Embedded System Final Project Proposal - Tune Trainer

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Introduction (motivation, functionality, etc.)

This proposal aims to build a tune trainer, which trains the user to identify certain note or harmony. Tune training is essential for any musician (maybe except for percussions), as players in orchestras must listen to each other's pitch in order to adjust their own. Based on my observation, many amateur orchestras have the problem of being out of tune. Hence the proposal aims to build a simple tune trainer for people who wish to improve their accuracy of identifying notes and harmonies.

There will be 3 buzzers used, to play a triad (三和弦). The buzzers will play the harmony for 3 seconds, and after the sound ends, the user will have to identify the 3 notes (from A to G) that composed the triad using a keypad. The input answer will be showed on LCD. If the answer is correct, the RGB will show green; if the answer is incorrect, the RGB will show red; if the user wishes to hear the triad again, input #. The difficulty can be changed by 2 photoresistors: one of them increases difficulty by changing the played harmony from a note to a dyad (兩音和弦) and then to a triad, and vice versa for the other photoresistor. The whole system will start only if the user is within 1 meter of range from the Arduino, otherwise it would be very noisy. The range will be detected by an ultrasonic sensor.

The components you are going to use:

- Buzzer *3 (borrowed 2 from TA)
- LCD
- Keypad
- RGB
- Photoresistors *2
- Ultrasonic sensor