

Embedded Systems Design

EECE 4038C, Embedded Systems Design

Ranga Vemuri

Laboratory Assignment – 4

Preparation:

Go through Chapter 8 in “What’s a Microcontroller?” (version 3.0) and perform all the activities described in these chapters on the Basic Stamp 2 HomeWork Board.

Assignment:

Using the knowledge you have gained from these activities, develop the following embedded system using the Basic Stamp 2:

The Last Music Trainer

A music trainer for beginners with the following features is proposed. You are asked to develop a prototype using the Basic Stamp 2.

- The user can select from a menu of 5 RTTTL songs appropriate for short beginner level music lessons. Selection will be done using a pushbutton switch such that each push will start a new song. After 5 button presses, the first song should start again.
- The selected song will be played on a speaker at the default tempo. However, the tempo can be changed using a rotary knob control such that the speed can be anywhere from a fourth of the default to four times the default. (Use a potentiometer based circuitry.)
- Each note being played is displayed on a 7-segment display for the duration it is played. Use the decimal point for # notes. Use additional LEDs of different colors to display the octave of the note.
- After playing a song the system repeats it unless the button is pressed.



Remember all the precautions discussed in the class and the current source/sink limitations of the microcontroller.

Include photographs of your circuit setups in your report. Submit the PBASE programs as separate files.

In addition note that,

1. Your report must include a flow chart for your solution.
2. You must draw the circuit diagram and include a photograph of your circuit setup. You must describe the design decisions made during the circuit design process and any other alternative designs you have considered.
3. Your code must be well documented and must correspond to your flow chart.
4. You must use macros and subroutines wherever appropriate to improve modularity and maintainability of the code.
5. You must use a good template design for your program, following the coding practices you have noticed in your reading assignments.
6. You must discuss the algorithmic, circuit design and programming choices you have made while developing this solution.