pdf file only) where you describe the oil file and the code you implemented. The output produced by your solution must also be included. Include in the report at least one SimulIDE screenshot and oscilloscope trace that clearly shows the input/output signals and data discussed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

The report must be uploaded to the *portale della didattica* using the *Elaborati* section by December 19, 2025, 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 (and way nicer) relative of the more famous HAL 9000, had a lot of fun talking with some students last year and now wants to call them on the phone to keep in touch. Unfortunately, Hal is unfamiliar with the terrestrial calendar and is using a signaling standard that dates back to the early 20th century. Hal dials numbers like this:



Help Hal by decoding and printing out the phone numbers that it is dialing 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 dialing and print out the phone numbers on the serial console, using only software and the signal sampled by a digital GPIO input. Print '/' at the end of each phone number.

Hints:

- The waveform above corresponds to phone number '31'.

Bonus:

- Hal does not always follow the standard to the letter. Print a '*' on the serial console after each digit in which Hal made a pulse width error that exceeds 20% of the nominal value, 50ms.