Band Scooby Project (Ruler Player)

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Objectives

- Automate music playing with a steel ruler.
- Collaborate with other band members.
- Be configurable over WiFi.

Project Overview

- This project uses two servos to play music. One plucks a steel ruler, and the other adjust the length of ruler being plucked to control tone.
- It has a light sensor so that other robots can start/pause it with LED light signals.
- It also broadcasts a WiFi and can be configured by its HTTP clients.

Techniques Used

- Interrupt structure:
  - A soft system timer that allows to system to play music in real time.
  - The interval 260ms is chosen such that the continuous servo pick plucks once in a single interval and that the regular servo can move to proper position in two interval times.
- WiFi communication:
  - Other than the light signal control, it can also be controlled by WiFi clients as a standalone instrument.
  - Just with a touch of a button on the client side, it can enter/exit the light-sensor control mode.

Materials

Materials	Quantity
Node ESP8266-12E board	1
ESP12 motor shield	1
Steel ruler	1
L-shape Wood base	1
Servo (9g, 3.3V)	2
Toothpicks	4
Light sensor	1

Procedure

Step 1

Fix the continuous servo as the plucker.

Step 2

Make a slot for the steel ruler to slide in.

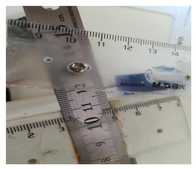
Step 3

Hot glue the other servo to the box.

Step 4

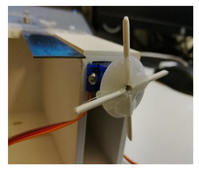
Make a linkage.

Step 5



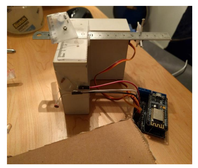
Drill a dent.

Step 6



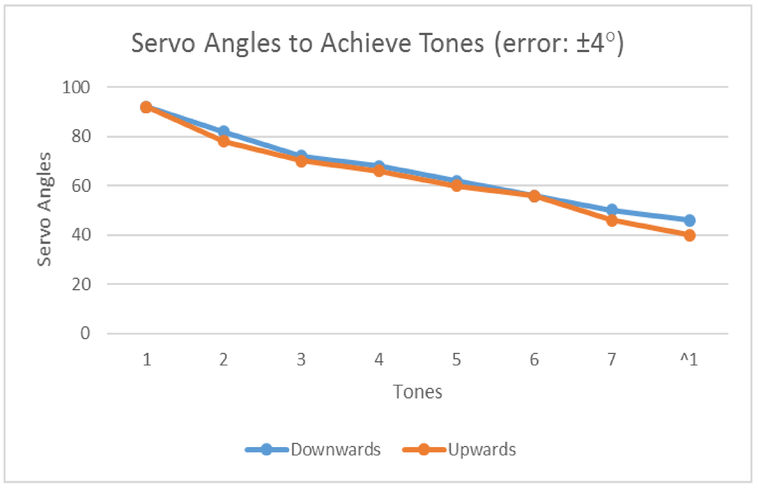
Make a pick with toothpicks.

Step 7



Add light sensor.

Results



- Note: Tuning results differ for two moving directions.

Possible Improvements

- Handcrafting cannot make perfect mechanical parts. Crafting with 3D printing or in a good workshop will make it better.

Related Websites

- Ruler Player site:
  - http://github.com/popo0293/ee183d-lab2
  - http://github.com/popo0293/ee183d-lab3
- Band site:
  - http://github.com/viktorzhang.github.io