Final Project Documentation

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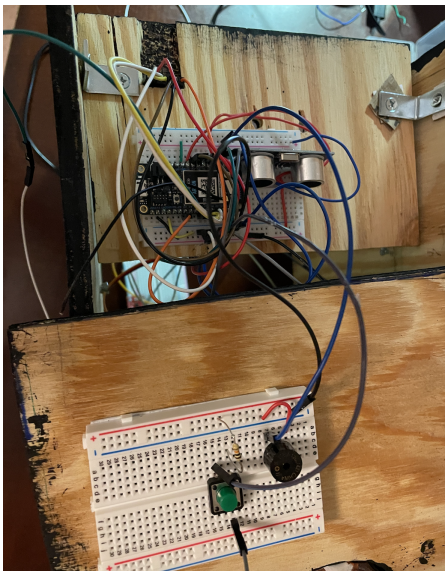
Functionality

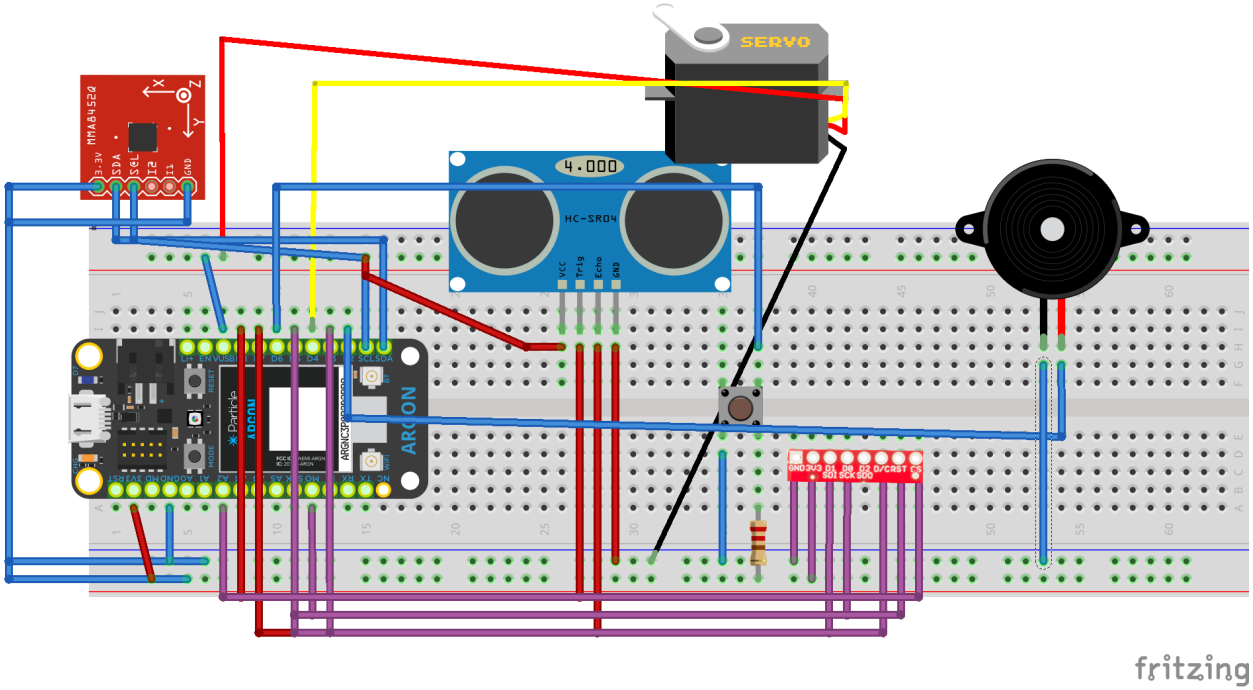
Through the removable top lid, gum will be refilled through the water bottle. A servo motor will rotate ~90% and go back to its original position to dispense the gumballs. Through the Blynk app, the user will be able to change into three modes: Study, Music, and Gumball. The Study mode will keep track of the time passed since it changed to this mode and publish it to InitialState every minute. The Music mode will dispense a gumball when it detects three knocks or “taps.” The Gumball mode will use the ultra-distance sensor to dispense gum when it detects motion.

Wiring

Part	Purpose	Type
Micro OLED	Display images through bitmaps of the different modes	Actuator
Push Button	Allows for machine to turn off	Actuator
Piezo Buzzer	Play tones	Other
Servo Motor	Turns enough to dispense gum off of the shelf	Motor
Ultrasonic Distance Sensor	Measures the distance to calculate when gum should be dispensed	Sensor
Accelerometer	Senses taps or knocks to dispense gum during the Music mode	Sensor

Two half size breadboards are used. On the bottom side of the lid, there is a piezo buzzer and a push button. The button is for emergency shut off, and it will turn off the machine without unplugging the whole device from the laptop. It acts as a switch, so once it is pushed again, all the functionality will return.



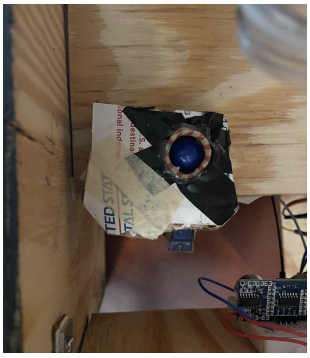


Set UpBox

Using scrap pieces of wood, make a box out of 9x10 and 7x10 rectangles. The top lid should have a circle shaped hole to fit a water bottle. An alternative is to use a shoebox and use cardboard pieces to complete the structure. The box needs to have a large enough hole on the side to fit a USB cable.

Servo Motor

The Servo motor should be at the edge of a shelf so that it can turn outward and have a space to drop the gumball. Any contraption can be used to catch the gumball, as long as it is small enough to only fit one gumball. The servo motor may not be stable, but masking tape has worked best to keep it in place.



OLED

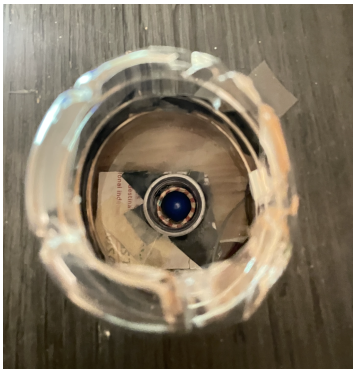
The OLED screen can be put anywhere on the box.

Ultrasonic Distance Sensor

This sensor should be placed facing the ground. A breadboard can be glued to the inner side of the box to detect motion.

Accelerometer

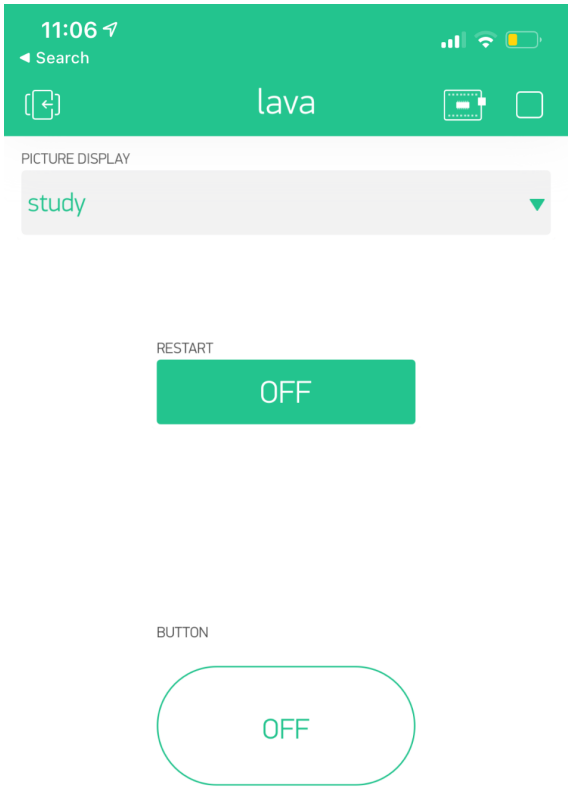
The accelerometer might have to go on a separate breadboard because it should be placed on the table.

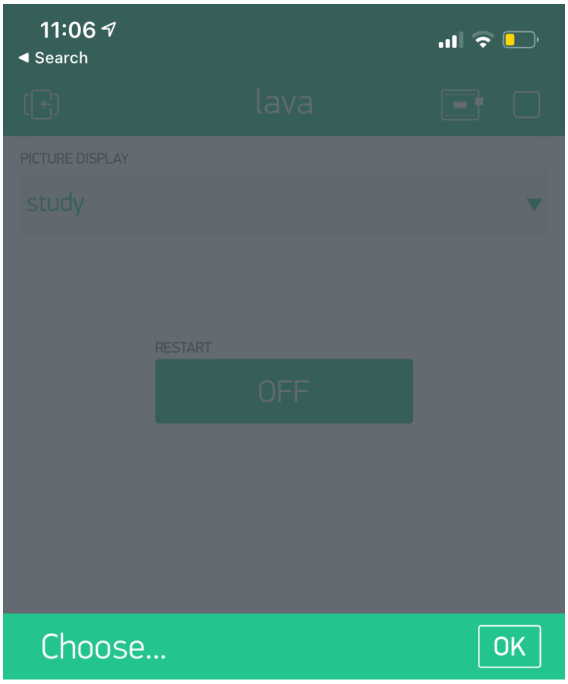


Refill Setup

The water bottle should fit right on the lid, and must be lined up with the hole. Make sure it is not touching the device that will be moving.

Blynk





gumball

study

music

The Blynk app should include three features: the menu, a restart button, and a dispense button. The menu will allow the user to pick the mode. The start button will allow the user to restart their timer, and the music mode lets the user dispense a gumball with three taps on the table.

Initial State

Initial State keeps track of the minutes passed since it went into Study Mode. It can be accessed here:
https://go.init.st/2vdubnt

Difficult Parts

It will be packed inside the box and it will be hard to see all of the wires. The best thing to do is to use jumper wires and test individual parts before adding the next step.

When making the circle widget that turns with the servo motor, it needs to be similar width and height to the gumball. Otherwise, there will be friction when it turns against the other gumballs in line.

Budget

1 Servo motor: $1.97
1 Push button: $1.00
1 OLED screen: $15.95
1 Breadboard: $2.50
Jumper Wire kit: $2.50
1 Ultrasonic distance sensor: $3.95
1 Mini speaker: $1.95
1 Empty water bottle: $0.00
1 Accelerometer: $12.95
2 Wood boards: $14.00

1 Jigsaw: $30.00

4 Metal screws: $1.00

4 Metal latches: $2.00

1 Tape: $2.00

1 Package of Gumballs: $3.00

Decorative elements (paint): $2.00

Total: $96.75

From the kit: $42.75 (depending on what all is implemented)

Not from the kit: $54.00