CS 362 Lab 6 Spring 2024

Learning Goals:

- Be able to take in user input from a computer (the serial monitor) and have your Arduino respond appropriately.
- Verify you have the latest libraries and learn how to install new ones if needed.

Lab: Due Monday 2/26/24 at your registered lab time.

Materials

1x Arduino
1x Breadboard
1x 16x2 LCD
1x 220 Ohm resistor
1x Potentiometer
Wires

Lab

Have your Arduino get the date(mm/dd/yyyy) & time(hh:mm:ss) from the user via the serial monitor in the Arduino Development IDE software.

- Date includes day, month and year
- Time includes hour, minutes and seconds (hours are given using a 24 hour clock)

You circuit/program should:

- Display a single prompt on the serial monitor,
- Get input of date and time from user via the serial monitor
- When data and time is entered:
    - Perform error checking for input that doesn't make sense (hours not in range of 0 to 23, minutes not in range 0 to 59, month not in range of 1 to 12, etc)
    - Verify data for leap years
    - If the user inputs an invalid date or time, your program must give error messages to the serial monitor
    - If entered date/time is valid, set the Arduino to contain the (valid) date and time entered by the user.
    - prompt for another date/time on the serial monitor with another single prompt
- Keep an accurate (continually updating) date and time shown on 16x2 display (you must the time library function to keep accurate time)
- The Arduino should always be checking if a new date/time value is available to be read
    - Your program must be able to update to a new date/time without restarting the Arduino
    - The initial date/time can use the system default time (or some other time you pick)

The LCD must display the date on the top row in the format 'mm/dd/yyyy', and the time on the bottom row of the screen in the format 'hh:mm:ss'. The time should continually update to always display the current time. The format string functionality from Lab 3 will be useful for this.

Here is the formula for leap year calculations for you to implement:
https://www.mathsisfun.com/leap-years.html

References on using Serial to Communicate with your Computer:
https://www.arduino.cc/reference/en/language/functions/communication/serial/
https://www.arduino.cc/reference/en/language/functions/communication/serial/available/
https://www.arduino.cc/reference/en/language/functions/communication/serial/read/
https://www.arduino.cc/reference/en/language/functions/communication/serial/readbytesuntil/

To open the Serial Monitor on your computer:

- click on the "Tools" menu item in the Arduino Development IDE
- then click on the "Serial Monitor"

To send input from the Serial Monitor on your computer:

- set the cursor to the input field on the top line in the Serial Monitor window
- type in some text
- click the Send Button to the left of the input field or type in Enter

Date/Time library:

- You may need to install the Time Library: https://www.arduino.cc/en/Guide/Libraries
- Time Library Discussion: https://playground.arduino.cc/Code/Time
- Another Time Library: https://www.arduino.cc/en/Reference/CurieTime

Notes

You may need to install the time library. In the Arduino IDE, go to Tools -> Manage Libraries..., in the top right search for 'timelib', and install the library called 'Time' by Paul Stoffregen. Remember to "include <TimeLib.h>" in your program to use the library.

Updated Time library:

- Github : https://github.com/PaulStoffregen/Time
- Using the library : http://www.pjrc.com/teensy/td_libs_Time.html

Inputs that you should be testing:

- valid dates and times
- invalid dates and times
- times right before the end of a day/month (4/30/24 @ 23:59:45) to show change of day/month
- times right before the end of a year (12/31/23 @ 23:59:45) to show change of day/year
- times right before leap day (2/28/24 @ 23:59:45) to show inclusion of leap day

Late Policy

- Lateness is determined by the time the lab is demonstrated, not when the .ino file is submitted.
- Labs that are not demonstrated get a score of 0.
    - -50% for no demonstration
    - -50% for being late
- Late Submission 1
    - Demonstrated before 11:59pm Thursday after Lab Due Date
    - 25% Penalty
- Late submission 2
    - Demonstrated between Friday and Monday after Lab Due Date
    - 50% Penalty

What should I include with my .ino Code File?

As with any code file, it should be written in Good Coding Style: in a manner that will help other people read and understand the intent, purpose, operation of the code. So your code must include:

- Name the .ino file with your NetId and Lab Number
    - I.E. something like: ptroy4Lab2.ino
- Header Comments (including the following)
    - // FirstName LastName, UIN and NetID
    - // Lab x - Title
    - // Description - what is this code supposed to do?
    - // Include any assumptions you may have made, what do you expect from the hardware, pinouts, particular arduino versions, etc.
    - // References - where did you find code snippets, ideas, inspirations? if no references used say: "no references used"
- Code is well documented/formatted with comments, indentations, and descriptive variable names
- Actual code - the functions in the cpp/ino file

Academic Integrity Guidelines:

You may use any resources linked from this lab, or posted by the professor or TAs on piazza/class web page/etc. You should not look at any other internet resources for this. This is an individual assignment, and should be completed on your own. You should not show anyone your code, or look at anyone else's code.