Proposal: Whistle-Operated Lockbox
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Description
A small box containing an Arduino, battery power supply, microphone, servo and locking mechanism. The box will only unlock itself when the microphone detects a specific tune being whistled. All signal processing and control logic will be performed exclusively on the Arduino.

Fallback: The same as above but detecting a pattern of knocks or other, simpler to process input.

Major Components
- Allow Arduino to detect the dominant frequency in a microphone sample, in real time.
- Given the detected frequencies and durations thereof, compare with a stored tune and determine if these are identical to within some tolerance.
- Implement control logic for servo lock and other I/O such as LED, switches, etc.
- Construct locking mechanism using servo. Must be compact and reasonably resistant to forced entry.

Prototype Plan
The hardware model of this project will be built. This includes ordering components, designing the electrical circuits within the box, wiring up the components and testing its functionality. This is prototype should be fully functioned and will be used in the final project to cooperate with the programming operations.

Hardware
- Arduino Nano 5V/16Mhz (knockoff)
- Arduino electret microphone breakout
- Micro servo
- Battery pack and AA batteries
- Premade box
- Locking hardware (exact form TBD)
- Miscellaneous electronics components: resistors, wire, solder, LED, switch, etc.

Anticipated Challenges
A large challenge will be that of capturing and processing audio data. The Arduino is barely capable of handling real-time frequency analysis. Possible avenues include using a FFT or FHT library, or some other, simpler method of detecting frequency.

The other major challenge will be in comparing the frequency data with a stored tune. Minor variations in pitch, key, and note duration must be tolerated without allowing tunes other than the secret tune to open the box.