Nikhil Garg
Nikhil Joglekar
EE445L lab 7 report

1. Overview

1.1. Objectives: Why are we doing this project? What is the purpose?

The objectives of this final project are to design, build, test and present a guitar hero type game. We will learn project design and management, as well as integration of multiple parts into an overall system. The goals are to learn, have fun, and win the class competition, in that order.

1.2. Roles and Responsibilities: Who will do what? Who are the clients?

Nikhil Joglekar and Nikhil Garg will be responsible for developing the project. The clients are the TAs, Professor Bard, competition judges, and consumers throughout the world.

1.3. Interactions with Existing Systems: Include this if you are connecting to another board

There will be two boards in this system, the newly designed PCB and the LMS1968. The newly designed PCB will act as the guitar controller and the master control unit of the system. It will receive inputs and set the system state. It will send commands to the LMS1968 through Zigbee wireless. The LMS1968 will receive commands from the new PCB and drive an LCD and sound output based on those commands.

2. Function Description

2.1. Functionality: What will the system do precisely?

Our system will mimic the poll be displayed on the LCD screen, indicating that the operator must input a Strum + Input Key compular video game Guitar Hero, in which a guitar controller is used to strum notes as they appear on a LCD screen. The operator will first see a screen where he or she will be able to chose a song for the system to play. Next, the operator will be presented with a screen to chose level of difficulty of the song. When the operator hits the strum button, the game will start. Color coded orbs wibination at the same time. The system will play a whole song, display the input combinations to the LCD screen, and verify and store operator inputs.

After the song finishes, the LCD will display various statistics about the game (the user's score, accuracy, etc), as well as system high scores.

There must be data structures to hold music, as well as a driver that plays the song when the game

starts. There must be a LCD screen and a LCD screen driver to display note combinations over the time period of the song. There must also be a wireless receiver to receive key inputs from our 2nd LM3S1968, which will have a corresponding transmitter.

On the receiver side, our LCD output will be dealt in the foreground. Our music output will be done in ISRs.
On the transmitter side, our button handling will be handled in ISRs.

2.4. Performance:

The following measures will be used to measure performance. Note that several measures are wholly qualitative.

1. Maximum game/note speed (how quickly we can get notes to stream down the screen) - This measure is determined quantitatively by notes per minute and qualitatively through the difficulty of the game
2. LCD output “prettiness” - How good looking our LCD output looks, qualitatively determined by information content and similarity to a guitar hero game.
3. Sound quality/volume - How nice the sound coming out of the DAC sounds (the number of songs, the volume, implementation of envelope)
4. “Playability” - How smooth the overall system is, and how fun it is to play.

2.5. Usability: Describe the interfaces. Be quantitative if possible.

The printed board will contain 6 large button inputs. When the user is in the middle of gameplay, 5 buttons will be for the notes, as in the image shown below. These five buttons, as below, will be labeled GREEN, RED, YELLOW, BLUE, AND ORANGE. The 6th switch/button will be to mimic a player strumming on the guitar (to indicate that the user wishes to play a note). This strum/button will have 3 settings - not pressed, pressed down, or pressed up.

On the menu, the user will use the 6th button to go up or down and will use the green button to select a song or a setting.

3. Deliverables

3.1. Reports:

The reports for Labs 7 and 11 will be written.

3.2. Outcomes:

Lab 7 deliverables

A) Objectives
    1-page requirements document
B) Hardware Design
    Regular circuit diagram (SCH file)
    PCB layout and three printouts (top, bottom and combined)
C) Software Design
    Include the requirements document (Preparation a)
D) Measurement Data
    Give the estimated current (Procedure d)
    Give the estimated cost (Procedure e)

Lab 11 deliverables

A) Objectives
    2-page requirements document
B) Hardware Design
    Detailed circuit diagram of the system (from Lab 7)
C) Software Design (no software printout in the report)
    Briefly explain how your software works (1/2 page maximum)
D) Measurement Data
    As appropriate for your system. Explain how the data was collected.
E) Analysis and Discussion (1 page maximum)

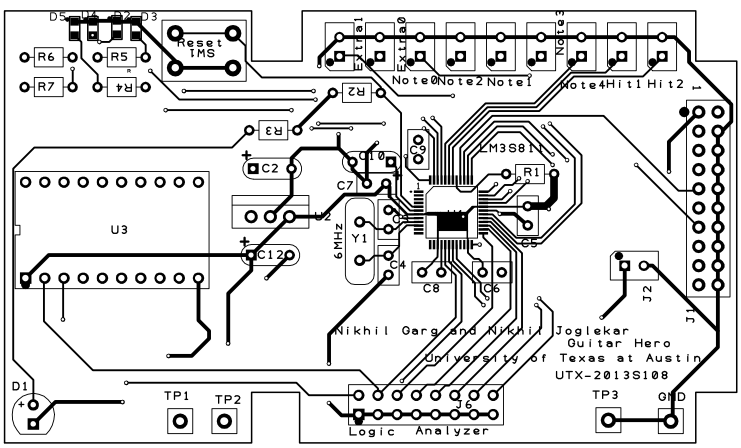
PCB and schematic files are included at the end of the document.

Estimated Current:

The current on the 811 side will be negligible, as everything is either an LED or a switch, besides debugging stuff. For the LED, with resistors of 1.5K, the estimated current is 3.3V/1.5K = 2.2mA. The switch inputs are similarly negligible with internal pull up resistance.
Current required on the 1968 side will be slightly more. Outputting sound will require a similar current requirement as in Lab 5, if we use the same speaker (14 mA), or much higher, externally powered current if we use external speakers. This higher current completely depends on our final speaker and does not factor into choosing a battery since it will be externally powered. The current required for the LCD is estimated to be slightly more than the speaker.

Estimated cost:

We spent $20 on our LCD, our only expense. As shown in the BOM attached at the end, the cost of the other materials received for free amount to about $4. The cost of everything else, also received for free (LEDs, resistors, buttons) are estimated to be no more than $10, for an estimated project cost of $34.



D5 U4 D2 D3
Reset
TMS
R6
R5
R7
R4
R2
R3
Extra1
Extra0
Note0
Note2
Note1
Note3
Note4
Hit1
Hit2
C2
C10
C7
C9
LM3S811
R1
U3
U2
C12
Y1
6MHz
C4
C5
C8
C6
J1
J2
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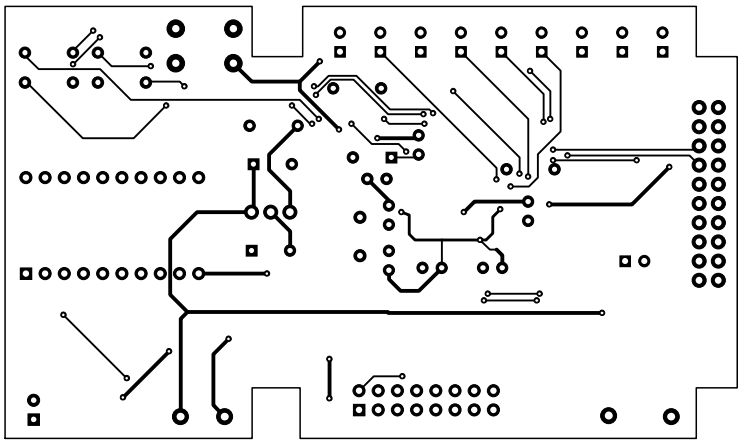
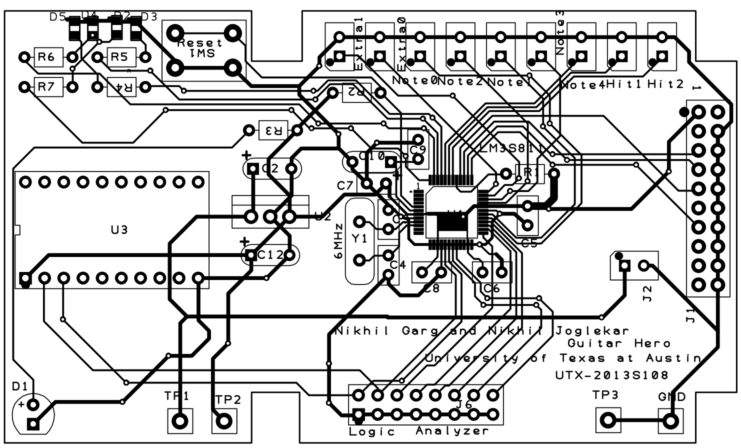
University of Texas at Austin
UTX-2013S108
D1
TP1
TP2
TP3
GND
J6
Logic Analyzer

Battery

+3.3V




Reset
TMS
Extra1
Extra0
Note0
Note2
Note1
Note3
Note4
Hit1
Hit2
LM3S811
U3
U2
Y1
6MHz
J1
J2
J6
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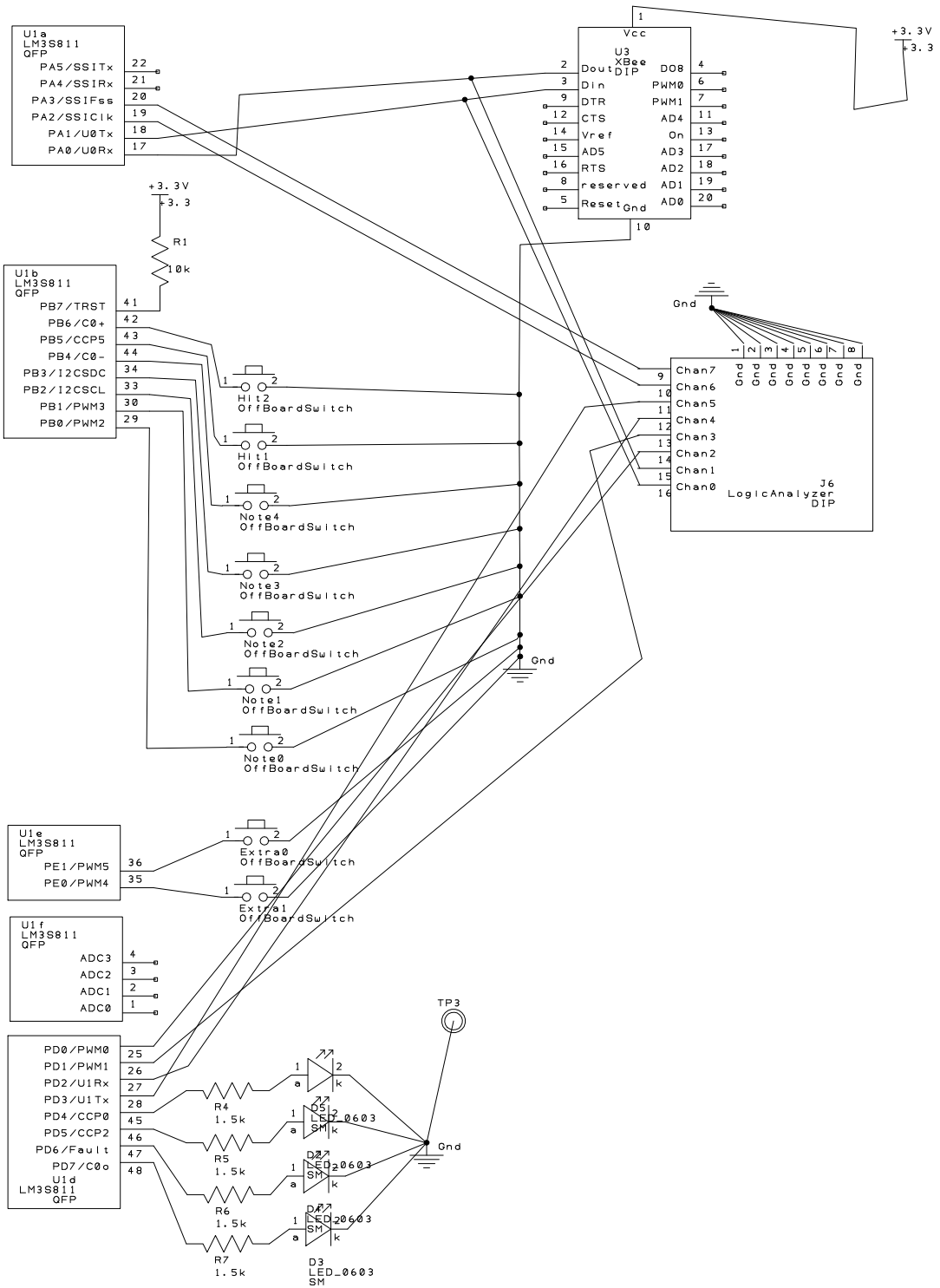

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Schematic Name:	Guitar Hero project		
Name(s):	Nikhil Garg and Nikhil Joglekar		
Date:	10/31/13	**Semester:**	Fall 2013

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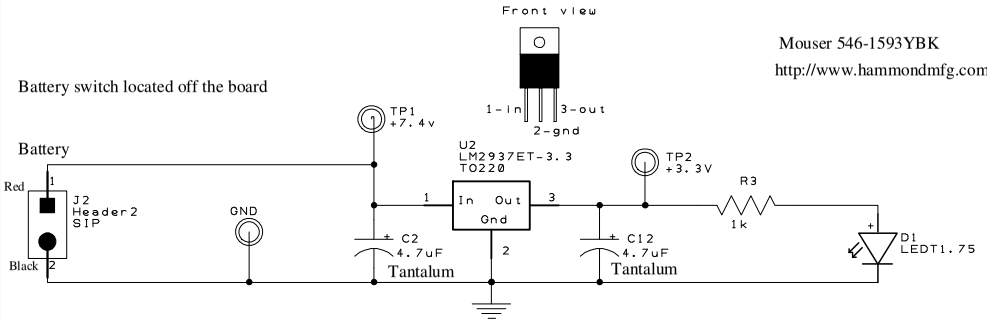

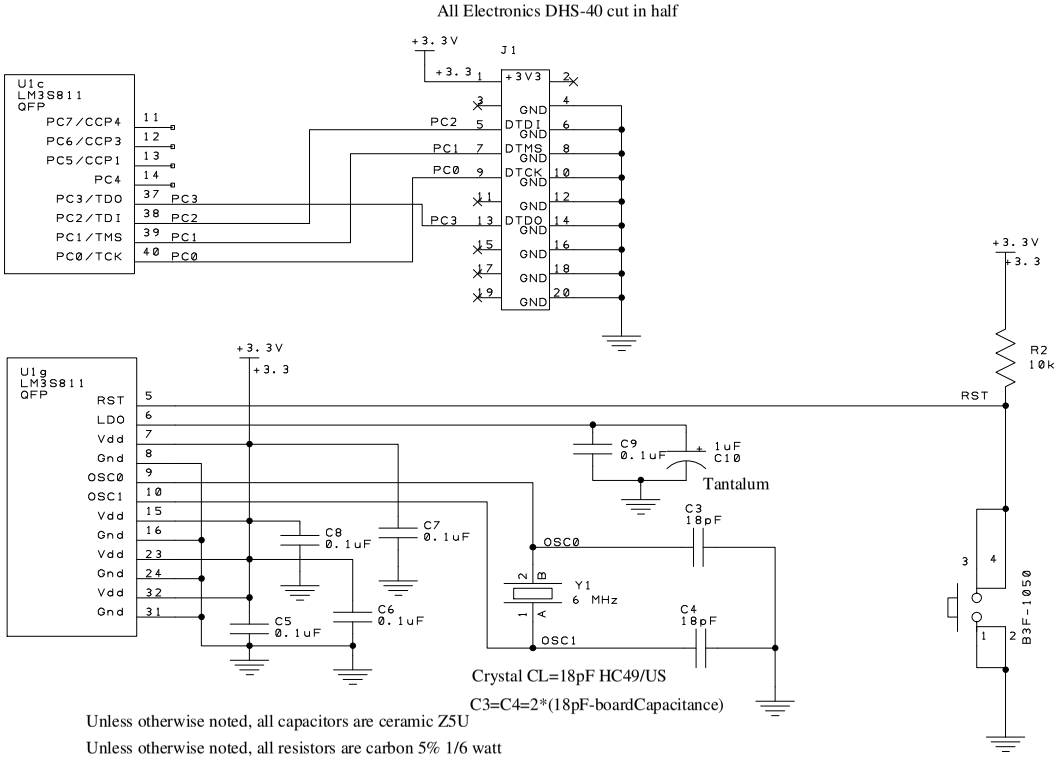

Unless otherwise noted, all capacitors are ceramic Z5U

Unless otherwise noted, all resistors are carbon 5% 1/6 watt

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