

In this Project, you will create a basic melody player for Arduino that plays audio digital tones with different frequencies on a Piezo (an electronic device that can play tones). The project will present on the LCD a list of melodies to the user, so that the user can select melody to play. The user can use the keypad to switch between the melodies, play and pause a specific melody.

Building the melody player will involve using **DuinOS** to manage multitasking of the tone playing, simple visualization of the melody on LCD and scanning keypad at the same time. It'll also include using all the features of the **DuinOS** to manage sharing data among those multiple tasks.

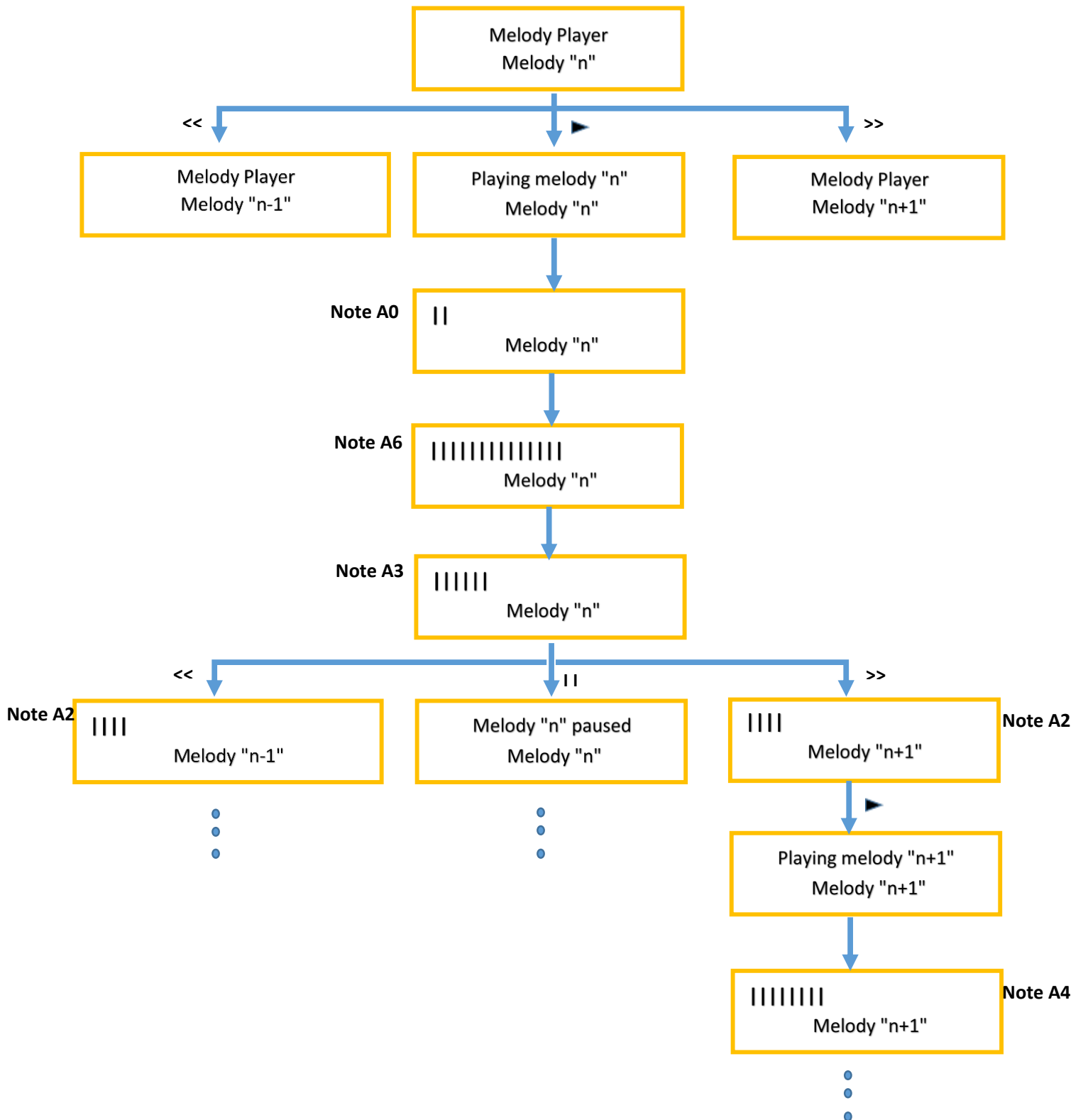
## HW Components Required:

- 16×2 alphanumeric LCD.
- 4×3 or 4×4 custom keypad.
- Piezo speaker.
- Wires, potentiometer.

## Sample Scenario Flow:

Scenario Assumptions:

- Melody "n" notes: A0, A6, A3, A2... (A0: minimum frequency, A7: maximum frequency)  
Melody "n+1" notes: A4...
- >> : keypad next button.
- << : keypad previous button.
- ||▶ : keypad play/stop button.



### Helper References:

- Arduino tone player library  
<http://www.arduino.cc/en/reference/tone>
- Creating custom character on LCD  
<http://www.arduino.cc/en/Reference/LiquidCrystalCreateChar>
- Arduino PWM  
<http://www.arduino.cc/en/Tutorial/PWM>

### Bonus:

One or more of the following:

- Melody player:
  - Update of the project to play not only digital tones, but also analog melodies (you can use PWM technique with changing the frequency of generated signal).
  - Add the feature of recording new melody and adding it to the stored melodies.
- Wav player:
  - Update the project to play .wav sounds. You'll need to interact with a SD-card using SD Card library where the wav sound files are stored.
- Every use of DuinOS features (queues, semaphore...) when managing and communicating between tasks is an added feature that will be counted as a bonus.

### Deliverables:

- A complete hardwired working circuit.
- CD contacting:
  - A documentation with a diagram describing the full connections of your circuit: Arduino board, LCD, Keypad, Piezo connections.
  - SW copy code of your project.
  - Proteus file of the circuit connected and working.
  - Screencast of your project in action.

**Deadline:** on delivery day (practical exam)

**Saturday, 09 May, 2015.**

**Good luck☺**