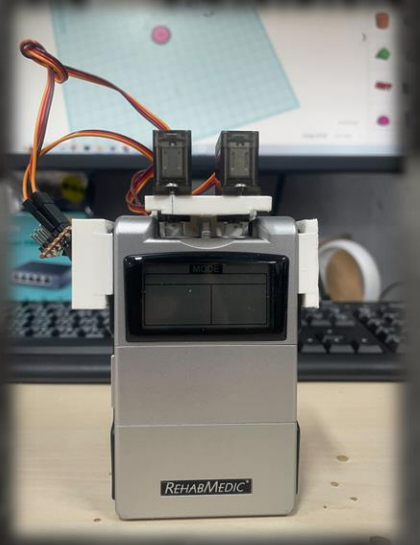

Servo-EMS for Unity

https://github.com/BrianGodd/Servo-EMS-for-Unity

Contributors

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Introduce our Hardware

- EV-804 TENS
- MG90D Micro Servo*2
- Arduino Seeed (esp32-c3)

Setting the EV-804 TENS

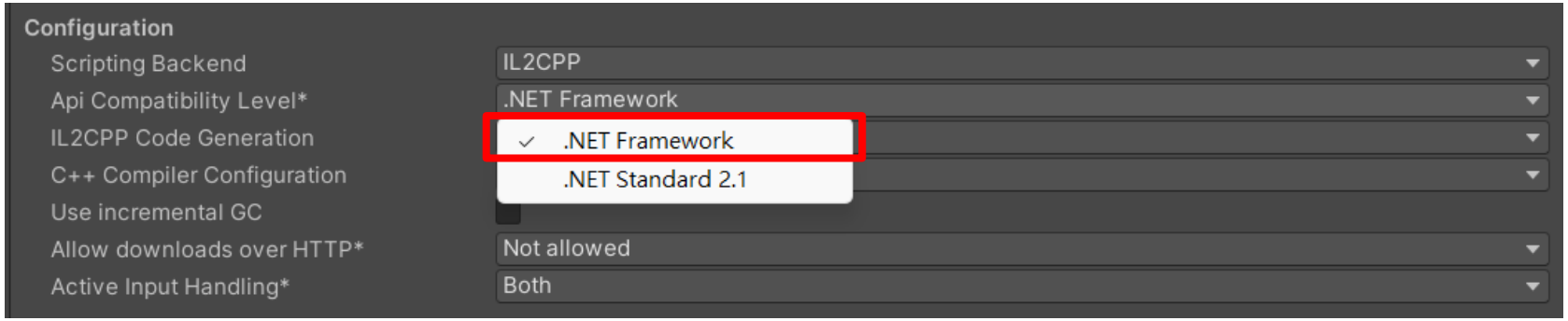
- Switch to Normal Mode
- Width for 200 us (pulse duration)
- Rate for 90 ~ 100 Hz (frequency)
- Stimulate time to “- -”

  (we will control by Unity)

Environment & Setting

- Unity 2022.3.xxf1 up

- Player Setting>Player>Other Settings>Configuration,
  Api set to ".Net Framework"



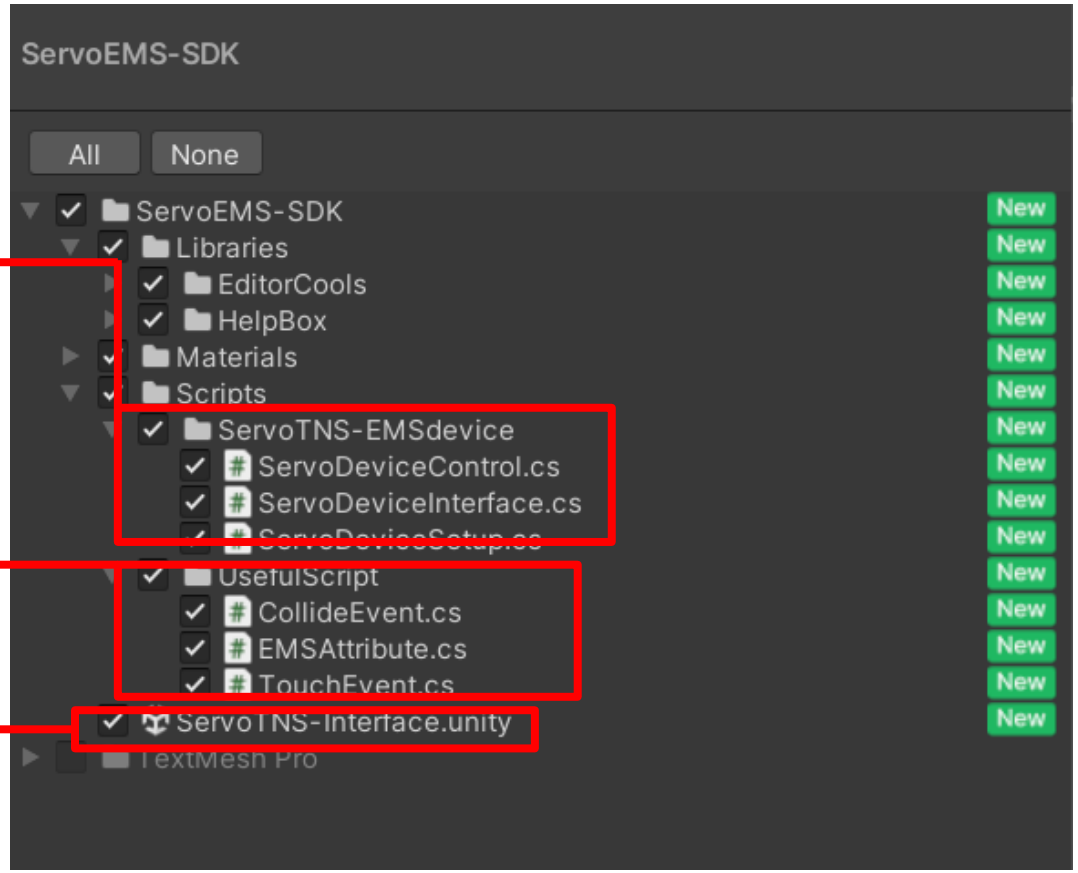
- Import Package: ServoEMS-SDK.unitypackage

Introduce our SDK ：Package

EMS Control System Code
(include Setup, Board Control
and UI Interface)

Useful trigger example script
(UI, Collide, Touch)

Example UI-Control Scene



Introduce our SDK ： *ServoDeviceSetup.cs*

1) Open serial when start running

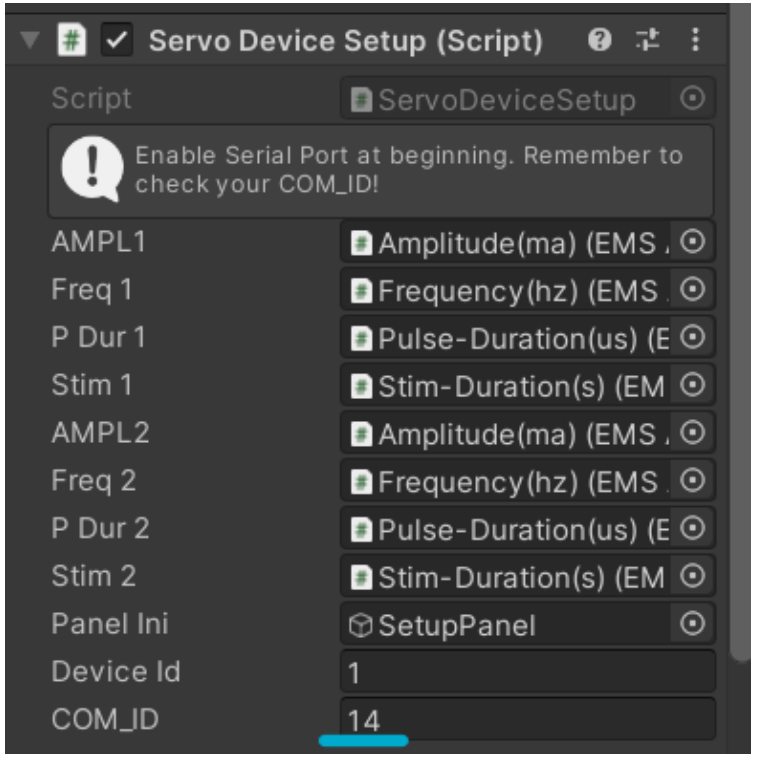
```
private void EnableDeviceSerialPort()
{
    this.DeviceSerialPort = new SerialPort("COM" + COM_ID.ToString(), baudRate, parity, dataBits, stopBits);
    try
    {
        DeviceSerialPort.Open();
        Debug.Log("(System) Open Device_" + deviceId.ToString() + " Serial Port Success.");
    }
    catch (Exception emsg) {
        Debug.LogWarning("Warning: " + emsg.Message);
    }

}
```

2) Set initial value when open success

```
//set Initial Channel1
AMPL1.SetNow(0);
Freq1.SetNow(90);
PDur1.SetNow(200);
Stim1.SetNow(0);
```

```
//set Initial Channel2
AMPL2.SetNow(0);
Freq2.SetNow(90);
PDur2.SetNow(200);
Stim2.SetNow(0);
```

3) Remember to check the COM_ID (at Device Management)



Introduce our SDK ： *ServoDeviceControl.cs*

- Stimulation Mechanism

Value Kind

1) IncreaseIntense()
2) DecreaseIntense()
3) DirectSetIntense()
4) DirectSetBothIntense()
5) SetValue()

Stimulate Kind

1) StartStim()
2) StartStimBoth()
3) StopStim()

Cluster Kind - IEnumerator Function

1) StimWholeAction(ampl, time, ampl2, time2)
2) StimWithTimeGap(channel, minAmpl, maxAmpl, degree, time_gap)

Introduce our SDK ： *ServoDeviceControl.cs*

- Stimulation Function Example

1) StimElectro() ：Short-time stimulate (Touch Pikachu kind)
2) StimFootUp()：Long-time stimulate (Walk on the Slope kind)
3) StimPickUpL()： Increasing stimulate with time gap (Pick up Box kind)

*** Remember the limit of stimulate time !!!

Servo turn 1 degree, the stimulate time will be at least 0.00268s.
For example:
Turn to 100ma/202 degree , which is the maximum AMPL
⇒ 202*0.00268 = 0.54136(s)
⇒ 0.54136*2 = 1.08272(s), includes turn back

Example Trigger : *TouchEvent.cs*

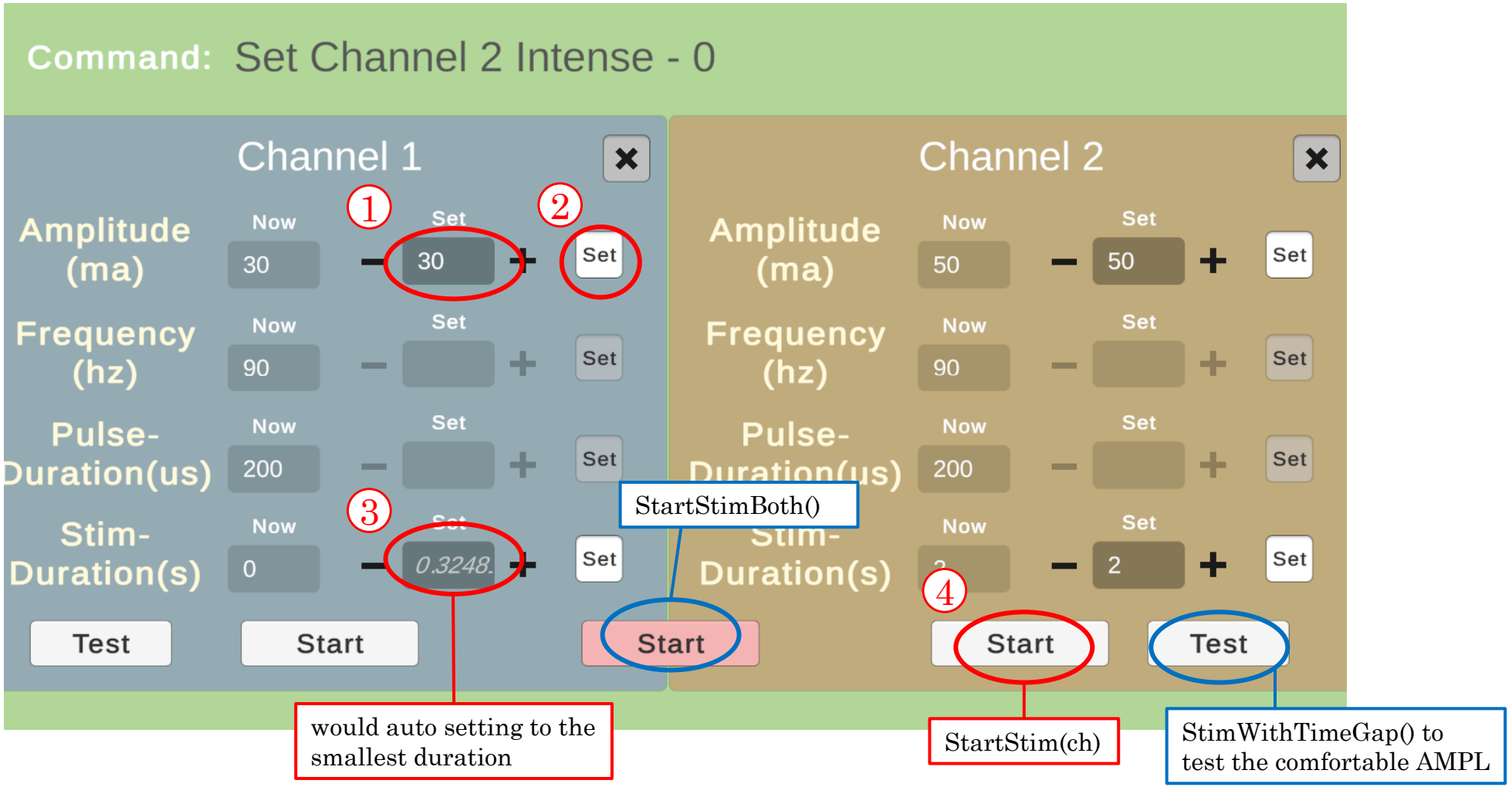
- StimElectro() Example at Touching the Pikachu

1) isTouch: Switch of touch state
2) master: SerialDeviceContorl.cs
3) Layer == 13: Hand layer(13)

In the Demo, we use TouchEvent to stimulate User when touching the Pikachu.

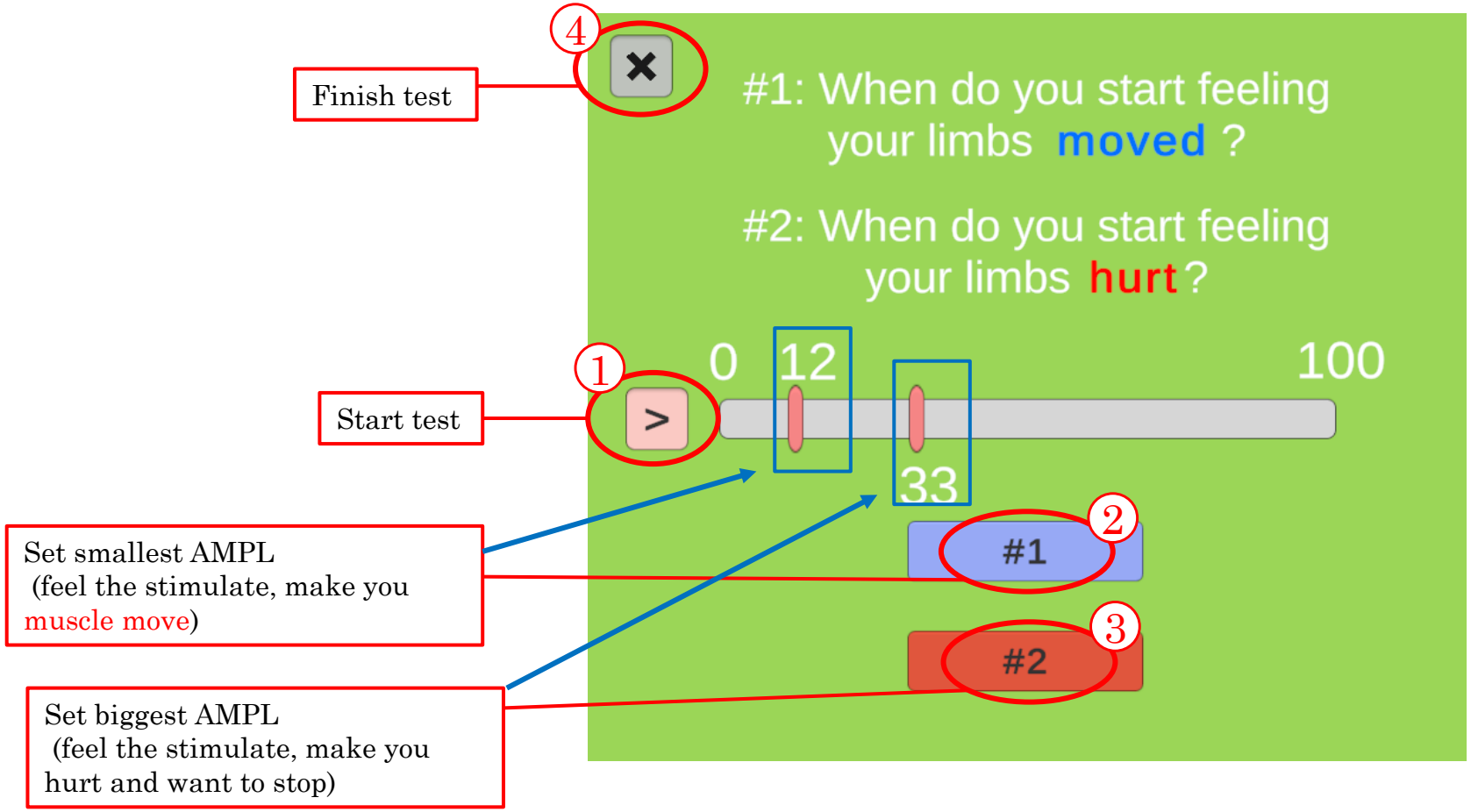
```
void OnTriggerEnter(Collider other)
{
    if(other.gameObject.layer == 13 && !isTouch)
    {
        isTouch = true;
        master.StimElectro();
        if(!sound.isPlaying) sound.Play();
    }
}

void OnTriggerExit(Collider other)
{
    if(other.gameObject.layer == 13)
    {
        isTouch = false;
    }
}
```

Example UI-Control Scene



Example UI-Control Scene

- Test Panel



Thanks for reading!

Create your own trigger event to stimulate!

Create your own stimulate behavior!

Create feedback and fun in your design!

QA Contact information: brianbaby0409@gmail.com