

Auto Guitar

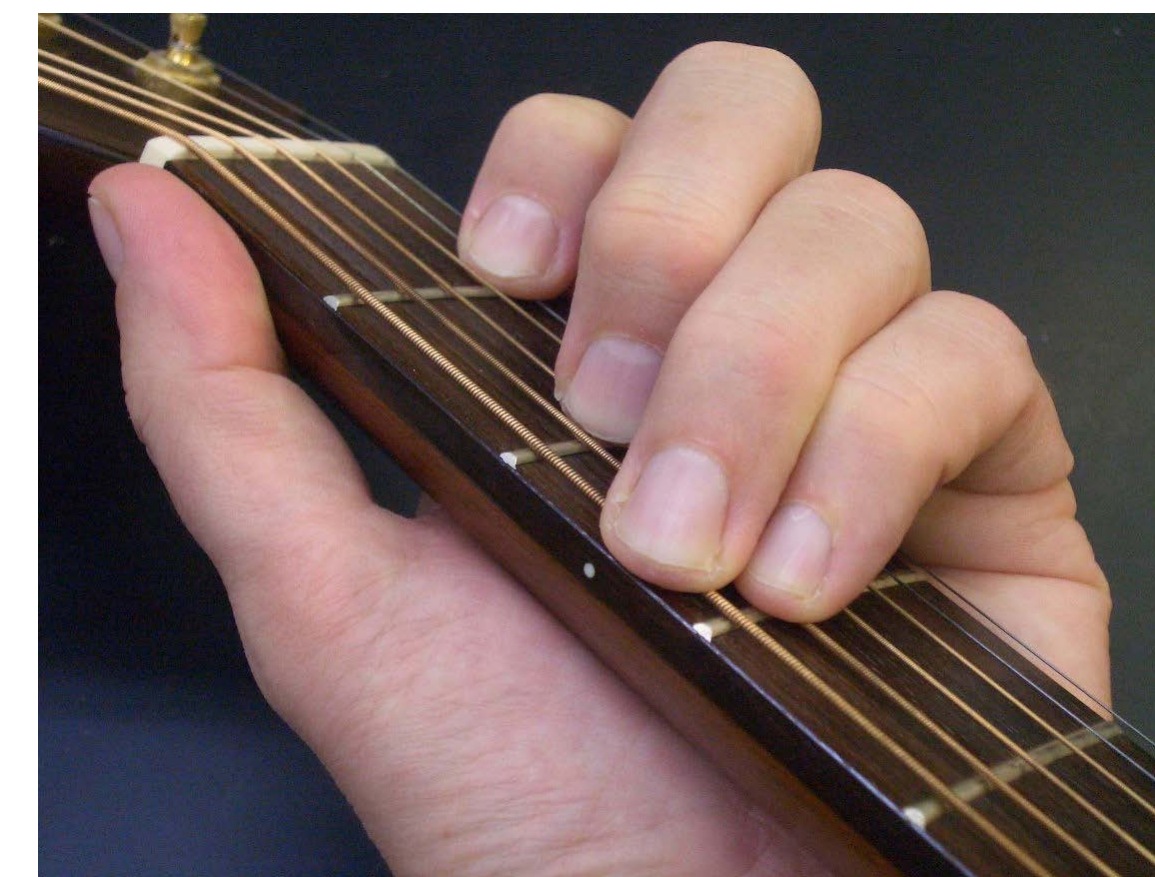
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Introduction: Auto Guitar, Analog Sound at a Push of a Button

IDEA

- Music is a popular past time for many people, however, not everyone knows how to play the instruments. We wanted to create a system that allows people to enjoy instrumental music without having to listen to digital recordings. With our Auto Guitar system we allow someone with little knowledge on how to play a guitar easy access to the different musical notes you can play with an electric guitar.



Problem Description: How to Accurately Play a Guitar?



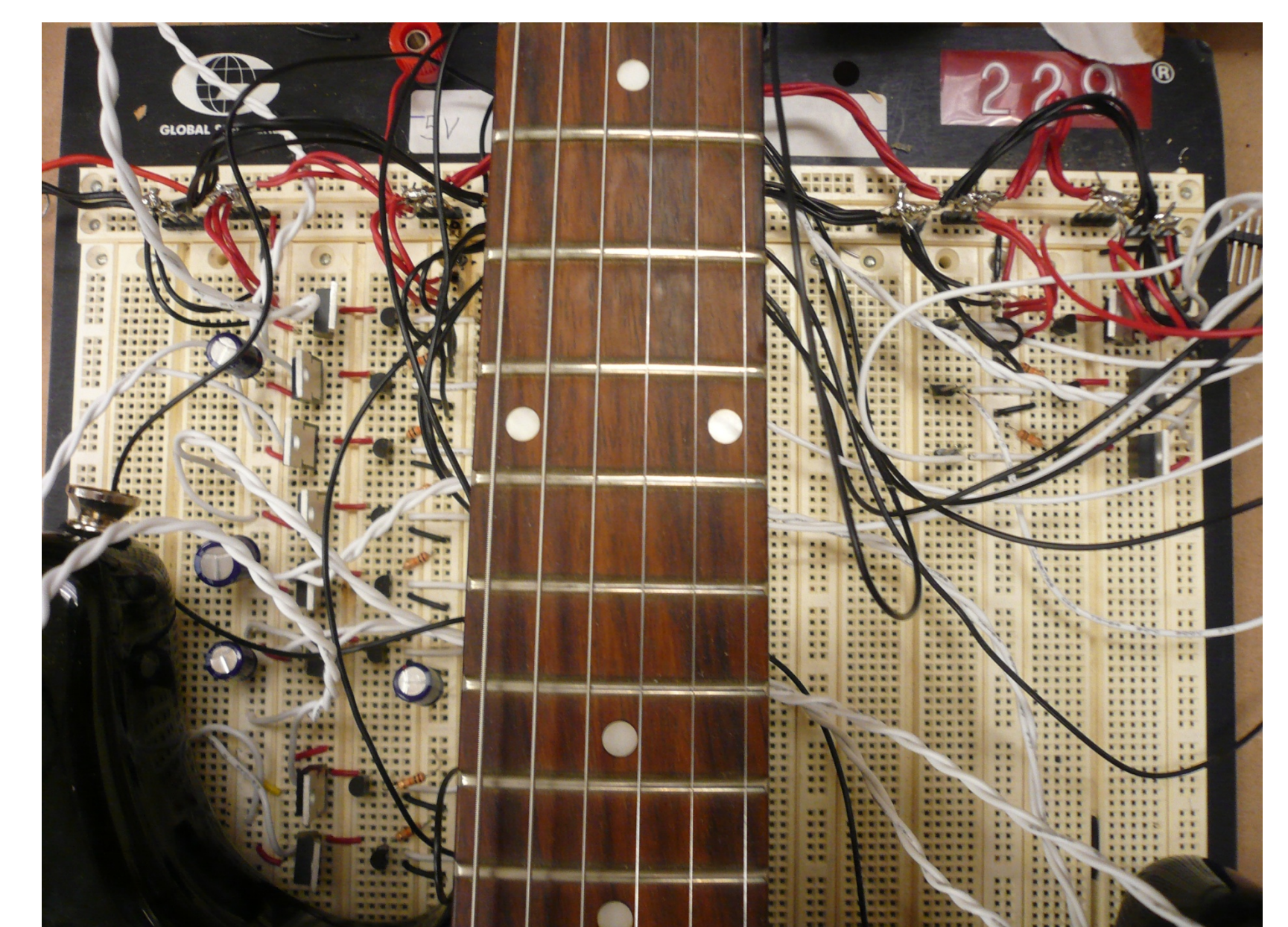
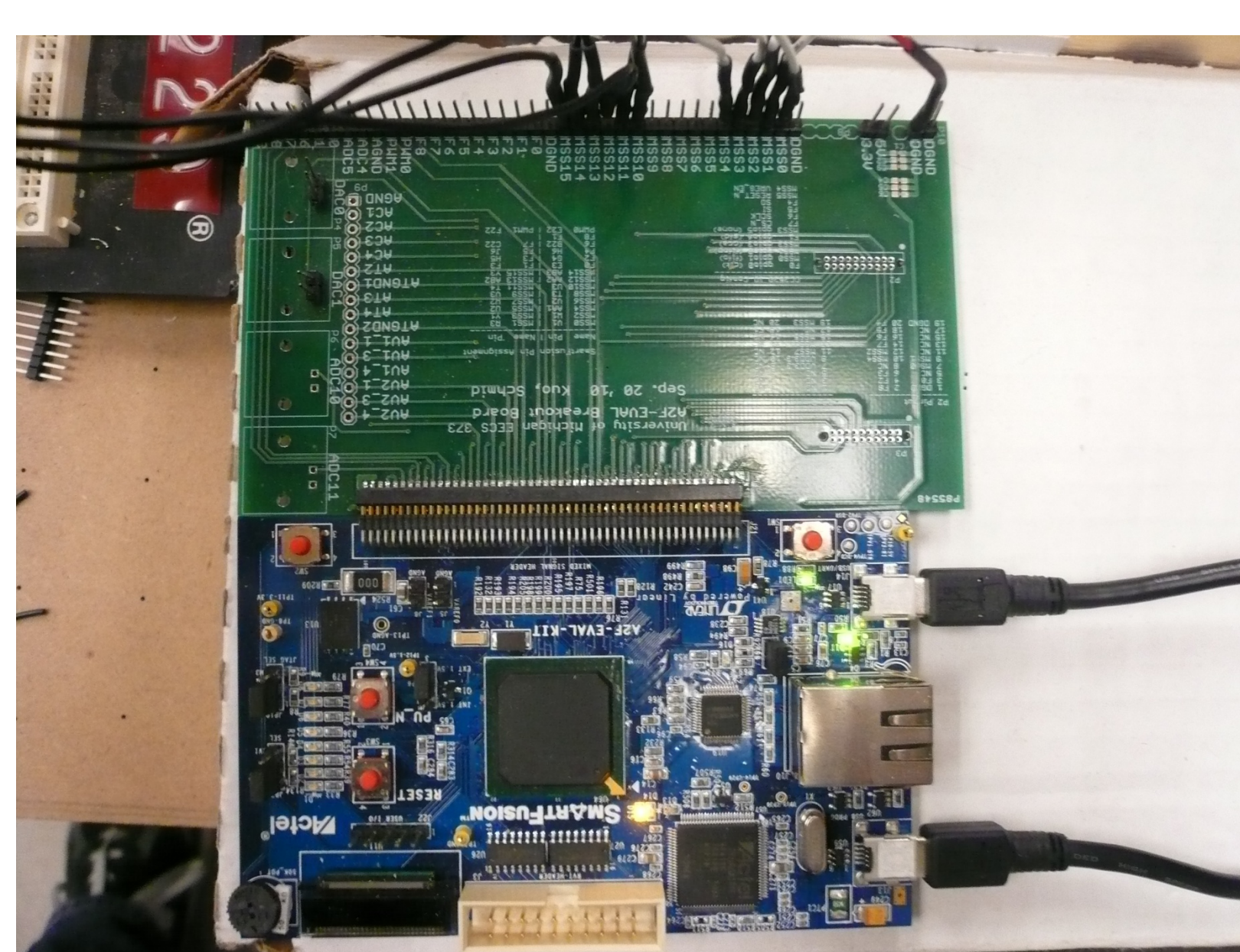
MAJOR PROBLEMS

- Precision
- Fretting
- Strumming
- Power & Cost
- Stability
- Playing a guitar is a complex problem. You need to be able to press down different arrangements of strings on the fret board, and strum the correct strings to play a note. We need a way to press down different strings at different locations on the fret board. We also need a way to pick individual and multiple strings. In addition, the system will have a lot of moving parts, so we need a way to keep both the instrument and system stable. Lastly, a way to effectively power the system is needed.

Proposed Solution: The Power of the Solenoids

Structure

- Fretting and Strumming with solenoids
- Control with SmartFusion FPGA
- Output buffer and switch control /w circuit



EECS 373 Topics and Other Techniques

- Serial Interfacing
 - Allows us to communicate to the SmartFusion board from the computer
- Interrupts
 - Prevents a command from double firing
 - Allows clean execution of notes
- Memory Mapped I/O
 - Allows us to trigger a solenoid by writing 1 or 0 to memory
 - Lets us play a single or an array of solenoids simultaneously
- Circuit Design
 - Needed to be able to trigger a solenoid with 3.3V from FPGA but still supply the solenoid with 5V
- Chassis Design
 - Created frame to house guitar and control system
 - Needed to keep components stable when in motion
 - Needed solenoids in precise locations to accurately play notes
- Future Work
 - Expand Fret board to play all notes
 - Create a more accurate strumming system
 - Improve power efficiency
 - Improve user interface
 - Create design for additional instruments

