Assignment week 2.3, 2.4: Graphical Digital Clock with (Audio and Visual effects optional)

Requirements

- A laptop or desktop computer
- A Cerebot MX4cK board
- 2 USB A to micro B cable (can also be done with 1)
- MPLAB IDE v8.83 and MPLAB C32 C Compiler v2.02B
- Our N@Tschool entry (will be provided if you are so far)
- The PmodCLP LCD display by Digilent Inc.

Objectives

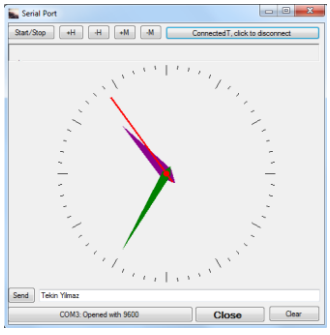
- Take a structured approach to realize and test your implementation.
- Use timers and interrupts to generate the timing signal to display a digital clock.
- Learn how to handle input signals in an embedded systems.
- Apply a debounce algorithm for button debouncing.
- Apply the knowledge of Software Design to practice.
- Learn how to use "ready to use methods".

Introduction

The purpose of the Graphical Clock is to acquire the basic programming skills to develop a simple embedded application running on a Cerebot board and managing simple UART/USB communication. The specification is as follows:

- The clock must be programmed on the Cerebot,
- The visualisation is on the PC/Laptop,
- The clock can be designed as a multifunction clock (like audio effects, alarm etc..) (optional),
- The clock must locally be configured via buttons
- The clock can also be controlled remotely via remote commands from a PC/Laptop connected using UART to the Cerebot board (optional),
- The clock must have at least Time display mode and Set Time mode.

The PC side and LCD of the Pmode could be something like this:



In this experiment you will develop the basic modules required for the clock. Please be aware that you are using all of the knowledge that you acquired up to now including the state machine concept from your digital design course, modular techniques and data typing from your Software Design course.

References

[1] PIC32MX Family Reference Manual, Section 12. I/O Ports
Microchip Technology, Inc., 2011
URL: http://ww1.microchip.com/downloads/en/DeviceDoc/61120E.pdf