

## Software Livability Lab Setup

### 1) Installation of Serial Communication protocols:

Before installing any libraries run the following two instructions.

- `sudo apt-get update`
- `sudo apt-get upgrade`

Commands to run on terminal of Pi zero w:

- `sudo raspi-config`

#### Enable serial communication in pi configuration

- `sudo systemctl disable serial-getty@ttyS0.service`
- `sudo nano /boot/cmdline.txt`

**delete the line “console=serial0 ,115200” and reboot**

- `sudo reboot`

### 2) Enable SPI and I2C on the raspi-config menu

SPI installation

```
sudo apt-get install python-dev
```

```
sudo nano /etc/modprobe.d/raspi-blacklist.conf
```

Put a # before spi-bcm2708

```
mkdir python-spi
```

```
cd python-spi
```

```
wget https://raw.githubusercontent.com/doceme/py-spidev/master/setup.py
```

```
wget https://raw.githubusercontent.com/doceme/py-spidev/master/spidev\_module.c
```

```
sudo python setup.py install
```

I2C installation

Check if the I2C device is connected to the pi by running the command

```
sudo i2cdetect -y 1
```

If the device is not detected, then run the command to install the necessary tools:

```
sudo apt-get install i2c-tools python-smbus
```

### 3) **Setting up location sensors: DWM1001**

Program the anchors using the anchor\_cfg.c file by connecting the DWM development board via UART pins to the pi. Similarly, program the tag by using the tag\_cfg.c file.

Make sure to enable Bluetooth, UWB mode and firmware update. The delay can be changed as per needed in the code.

Download DWM1001 APK for android tablet. Detect the connected anchors, tags and initialize their positions.

### 4) **Wireless communication setup**

Install the Bluetooth library on pi and then install py-bluetooth.

### 5) **Make sure to add the compatibility flag to the Bluetooth settings on both the devices for uninterrupted communication.**

### 6) **When all the libraries are installed make sure to **run** the **sensors.py** file after the server is started.**

### 7) **Setting up the server**

Make sure the device(laptop) which will be used to run the server file has Linux based operating system (UBUNTU 18).

Install the Bluetooth, dbus, pybluetooth modules and then reboot.

Turn on the Bluetooth on the device and then trust the device using the following commands through command line:

```
bluetoothctl
```

```
discoverable on
```

```
scan on
```

“find the mac address of the pi and then run the following command”

```
trust “MAC ADDRESS”
```

```
scan off
```

```
discoverable off
```

```
exit
```

- 8) Run the server file once ready.

After running the server file, turn on the gait analysis box and wait for a minute. A timer will start after a minute and at the end of the timer data will be collected on the server and written to the file.

When the data is seen transmitted on the server, run the analysis file which will give an idea of the magnitude of component of forces in a 3-d live graph.

#### 9) **Collected data format**

Force(lb), x-axis acceleration, y-axis acceleration, z-axis acceleration