1. **Flow Chart For Connection between Iphone Application and Arduino**

check\_Start\_signal();

Assert Cal flag

check\_Cal\_signal();

Finish

#reps

Fatigue

Start

Calibration

Watching video

Selecting exercise

Selecting muscle

Selecting goal

Establishing connection

Iphone Application

Assert Resume Flag

Clear Start flag  
Assert Finish Flag

Assert Start flag

Cal Error  
Done

Arduino

# of Reps  
Fatigue Flag  
Start Error

check\_Start\_signal();

Get\_Calibration();  
Update\_Cal\_Status();

Clear # of reps  
Clear Fatigue Status

Reps\_detection();  
Update\_reps();  
Fatigue\_detection();Update\_Fatigue();

Bluetooth\_Initialization();

**Iphone Application**

Establishing connection

Selecting goal

Selecting muscle

Selecting exercise

Watching video

Cal Error = 1

Stop = 1

Cal Error = 0

Timeout = 0

Start

Calibration

Result

Finish

Finish the last 2 reps

Timeout = 1

1. **Arduino**
   1. **Calibration Part without considering timeout**

Initialize Bluetooth connection

Cal Flag (I) = 0

Waiting for start signal

Check Cal Flag (I)

Disable Timer

Cal Done (A) = 1

Cal Flag (I) = 1

Do the calibration

Cal Done (A) = 1  
Update to iphone

Start Timer

* 1. **Calibration Part dealing with timeout**

\*ISR for timer

Timeout (A) = 0

Every 1ms

Continue doing the calibration

Start Timer

Timeout (A) = 1

Cal Error (A) = 1  
Updates Cal Error to iphone

\*look at section 2.5 for more details

Disable Timer

Cal Flag (I) = 1

Cal Flag (I) = 0

Check Cal Flag (I)

* 1. **Reps and fatigue detection without considering timeout**

Check Start Flag (I)

Start Flag (I) = 0

Start Flag (I) = 1

No

Detect fatigue

Start Timer

Yes

Fatigue flag (A) = 1  
Update to iphone

Increment rep (A)  
Update to iphone

Detect a correct rep

No

Yes

* 1. **Reps and fatigue dealing with timeout**

\*ISR for timer

Every 1ms

Timeout (A) = 0

Continue doing the reps and fatigue detection

Start Timer

Timeout (A) = 1

\*Look at section 2.5 for more details

Disable Timer

Start Error (A) = 1  
Updates Start Error to iphone

Resume flag (I) = 1

Finish flag (I) = 1

Check Resume or Finish Flag

Enable Timer

Waiting for Cal flag to do the calibration

Resume flag (I) = 0  
Finish flag (I) = 0

* 1. **ISR for Timer:**

Timer will be used for ADC and detecting timeout while doing the calibration. We choose it’s to be 5 seconds for the timeout.

Timer will be initialized right before doing the calibration or starting detecting reps

ADC < Baseline

No

Check Cal Flag or Start Flag

Yes

Reset Timeout\_Count

Increase  
Timeout\_Count

Either Cal Flag or Start Flag gets asserted

No

Yes

Timeout\_Count = 5000

Initialize timer

Timeout = 1

* 1. **Reps detection algorithm**

Start Flag is asserted

ADC > MAX

ADC > baseline

No

Yes

Yes

No

MAX = ADC

MAX >= threshold

Yes

No

Increment reps

Curr\_voltage = MAX

Prev\_voltage = Curr\_voltage  
MAX = 0

Increase > 17

No

Fatigue\_flag = 1

Yes