Handheld Automatic Guitar Tuner

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Team GnG!
(Gadgets n Gizmos)

Background

To bring **convenience, accuracy, and modern-style** to the tuning process for amateur and professional guitarists. The **handheld automatic tuner** will be designed to **work in very noisy environments**.

Project Goal/ Device Functionality

Create a handheld automatic guitar tuner that works in noisy environments with great accuracy.

Designed for the following method of operation:

- Hold device on the tuning peg of a string.
- Pluck that string.
- The device will use signal processing techniques to filter noise from the desired string vibration frequency.
- Device will automatically turn a stepper motor, which winds the string's tuning peg, so that the string plays the correct frequency.

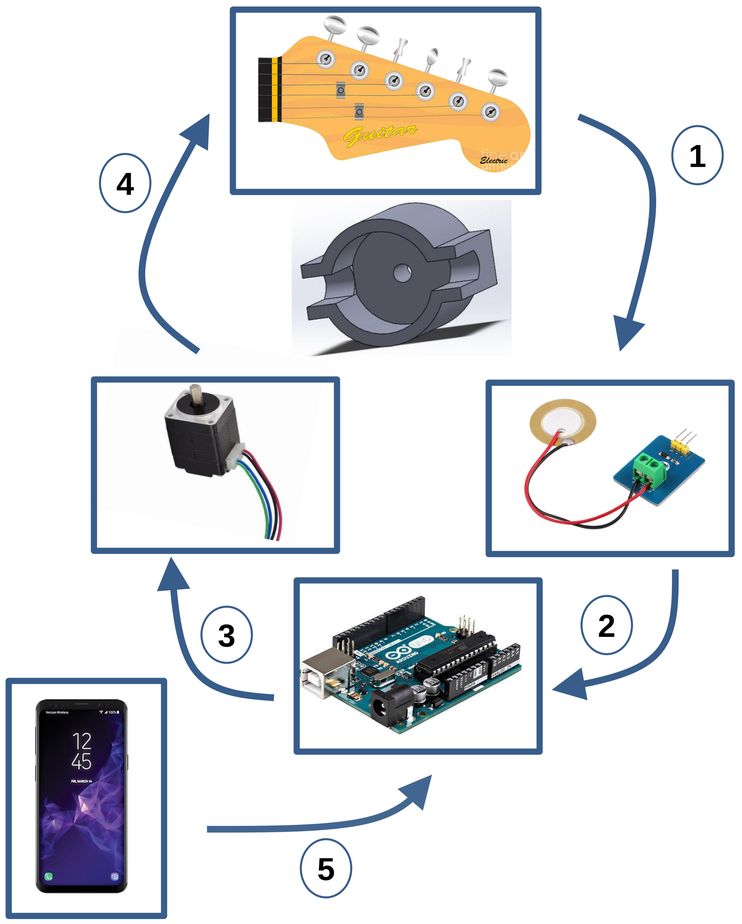
Tasks

Victor Darakjian (EE) - Signal Processing (filtering noise, frequency finding), Leading (Testing, Planning, Delegating)

Adalberto Sicairos (EE) - Hardware Implementation (sensor/motor organization and upkeep, chassis, 3D printing)

Dexter Gianto Suherman (CSE) - Microcontroller programming (sensor, motor, microcontroller)

Ha Young An (CSE) - App development



Components and (Conduits)

There are **5 interfaces**:

1. Guitar-Sensor (String-winder bit)
2. Sensor-Microcontroller (Amplifier, Low-Pass filter)
3. Microcontroller-Motor (Motor Power module)
4. Motor-Guitar (String-winder bit)
5. Android App-Microcontroller (Bluetooth module)

Milestones

Week 1-3: Find an optimal sensor placement location to get reliable data. Begin creating the app and establishing Bluetooth connectivity. Learn control of stepper motor.

Week 4-7: Reliably determine guitar string frequency. Optimize string-winding bit to transmit vibrations well. Determine a reliable ratio of frequency difference to winding rotation. Finish adding features to app. Solidify power distribution.

Week 8-9: Make the app pretty. Fine-tune any motor/sensor/algorithm features.

Week 10: Last minute checks and fixes.

Challenges: Figuring out an optimal vibration sensor placement for more reliable readings. Figuring out the power specs of a battery.

Future Work: Find an appropriate frequency difference to winding rotation ratio. Finish the app. 3D print chassis and solidify power distribution.

References

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