

Lab 7: Music Player

Due: 18:30, November 22, 2016

Objectives

- Be familiar with audio peripheral.
- Be familiar with FSM design.

Action Item

Design a music player that is able to play **eight bars (measures)** of 櫻桃小丸子 and **four bars (measures)** of 哆啦 A 夢. It has the following functions:

- Start/resume or pause the playing.
- Stop the playing.
- Switch the music.
- Repeat or play the music once.
- Play the music at one of 4 speed levels.
- Play the music at one of 4 quality levels.
- Mute the volume.

It uses the following I/O parts:

button BTNC: **Stop**

button BTNU: **Play/Pause**

switch SW0~1: **Speed**

switch SW2~3: **Quality**

switch SW13: **Mute**

switch SW14: **Repeat**

switch SW15: **Music**

Pmod JB1~6: **PmodAMP2**

The functions of the I/O parts are explained below:

- When the player is powered on, it should not play any tone until the **Play/Pause** button is pressed.
- By pressing the **Play/Pause** button, the music can be paused while it is playing, and it can also be resumed from the same point after pressing the **Play/Pause** button again.
- Pressing the **Stop** button will terminate the music. And the

music will restart from the beginning after pressing the **Play/Pause** button.

- When the **Music** switch is at the “down” position, the music player will play 櫻桃小丸子. When the **Music** switch is at the “up” position, the music player will play 哆啦 A 夢.
- The music will repeat as it reaches the end of the music while the **Repeat** switch is at the “up” position; otherwise, it will stop playing when reaching the end of the music.
- When the **Mute** switch is at the “up” position, the volume will be zero.
- The functions of the **Speed** and **Quality** switches are shown in the following table:

Speed	1x	0.5x	1.5x	2x
SW1			●	●
SW0		●		●
Quality	25%	50%	75%	100%
SW3			●	●
SW2		●		●

p.s. [●] means the switch is at the “up” position;

[empty] means the switch is at the “down” position.

Hint:

You can use a FSM (Finite State Machine) to model the music player.