AUTOMATED GUITAR

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ABSTRACT

This report revealed a self playing guitar using a near invisible system.

From the mechanical aspect, 12V push solenoid is used to fret the strings. Fretting is a method to compress the strings. There are many frets on a guitar, but to pay some simple chords, three push solenoids will be enough. 12V solenoid is chosen because it generates high moment that is similar to human's finger fretting.

To pluck the strings, servo motor is chosen because it has an ability to turn in both directions. At the rotator of servo motor, a pin will be attached to act as a plectrum simulating human's up and down picking. With the help of pulse-width modulation, the turning angles of servo motor can be controlled.

Both solenoid and servo motor will be fitted on the guitar using an adjustable rack made from acrylic. With adjustable rack, the system is more robust to be used in guitars with different size. Two solenoids is paced on the 2nd string, 1st and 3rd fret, and another solenoid is placed on the 3rd string, 2nd fret. Three servo motors are placed on the 1st, 2nd and 3rd (G, B and E) strings.

The system is controlled using PIC16F877A microcontroller; it has 40 pins which are suitable in this project. In the programming part, delays are generated to control the relay and therefore turning on and off the solenoid. On the other hand, pulse-width modulation is generated to control the servo motor. For a different play of arpeggios, the PIC microcontroller would need to be programmed again. An arpeggio means a broken chord that is played note by note in sequence.

The project design and objectives have been successfully realized. Solenoid and the servo motor are working in a synchronized mode and it sounds like a real guitarist play.

Keywords: Solenoid, Servo Motor, PIC Microcontroller, Automated Guitar, Pulse-Width Modulation.