

# BAssist

(Banjo Assist Robot)

## Project Proposal

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### Project Description:

To design a banjo plucking robot to assist user with playing in the common Scruggs' style. This style is characterized by picking patterns of eight notes, alternating between thumb, index, and middle finger plucking various strings. The BAssist will assist the player by taking control of the plucking, leaving him to worry only about fretting the desired chords. The BAssist will use mini solenoids to pluck strings in user-programmable patterns. Users will also have control over the speed in beats per minute and time signature.

If we can progress quickly, we will integrate a Bluetooth Low Energy module for wireless update of picking patterns. Otherwise we will leave a port exposed for wired serial update of picking patterns. Users will cycle through picking patterns via button press, and the current pattern will be displayed on a LCD display.

### Goals:

- 1) To pluck banjo strings in preprogrammed patterns
- 2) To display the chosen pattern on LCD
- 3) To allow for tempo and timing control of the plucked strings

### Hardware Components :

MSP430 launchpad – EXP430F5529LP  
LCD – To display selected plucking pattern  
5x mini push pull solenoids – actuators for string plucking  
Interfacing circuitry – transistors, resistors etc. for solenoids  
2x push button switches – For cycling through preprogrammed picking patterns and start/stop  
Adafruit BLE module – for remote update of picking patterns

### Component interfacing with MSP430 :

P1.2 – P1.6 : GPIO for switching driving circuitry for solenoid actuators  
P2.3, P8.1, and P8.2 – GPIOs with interrupt capability for switches  
P4.0- P4.4 – SPI interface for LCD  
P6.1, 6.2 etc. – UART interface to BLE module

### MSP430 features:

GPIOs from port 1 will be used to turn on driving circuitry for the solenoid actuators which will pluck the banjo strings.

GPIOs with interrupt capability used for switches to start/stop the device and to switch between the user-programmed patterns.

USCI\_B1 communication interface will be used for SPI communication with the LCD.

UART for communication with Adafruit BLE module.

Timer A to set and control timing between the activation of the solenoids in the current selected pattern.