Interactive Teaching Guitar

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Faculty Advisor: Dr. Eads
Group Members

- Michael Ullmann
  - Software
- Tim Stansbury
  - Software
- Joseph Molaskey
  - Construction of Guitar
Design a guitar that will help teach the user proper fingering and timing.

- LEDs in the neck will show finger position.
- An LCD screen on the body will show song, measure and tempo information
- Will allow the user to slow song down in order to learn at his or her own speed
Guitar Description

- **Guitar Style:**
  - Telecaster style guitar with bolt on neck.

- **Neck of guitar:**
  - Contains 150 LEDs, one for each fret position
  - 31 Inputs – 6 for the strings, 25 for the frets
  - 25.5” scale length
  - Tigerwood and walnut neck, Cocobolo fret board

- **Body of Guitar:**
  - Cavities for microcontroller, pickups, switches, knobs, buttons and LCD
  - Body wood will be walnut with a maple veneer.
  - Buttons
  - LCD screen
  - Battery pack
Hardware Description

Hardware requirements:
- Microcontroller
  - 36 Programmable DIO ports
  - LCD Port
  - SD Card reader
- LEDs
  - Low-power consumption
  - Small shape
  - Bright output

Hardware chosen:
- EmbeddedArm TS-7260 Single Board Computer w/ SD Card Reader and PC-104 peripheral
  - PC-104 64 DIO board
  - LEDs-100mW, 2.5mm X 2mm dimensions, 50mcd
Software Components:

- **File Input System**
  - Reads in all music files and stores song names

- **Button Program**
  - Allows user to scroll through files on the SD Card.
  - Play/pause/stop capability
  - Forward/back capability
  - Select song tempo

- **LCD Screen Program**
  - Shows the name of the song, tempo, and current measure

- **LED Program**
  - Reads the music file and activates the correct LEDs
File Conversion:

- Music files are of the form .ptb files.
- Music files are converted into .xml files using open-source software named TuxGuitar.
- Converts .xml files to a .txt file that contains only the necessary information.
Current Money Spent: $264.00
- EmbeddedArm 7260: $195.00
- Fret LEDs: $52.80
- Prototype LEDs: $16.20

Future Spending: $239.00
- LCD Screen: $~20.00
- PC-104 64 DIO Board: $69.00
- Construction Materials $~150.00
Plans for Next Semester

- **Guitar Construction**
  - Neck completion by 1/15/09
  - Construction of body with slots for all hardware components by 2/16/09
  - Completion of all construction by 3/1/09

- **Software**
  - Finish the music file reader and integrate with LEDs by 2/2/09
  - Add button capability by 2/20/09
  - Add screen capability by 3/20/09
At this point we are satisfied with our progress, but we still have a lot of work ahead of us.

We have a good idea of what needs to be done next semester as well as good plan to accomplish it.

If we stick to our timeline, we will be able to demo a fully working prototype by E-days.

The Interactive guitar should be a hit once finished and may hold some marketing opportunities.
LED MATRIX SYSTEM

ANODES

CATHODES

FRETS

STRINGS