
# ECE 477 FINAL REVIEW: TEAM #12

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# OUTLINE

- Project Overview
- Block Diagram
- Design Challenges
- Individual Contributions
- Project Demonstration
- Questions

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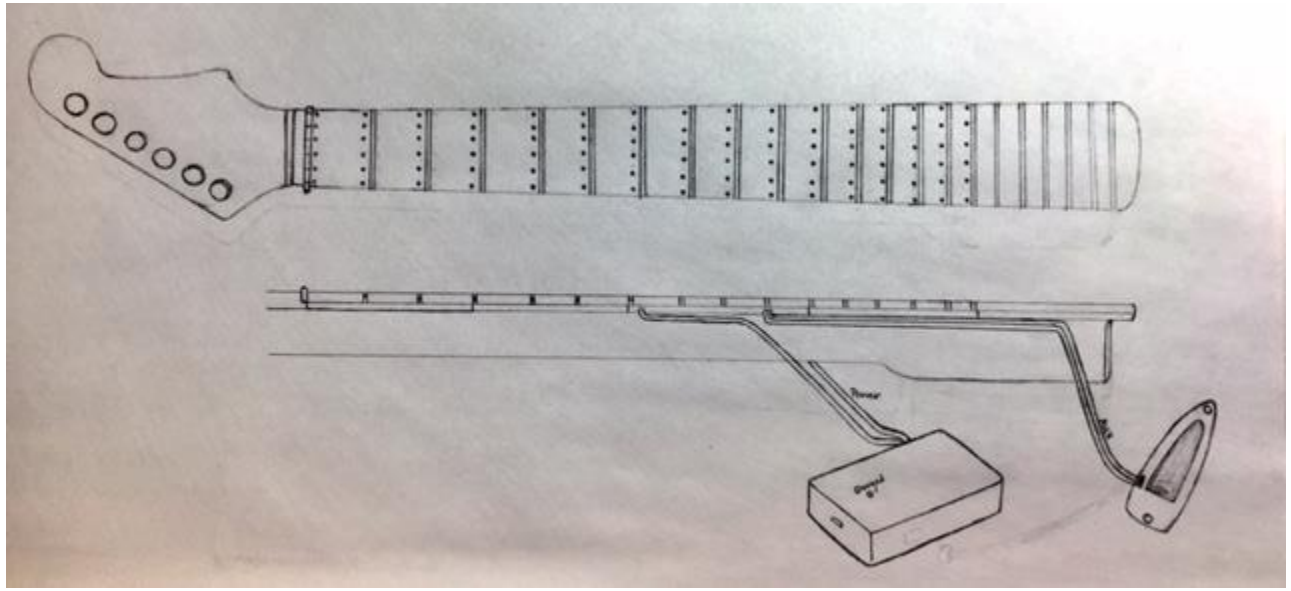
# PROJECT OVERVIEW

- Guitutar is an LED embedded guitar neck that is designed to serve as a supplement to learning how to play the guitar. Once attached, Guitutar will allow for two modes of operation: learning mode and full playback. Learning mode would wait for the user to press the correct notes/chord and wait for a strum. A switch matrix using the guitar's strings and frets serves as the chord/note detection while an amplifier circuit connects to the guitar's pickup and serves as the method of strum detection. Full playback mode will play the full song and light up the chords and notes at the right time.



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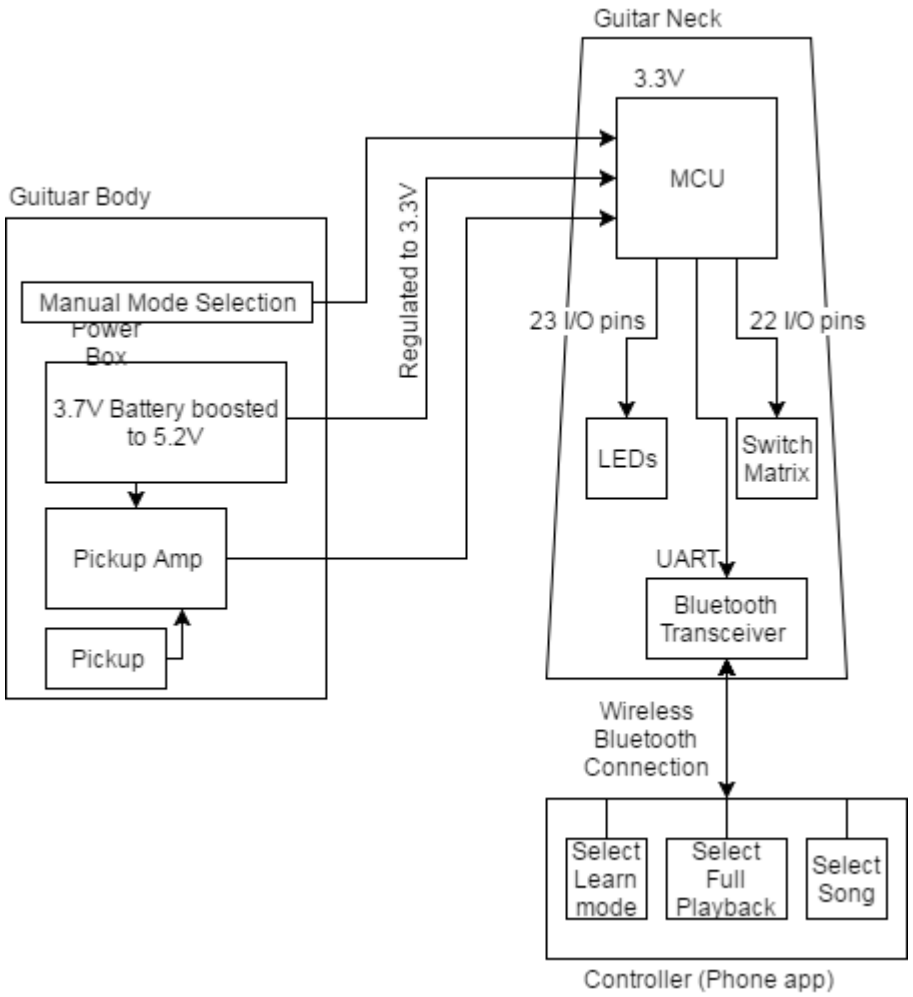
# BLOCK DIAGRAM

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# DESIGN CHALLENGES

- Connecting multiple PCBs with solder bridges
- PCB layout (traces and multiple layers)
- PCB size restricted to guitar neck size
- Common grounds
- Debugging
- Harmony vs PLIB.h
- Programming post packaging
- Bluetooth transceiver (designed using BM78 and not with RN4020)
- Final packaging of guitar neck
- Final packaging of power box

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# INDIVIDUAL CONTRIBUTIONS

## AUSTIN PETERSON

- Schematic/PCB Design
- Power considerations
- Pickup amplifier
- Testing components before final design
- Packaging design and build for Power Box and Guitar Neck
- PCB soldering
- Hardware debugging
- Part selection and purchasing
- Guitar sacrifice

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# INDIVIDUAL CONTRIBUTIONS

## BRIAN RIEDER

- Contributed to the general planning process
    - Served as the resident guitar “expert”
    - Helped with generalized engineering group decisions
- Configured the software development environment to allow for device programming
- Wrote software to implement:
    - LED driving via GPIO
    - Song encoding - turning an LED array into a software accessible interface
    - String-fret switch matrix - translating human finger position into played notes
    - Multi-mode configuration and final implementation mode switching

# INDIVIDUAL CONTRIBUTIONS

## JENNIFER ISAZA

- Schematic/PCB Design
- Fretboard Design
- PCB soldering
- Acrylic Fretboard Overlay
- Testing components before final design
- PCB soldering
- Hardware debugging
- Part selection and purchasing
- PCB soldering

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# INDIVIDUAL CONTRIBUTIONS

## COLE GIANNOTTI

- Designed data encoding structures for song information
- Birthed delay concept and implementation
- Wrote Android phone application to interface with guitar
- Wrote software to implement:
    - Song encoding / decoding
    - String-fret switch matrix - translating human finger position into played notes
    - Multi-mode configuration and final implementation mode switching
    - Fretboard data structure to quickly add notes and push out information to the display

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# PROJECT DEMONSTRATION

PSSC #1: An ability to interact with the system through an external user interface such as a phone or remote.

PSSC #2: An ability to interface the microcontroller with an external device via Bluetooth.

PSSC #3: An ability to recognize and process pitches played by a user through a sensing interface.

PSSC #4: An ability to display chords and notes on an LED array on the guitar neck.

PSSC #5: An ability to have the microcontroller support two modes for user learning and full playback.

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Questions?