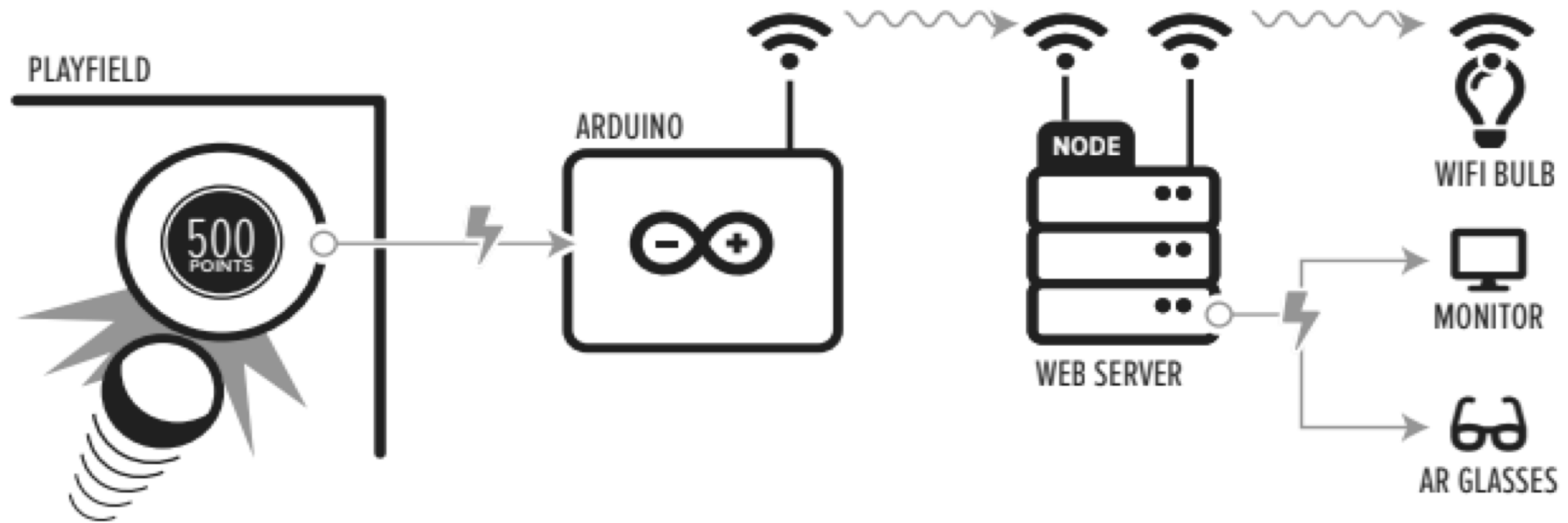# Enhancing an Analog Pinball Experience using IoT, NodeJS and Visualizations

DGMD E-598 DIGITAL MEDIA DESIGN CAPSTONE

FRANK PIZZUTA - FALL 2019

Project Description

Technologies Used
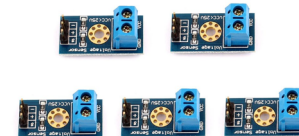
Technology #1: Arduino

Technology #2: NodeJS

Technology #3: Lifx bulbs

Technology #4: Augmented Reality System - Wikitude

Technology #5: Voltage Detector

Technology #5: Web Sockets

Technology #6: Cordova

Arduino

```
EthernetClient client;

if (client.connect("192.168.1.48", 8080)) {
        Serial.println("connected");
        client.println("POST /drwho HTTP/1.1");
        client.println("Host: 192.168.1.48");
        client.println("Content-Type: application/x-www-form-
urlencoded");

        client.println("Connection: close");
        client.println("User-Agent: Arduino/1.0");
        client.println();

 }
```

```
delay(200);
```

Websockets Server Side

```
server.listen(port);
server.on('listening', () => {
    console.log("Listening on %s", server.address().port);
});
var io = require('socket.io').listen(server);
app.io = io;
```

```
req.app.io.emit('master','You lose Doctor!');
```

Websockets Client Side

```
<script src="https://cdn.socket.io/socket.io-1.4.5.js"></script>
```

```
var socket = io();

socket.on('master', function(msg){
        $('#master').toggle();
    });
```

Wifi Bulbs

```javascript
const Lifx  = require('node-lifx-lan');
```

```javascript
Lifx.discover().then((device_list) => {
  device_list.forEach((device) => {
    console.log([
      device['ip'],
      device['mac'],
      device['deviceInfo']['label']
    ].join(' | '));
  });
}).catch((error) => {
  console.error(error);
});
```

```javascript
router.post('/', (req, res, next)=>{
 console.log('/drwho requested');
 req.app.io.emit('master','You lose Doctor!');
 // Turn on all LIFX bulbs in the local network
 if (req.app.locals.lightsOn == 0) {
    Lifx.turnOnBroadcast({
      color: {css: 'green'}
    }).then(() => {
      console.log('Light On!');
    }).catch((error) => {
      console.error(error);
    });
    req.app.locals.lightsOn = 1;
 } else {
    Lifx.turnOffBroadcast({
      duration: 3000
    }).then(() => {
      console.log('Light Off!');
    }).catch((error) => {
      console.error(error);
    });
    req.app.locals.lightsOn = 0;
 }
 res.end();

});
```

Augmented Reality

Final Thoughts

AR still isn't ready for mass adoption. The phone is too limiting and implementation is difficult.

I would like to investigate sound based triggers. This would remove the need for tapping switches.

Combining an Arduino with a NodeJS backend allowed me to learn and test physical computing concepts very easily. I want to try the Johnny-five, JavaScript robotics and IoT, library next.

My job has expressed interest in having me enhance our Modern Art collection with AR.

I wish there was a full IoT / Physical Computing degree program at the Extension School!!

Thank you and Happy Holidays!