[Block]

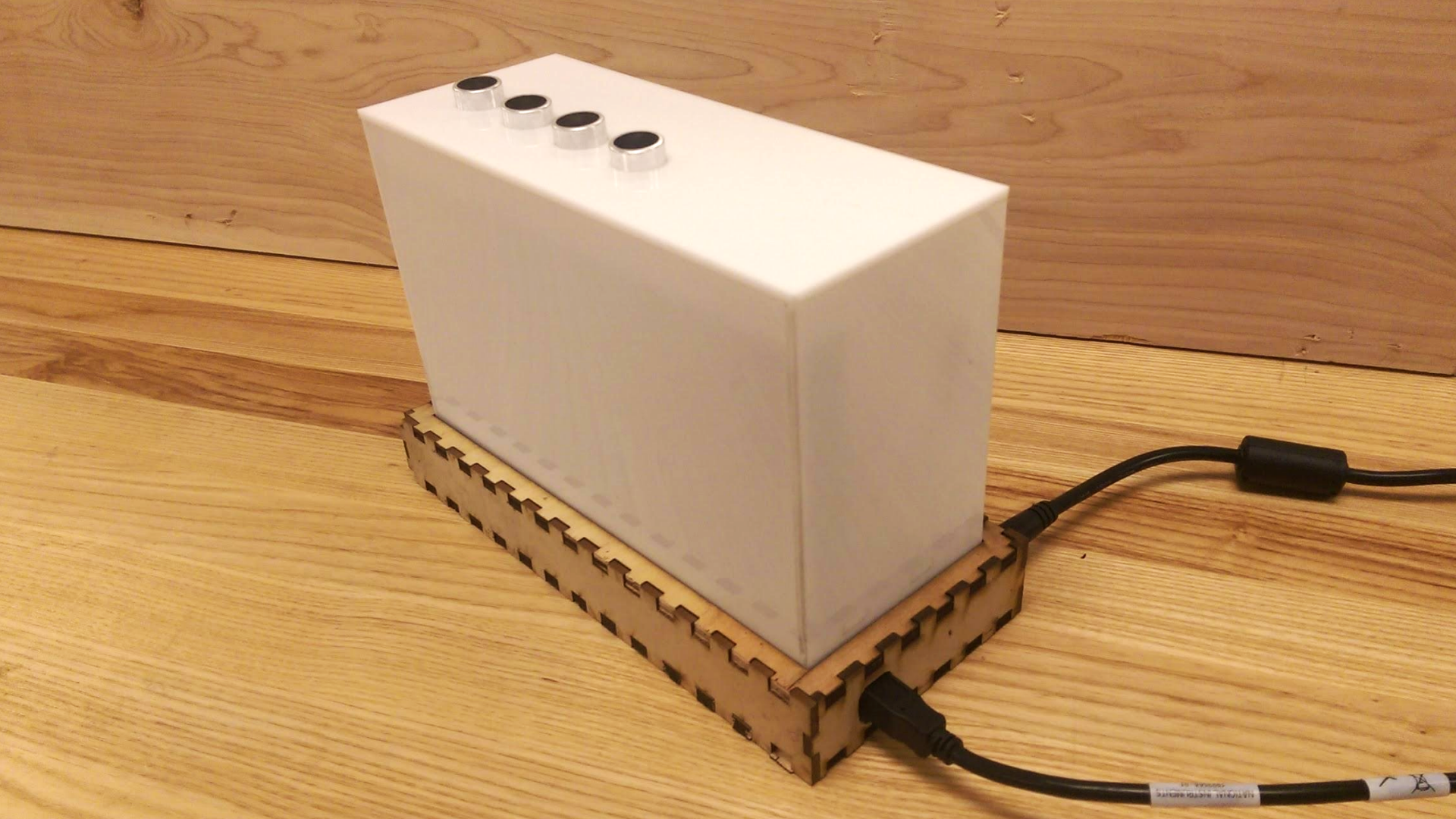
Stephanie Ho, Johnny Shen, Emily Chen

What is [Block]?

A simple, unobtrusive at home notification hub

Motivation

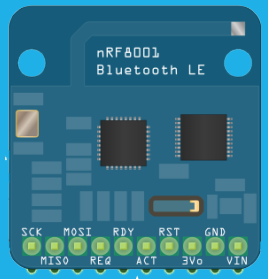
- At home
- Hands occupied
  - Kneading dough
  - Babysitting
  - Quality time with family
- Limit personal phone use
- Important notifications
- Improves quality of your home experience



Features

- Smartphone notification passing
- Bluetooth communications
- Gesture control scrolling
- At a glance display
- Light show

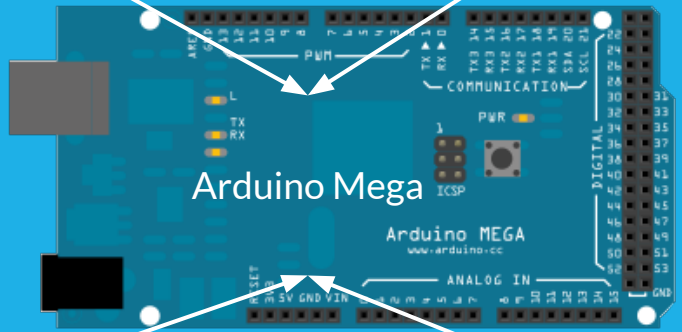
How does it all work?



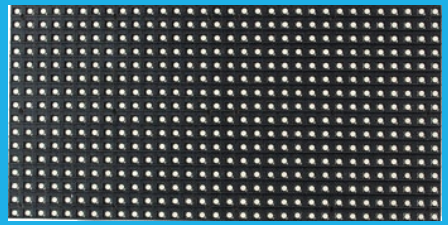
Bluetooth Dongle

Ultrasonic Sensors

Android Phone

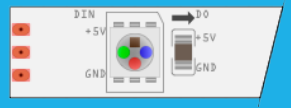


Arduino Mega

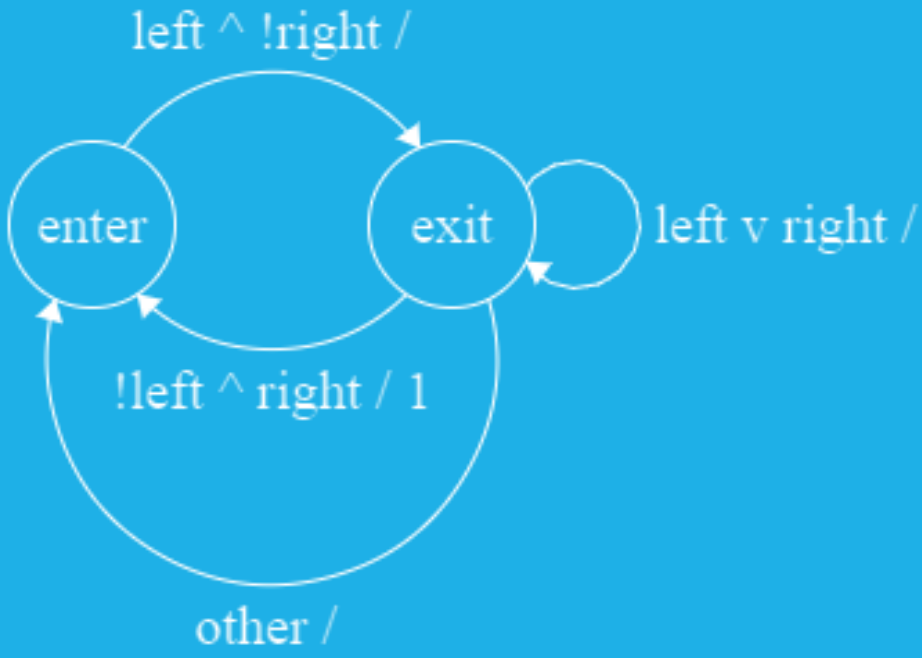


RGB Panel

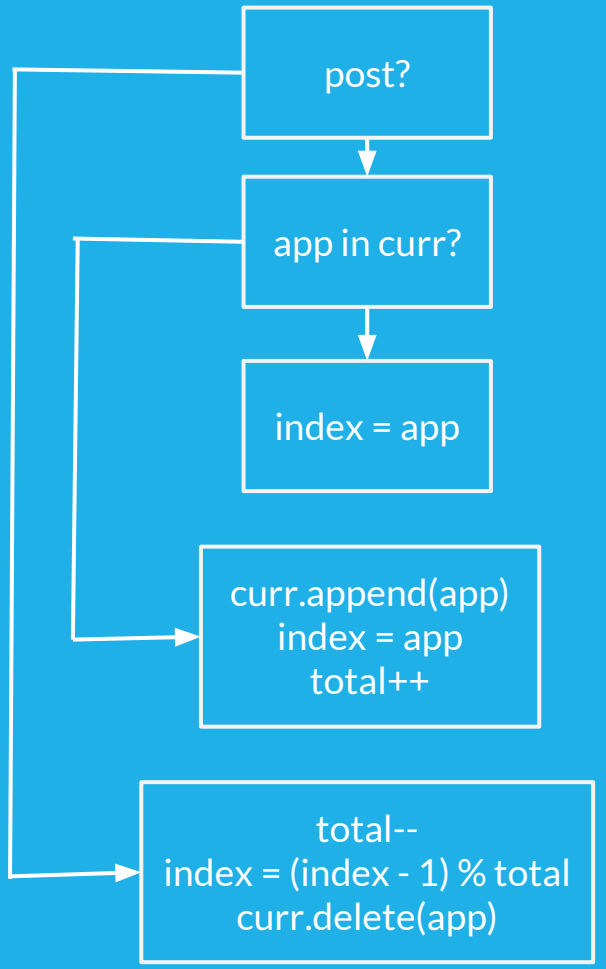
NeoPixel LEDs



State Machines

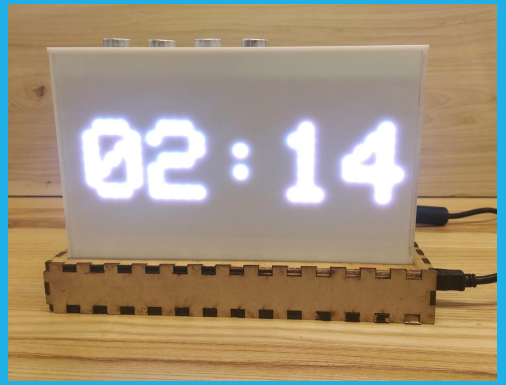


Detecting right swipes



Notification update logic

Look & Feel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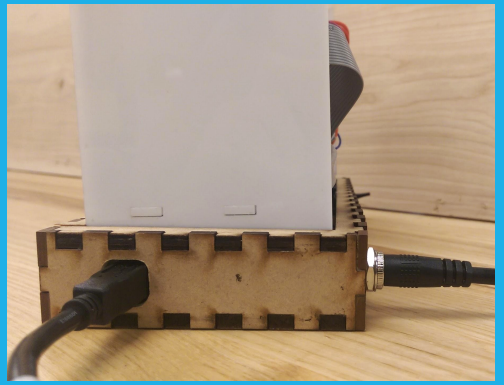

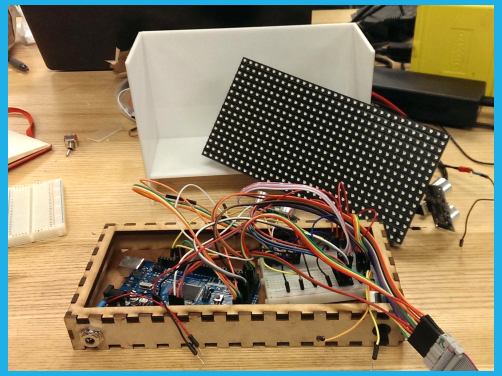

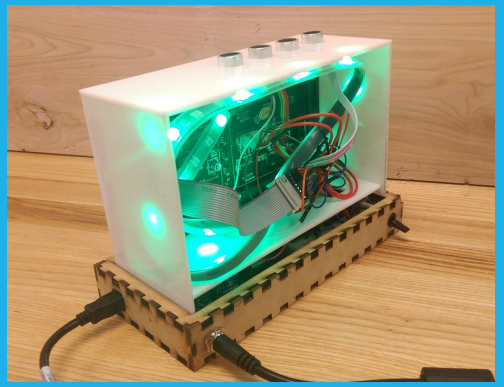

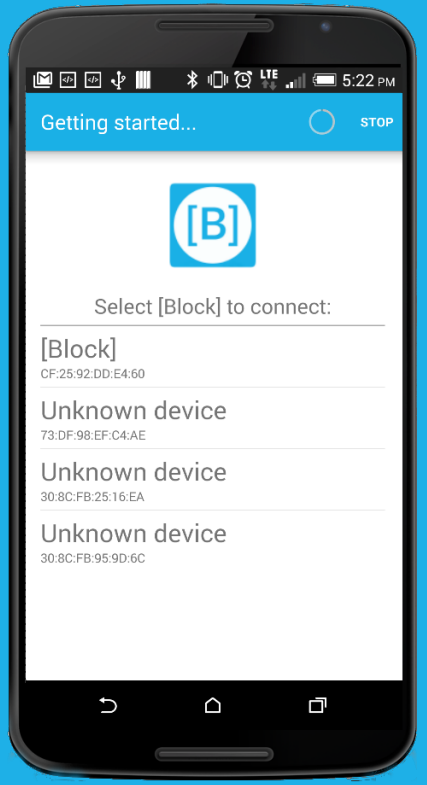
5:22 PM
Getting started...
STOP
[B]
Select [Block] to connect:
[Block]
CF:25:92:DD:E4:60
Unknown device
73:DF:98:EF:C4:AE
Unknown device
30:8C:FB:25:16:EA
Unknown device
30:8C:FB:95:9D:6C

[Block]

Demo

snapC

Software Details

- Android
  - JodaTime
  - NotificationListenerService & Bluetooth LE, targets android API 18 +
- Arduino Libraries
  - Adafruit_NeoPixel.h
  - Adafruit_GFX.h
  - RGBmatrixPanel.h
  - Adafruit_BLE_UART.h

```
#include <Adafruit_NeoPixel.h>
#include <SPI.h>
#include <Adafruit_GFX.h>   // Core graphics library
#include <RGBmatrixPanel.h> // Hardware-specific library
#include "Adafruit_BLE_UART.h"
```

Performance Analysis

	Performance
Notification receive time	~1000ms
Bluetooth connection speed	~200ms
Ultrasonic sensor response time per reading	~20 - 30 ms
Minimum time to recognize gesture	4 readings per gesture = ~80ms
Ultrasonic sensor range	~200 mm

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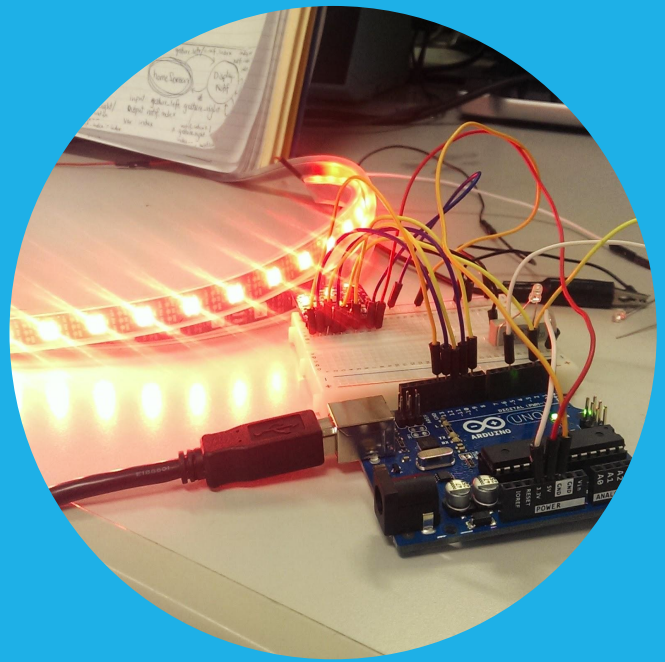
Challenges

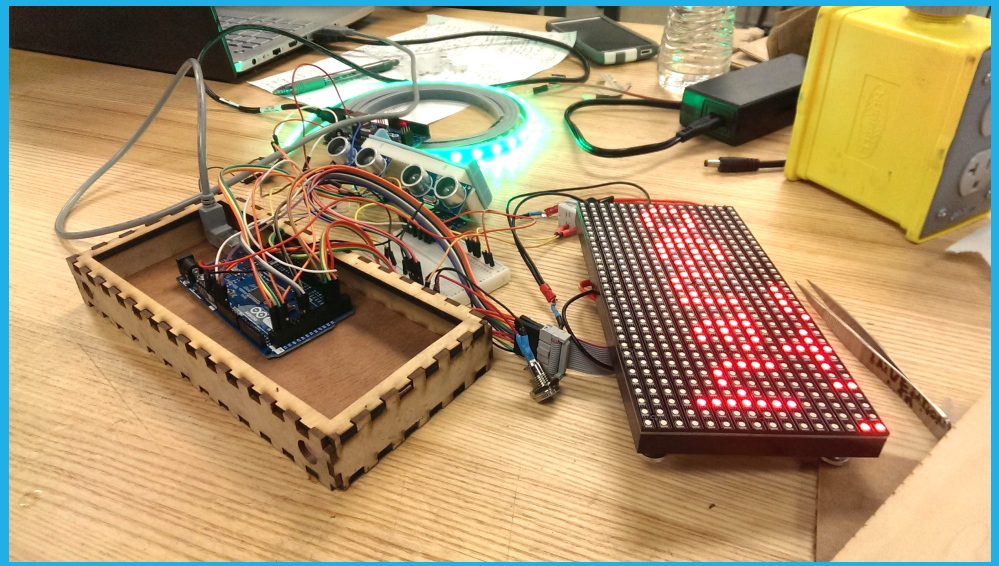
- Gesture Control
  - LeapMotion → Ultrasonic
- Not Enough DIO/PWM Pins
  - Uno x3 → BT, LEDs, Ultrasonic
  - Arduino Uno → Arduino Mega
- Insufficient Power Supply
  - USB → Regulated 5V/10A
  - Impacted sensor readings



Improvements

Usability

- PCB for cleaner housing
- Interactive sensors
  - clear notifications
- Informative actuators
  - display notification details
  - audio feedback (read messages)



Extensions

- Phone calls & Voice commands
- User modes

Aesthetics

- Color customization
- Improved UI e.g. sliding animations

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Any Questions?

OTHER DRAFTED MATERIALS

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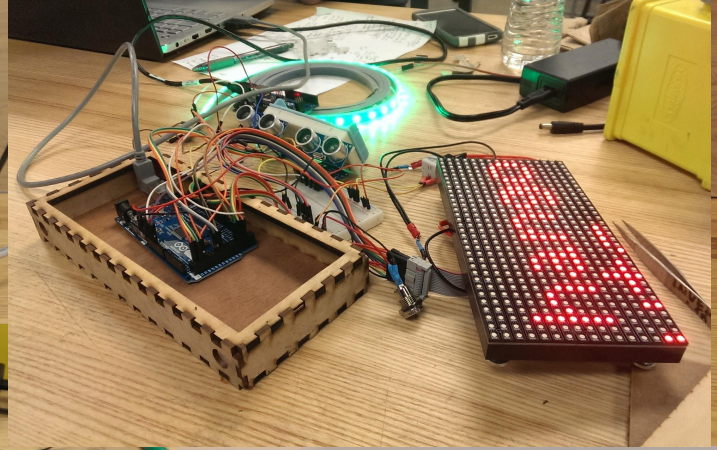

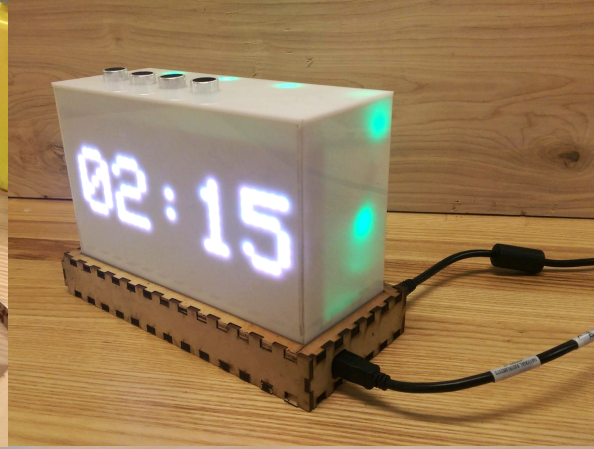
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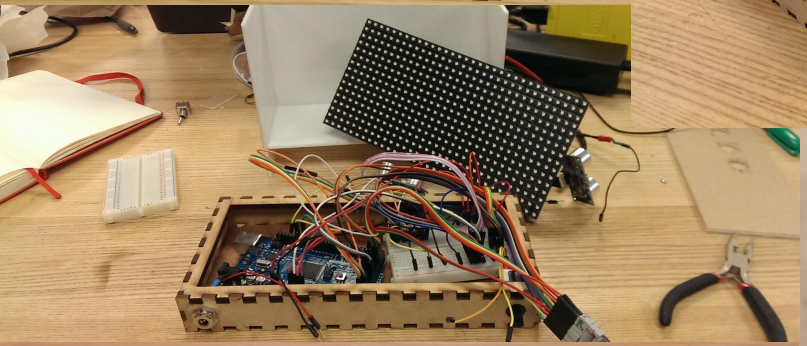
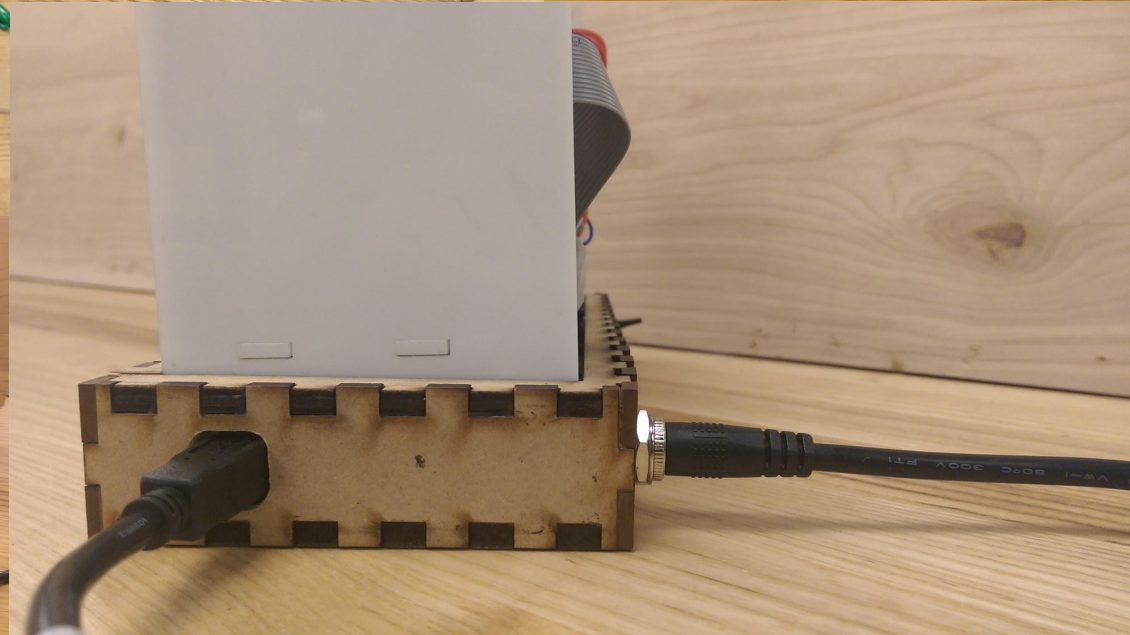
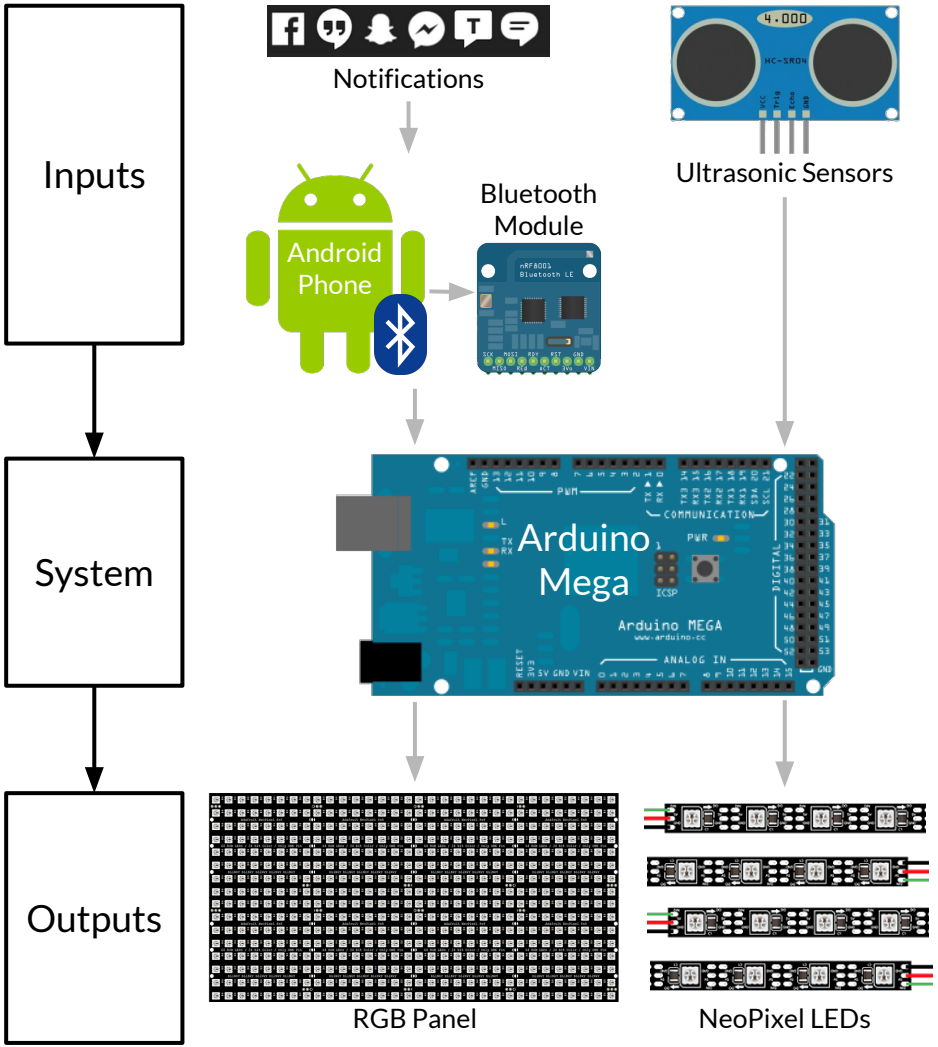
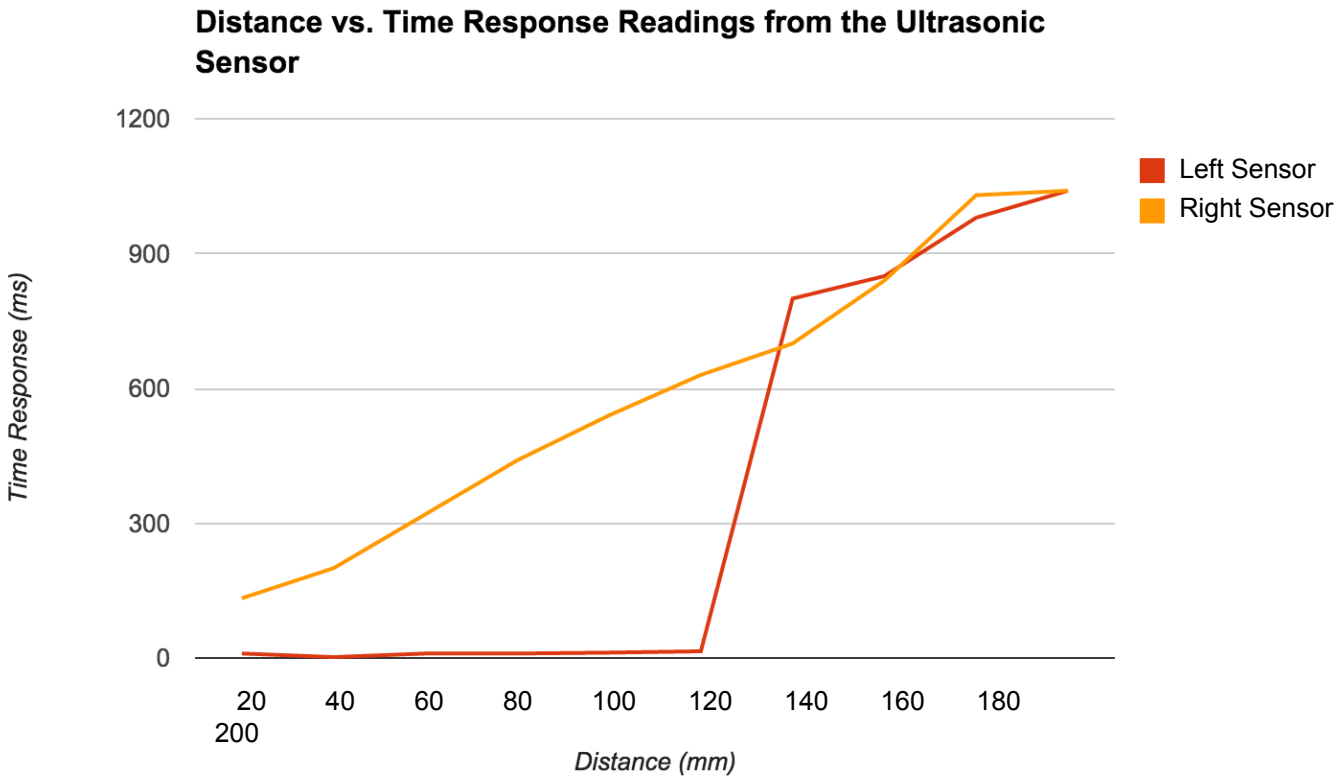
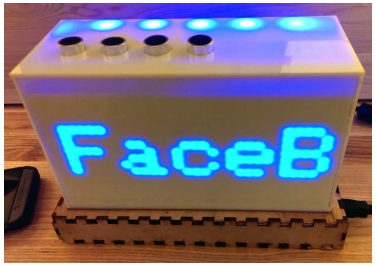





Inputs
System
Outputs
Notifications
Ultrasonic Sensors
Android Phone
Bluetooth Module
Arduino Mega
RGB Panel
NeoPixel LEDs


Distance vs. Time Response Readings from the Ultrasonic Sensor
1200
900
600
300
0
Time Response (ms)
20
40
60
80
100
120
140
160
180
200
Distance (mm)
Left Sensor
Right Sensor


FaceB

snapC

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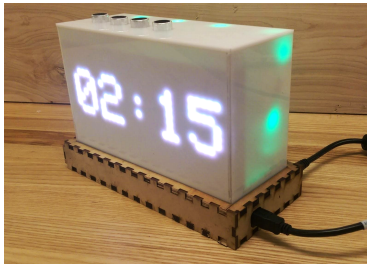
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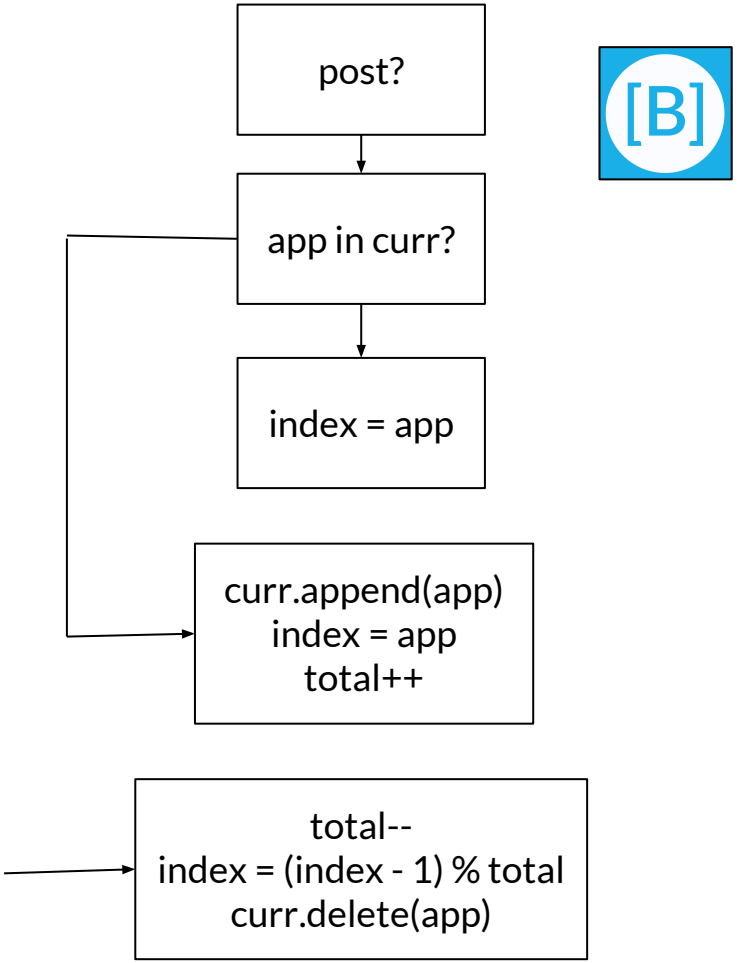
post?
app in curr?
index = app
curr.append(app)
index = app
total++
total--
index = (index - 1) % total
curr.delete(app)