

# MindControl team 12



Matt Dickoff



Bruce Clarke



James Owens



John Levidy

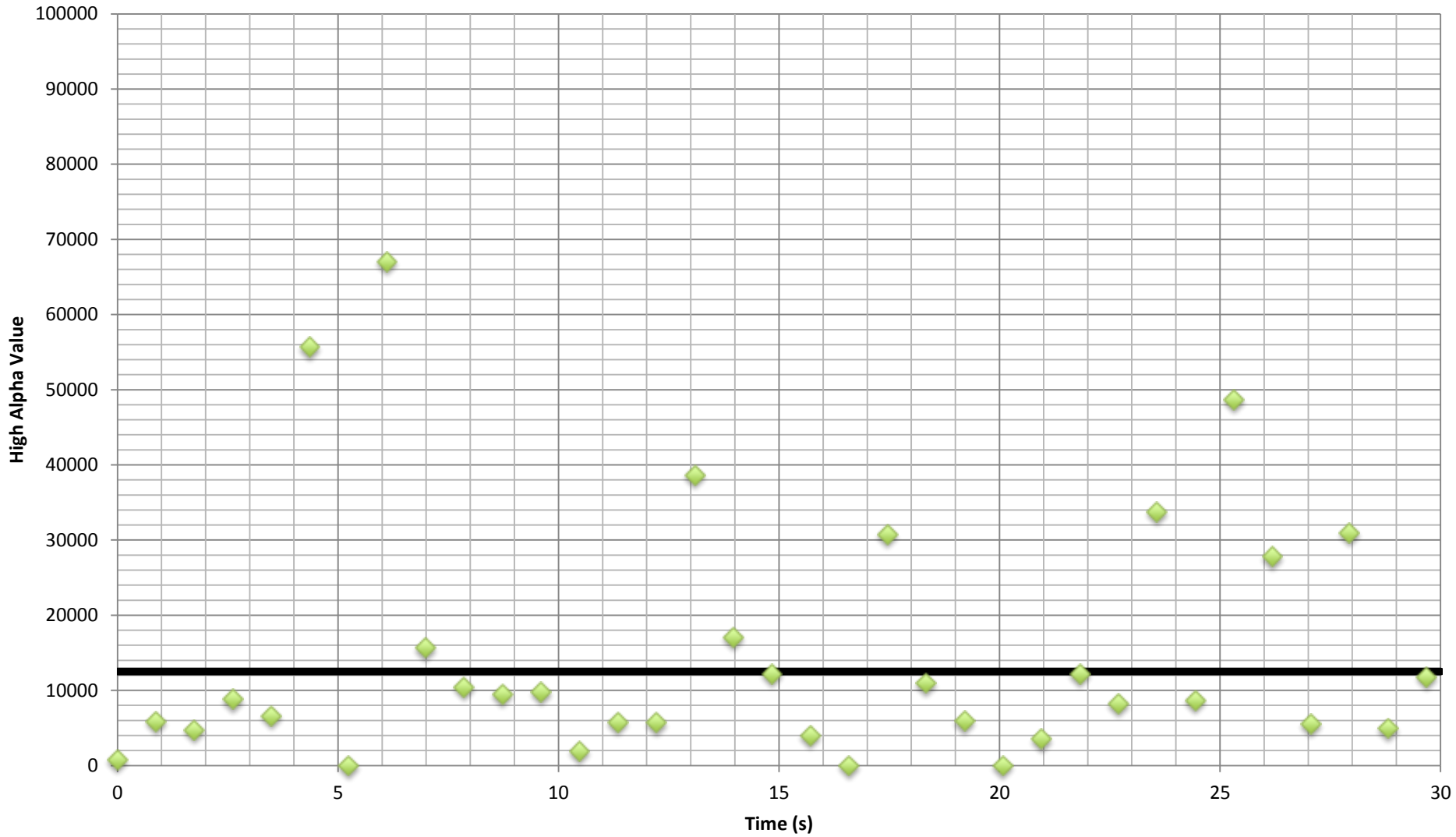
# Requirements

- Extract the user's Signature from the EEG readings
- Map the users unique Signature to remote control commands
- Arduino has the ability to receive IR commands and mimic those commands when needed.
- The Arduino must reliably transmit the correct commands over IR to the TV.
- No need for complicated calibration (auto calibration)

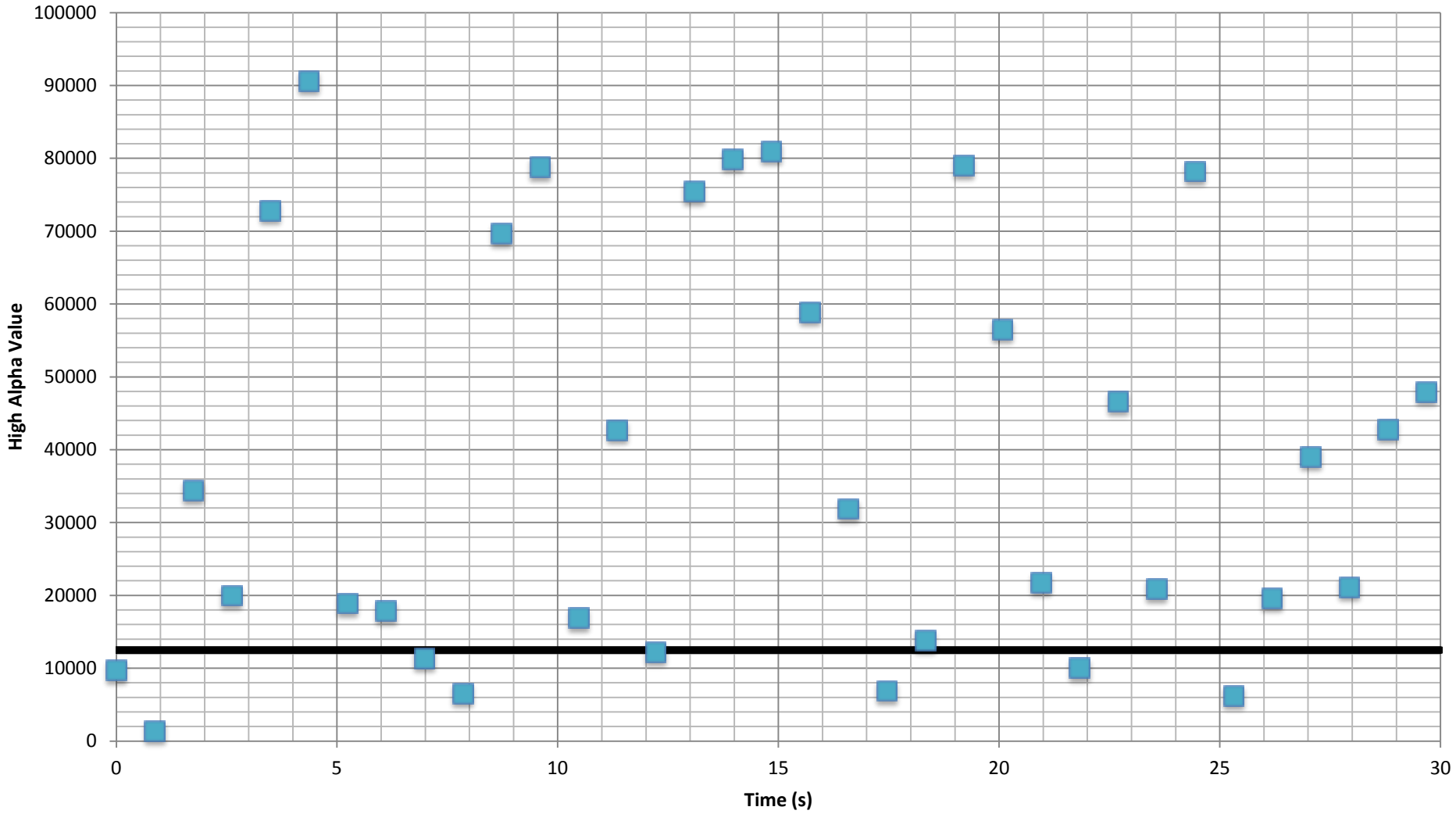
# Technical Specs

- MindWave
  - 8-hour AAA battery life, Weighs 90g, 2.420 - 2.471GHz RF frequency, 10m RF range, 250kbit/s RF data rate
  - Comes with USB dongle that can be wired up to an Arduino for receiving EEG output
- Arduino Uno
  - 7-12V input voltage, 14 Digital I/O Pins, Powered via AC-DC Adapter, Battery, or USB cord
  - ATmega328 microcontroller (32KB Flash Memory, 2KB SRAM, 1KB EEPROM) 16 MHz clock speed
- Logic Level Converter
  - Allows us to use the MindWave USB dongle as a receiver for the Arduino
- IR Receiver
  - Generic IR sensor
- IR Transmitter
  - Generic IR LED

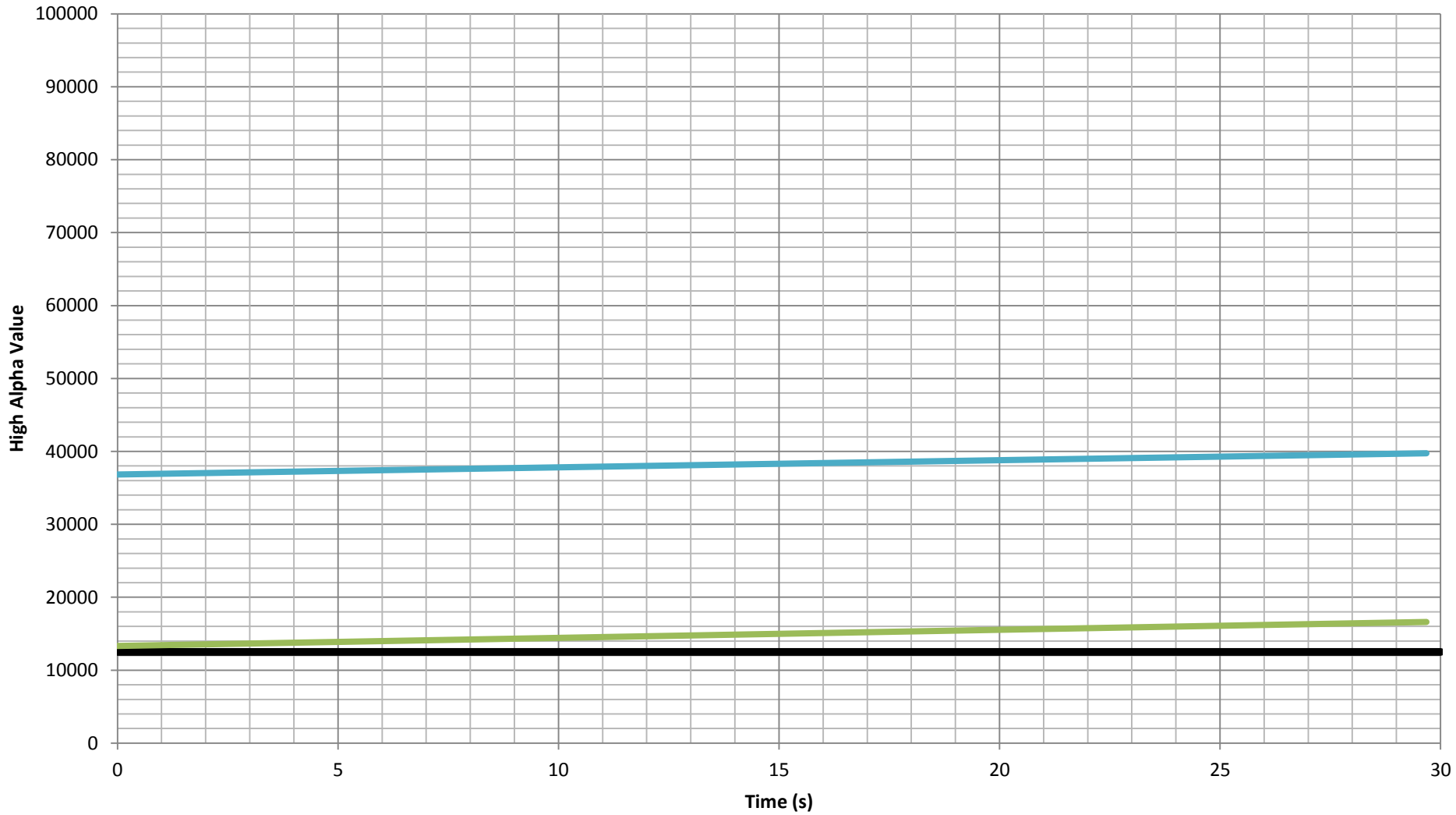
# Alpha Values (Eyes Open)



# Alpha Values (Eyes Closed)



## Average Alpha Values: Eyes Open vs. Closed



# Average Time to Trigger Power

- Best Case Scenario
  - 4.4 seconds
- Worst Case
  - 15 seconds
- Average Case
  - 8.35 seconds
  - Standard Deviation = 3.351590353 s
- Median
  - 7.15 seconds

# Other Specs

- IR Working Distance
  - 20+ feet
  - Our tests worked for any reasonably sized room
- Battery Life
  - Limit will be MindWave headset
  - 8-10 hours



# Risks + Mitigation

## Risk

The easiest values to get from the MindWave are the hardest for humans to control - rarely remain constant.

Blink strength values not given on Arduino MindWave code

MindWave doesn't fit everyone's head

## Mitigation

Extracting the specific brain waves, which have higher precision. (Alpha currently, beta waves next)

Finding spikes in other brain waves that correlate to blink strength

Unfortunately, this is not fixable in the time left, but it works for most people

# What's next

- Complete end-to-end functionality for triggering IR sensor
- Add blink / beta waves support for more functionality
- Work on decreasing time it takes to trigger power

Questions?