Portable Laser Guitar

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Problems

The guitar is popular, but some problems about the ordinary guitar have existed since its invention:

- The guitar is too heavy and big to carry.
- The strings are easy to break.
- The guitar has to be tuned every time before performance.
- Playing the guitar for a long time hurts the musician's fingers.

Needs

- A portable design.
- Strings that never break or hurt fingers.
- A tuning-free technology.

Design Description

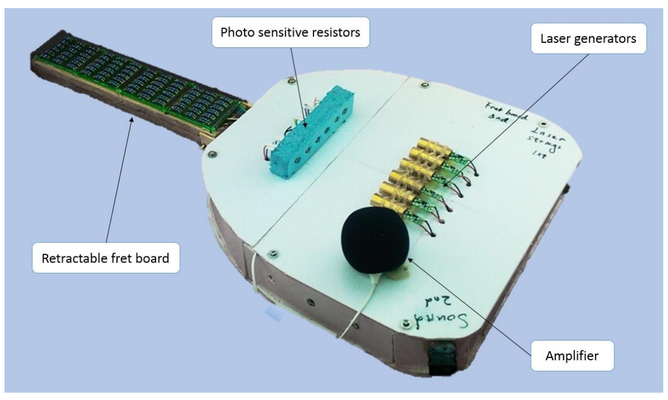

Fig.1 Main Body

There are three main components in our guitar: the laser strings , the retractable fret board and the built-in audio system. We use the laser generators to shoot green laser beams onto the photo sensitive resistors. When the user's fingers block some laser beams, the corresponding photo sensitive resistor will change its resistance significantly, which tells the built-in program which string has been played. On the retractable fret board, we use conductors to short out certain pins of the resistors to generate certain values of partial voltage. These certain values will inform the built-in program which "fret" has been pressed. We use the built-in audio system to generate the sound of the guitar. We have recorded all the standard tones of an acoustic guitar in the SD card. The built-in program will automatically play the tones out via the WAV module according to which string and fret is played and pressed. You can plug in whatever amplifier you like to the WAV module to make the sound aloud.

Significance of the Solution

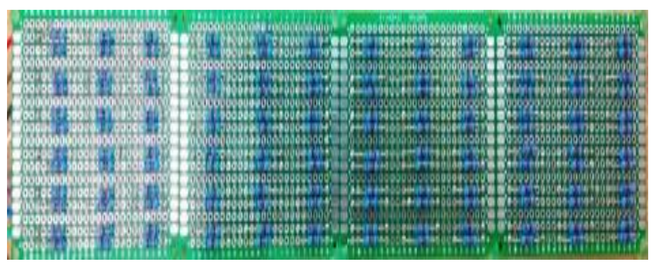

Fig2. Fret Board

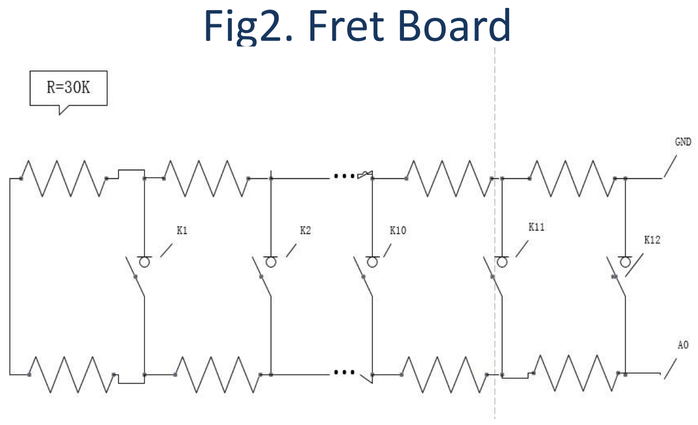

Fig.3 Circuit Diagram of the Fret Board

First, to simulate how a real guitar works, the circuit of the fret board is designed to guarantee that if two "frets" on the same string are pressed simultaneously, for instance, the 3rd and the 7th fret, only the 7th fret will be recorded by the program.
Second, we use the file allocation table of the SD card to locate the tone file. This will significantly shorten the time used to locate the file in the SD card compared with checking the names of the files one by one. This will make the performance much more fluent.

Validation

Each time we use conductors to short out certain pins of the resistors on the fret board, certain values of partial voltage in the circuit will change. This informs the program which fret has been pressed. Simultaneously, we use our fingers to block certain laser beams, the corresponding photo sensitive resistor will change its resistance significantly, which informs the program which string has been played. Based on these two types of information, the program will automatically play the tones out via the WAV module.

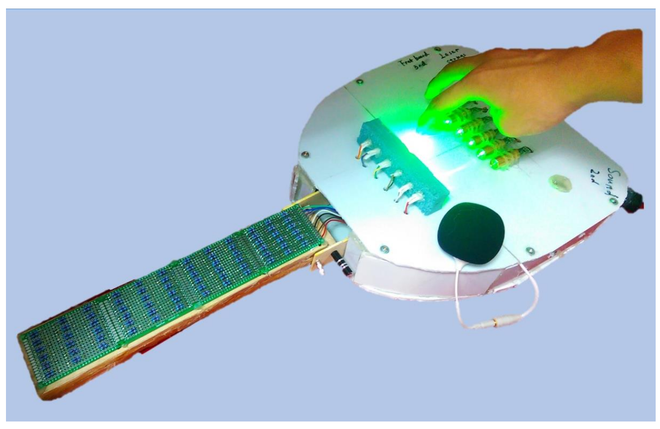

Fig.4 Strumming Strings

Conclusion

Our product successfully reduces the size and the weight of the guitar to a portable level. We stored all the standard tones in the built-in audio system so that tone tuning would no longer be necessary. The laser "strings" will not break or hurt fingers. Moreover, the flashy laser beams will take the stage performance to a higher level. We believe that this product is attractive to both the guitar performers and the audience.

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