INSTITUTO POLITÉCNICO DE BRAGANÇA
Escola Superior de Tecnologia e Gestão

Mobile Communications
Informatics Eng.

Practical Work #1
Arduino: Basic Concepts

Teacher: Rui Fernandes

Note 1: It is advisable to consult the *"Reference"* in http://arduino.cc

The objective of this work is to implement some arduino *sketches* that use the basic input/output commands for the analog and digital pins of the arduino. It also presents the first contact with the use of cellular communications technology.

1. Consider a range of values defined by the number of bits (3 a 7) that represent the values of that range. Implement a *sketch* that:
   (1) sequentially sweeps the numbers of the range, alternating between the ascending and descending sweep of the values
   (2) changes the state of a number of LEDs, equal to the number of *bits*, in order to show the binary representation of the present number of the sequence (*bit* is 1 — LED ON)
   (3) sends to the screen the current number and its binary representation

(4) controls the time between consecutive numbers from an analog input. The maximum time between consecutive numbers should be 2 seconds

(5) allows the user to choose the number of *bits*, the initial number and the initial direction (ascending/descending) of the sweep inicial do varrimento. Default values: 5 *bit*, 0, ascending.

(6) allows a *push-button* to change the sweep direction, when pressed

Example, without initial definitions and *push-button*, for the range of values defined by 3 *bit*: 0, 1, 2, 3, 4, 5, 6, 7, 6, 5, 4, 3, 2, 1, 0, 1, 2, ...

2. Consider the following changes to the description of problem 1. and develop the *sketch* that implements these changes:

(1) it is now possible to control the system by sending/receiving SMSs. This controls allows to define:

- the current number
- the sweep direction
- the change of the sweep direction
- the time between consecutive numbers
- the number of *bits* for the range representation

Important notes: While no SMS is received, the system should behave exactly as in problem 1. The control through SMSs is more important than any other control, however, it should be possible to terminate this control.

3. Implement a *sketch* that reads two real values entered by the user and that executes arithmetic operations with them:

(1) implement the addition, subtraction, multiplication, division and power of the two values. Present all possibilities of different outcomes.

(2) inform the user of the results.

Note: The *sketch* should wait for the user to input the next 2 values, to perform again the arithmetic operations with these new values.