

# Lab n° 3

## Real-Time systems [ELEC-H-410]

### CAN network overview

2019–2020

## Purpose

This lab aims at giving a short overview of the CAN network. You will first study the CAN features then write an application sending and receiving messages.

### Useful documentation:

- Official FreeRTOS documentation: [https://www.freertos.org/Documentation/RTOS\\_book.html](https://www.freertos.org/Documentation/RTOS_book.html)
- Getting Started with PSoC 5LP: <https://www.cypress.com/file/41436/download>
- Video example on how to use the PSoC: <https://www.cypress.com/video-library/PSoC>
- The extension board schematics: [Extension\\_PSoC.pdf](#)
- Getting Started with CAN on PSoC 5LP: [Getting\\_Started\\_with\\_CAN.pdf](#)

## 1 CAN and PSoC

Plug the CAN network yellow twisted pair in the DB9 connector of the PSoC extension Board. You will program the CAN peripheral of the PSoC to receive messages transmitted continuously by a PC connected to the network, then to send message to that PC.

### 1.1 Read the manual,...

Open the [Getting\\_Started\\_with\\_CAN.pdf](#) file and read the CAN Basics section.

**Exercise 1.** Describe the content of a CAN frame.

**Exercise 2.** If you watch closely the schematics of the extension board ([Extension\\_PSoC.pdf](#)) you will notice that the PSoC is not directly connected to the DB9 connector. What component is required to make that connection and what does it do ?

Open the project `can_rx`.

A node in the lab connected to the CAN network is sending a message. This project is designed to print the message to the LCD.

**Exercise 3.** In the `TopDesign` tab, open the configuration window of the the CAN instance.

- Go to the `Receive Buffers` tab and use the datasheet to understand how those buffers are configured.
- In the `main.c` you have an example of how to handle received messages. What is the `CAN_BUF_SR_REG` variable and how is it used here ? You might want to have a look here <https://community.cypress.com/docs/DOC-15595>.

## 1.2 ...and use your knowledge

Now that you saw how to receive and transmit messages through CAN network, let's apply what you learned.

In the CAN network of the lab, one node is programmed to send periodic messages on with IDs 0x042, 0x043 and 0x044.

Keep the project `can_rx` open.

**Exercise 4.** Adapt the code to print the content of the three messages whenever a message is received.

Open the project `can_tx`.

This project consist in sending a message with the IDs 0x045 every 2 seconds.

**Exercise 5.** Adapt the project so that one time out of two it sends a second message with IDs 0x046. The message content should be composed of as many byte as there members in your group and each byte should be the ascii code the first letter in each member's name.