LAB   N°02
Arduino Communications
GPIO-Sensors-Actuators

ÉCOLE NATIONALE
SUPÉRIEURE
D'INFORMATIQUE

I. THEORY: (01 pages max)

A. Explain the use and connection of:
1. Pushbutton (digital input).
2. Explain the de-bounce circuit, is it necessary?
3. Introduce Pull-Up and Pull-Down resistance.

B. Connection of a light sensor (Analog GPIO):
1. Introduction of the light sensor.
2. How to use the Arduino serial console as a display.
3. Arduino Analog GPIO Input Output
4. Configure a GPIO line as an analog Input and output.

II. ACTIVITY:

1-PART-01(3 pages max)

A. Connection of a light sensor (Analog):
- Configure a GPIO line as an analog input and use a light sensor LDR to display the light value in a terminal. (Provide necessary explanations.)

B. Connection of a push button (Digital): (Provide necessary explanations.)
- Configure a GPIO line as a digital input using a Pullup and/or pull-down resistance. (Explain and show the difference). You can experiment a virtual pull-up also.
- Configure a GPIO line as a digital input and display the button state: When the push button is pressed, display that the button has been **pressed** or **released** in the console.

2-PART-02 (3 pages max)
- Connect a **de-bounce circuit** **(capacitor)** and test again: Is the de-bounce circuit necessary? Show and explain by examples showing the problem. (See Fig.1.).

C. Using an LED with LDR and Pushbutton:
- Use a LED with the previous manipulations to turn it on (detail and explain all the programs and libraries used):
  1. From a light threshold;
  2. By pressing the button (test: by pressing once and twice ; test all combinations with the sensor, experiment the role of the de-bounce circuit).
- Imagine a scheme for a smart control of streetlights for public use.
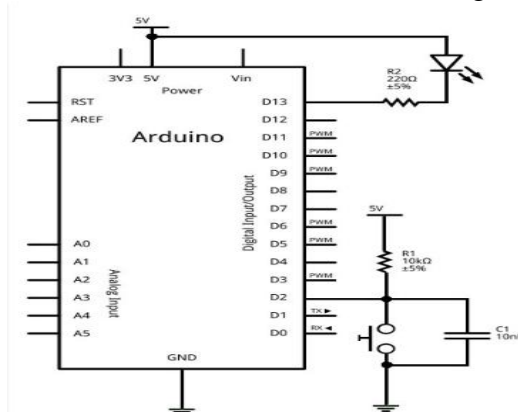

Fig.1: Pushbutton with a de-bounce circuit.

III. CONCLUSION (very important, and use your equivalent style of writing and speaking)