

User manual

1. Workbench preparation

First of all, it is necessary to adjust the workbench calibration using the four adjustable legs installed at the bottom side and the level incorporated. It is important to set the work area as parallel as possible to the ground plane, and fix the bank to ensure that the position does not change during the process.

2. Switching on the system

When switched on the main switch (at the back side), it is necessary to wait some seconds (around 30-50s) until the system has completely started. During this time, the blue led will be blinking slowly and the LCD will be showing *"Zowi workbench. Starting..."*. After this, the workbench will emit a sound and the LED will stop blinking.

At this point, it depends on the switch position (at the front side) to start the process.

If the switch is set at *"1"* the LCD will show *"Change switch to start process"*, whilst whether the position is set at *"0"*, the LCD will show *"Place shoes in Horizontal box"*, and it will be ready to start the calibration process.

Notes:

It is really important not to have any Zowi plugged when the system is switching on, to avoid communication problems (usb port assignment done by raspberry).

It helps to the horizontal offset calibration having the shoes placed in the horizontal box when the system is switching on, as the IMU sensors will be getting right measures all the time.

3. IMUs calibration

The operator must follow the display instructions to calibrate the offset of the sensors correctly. Firstly, the horizontal position is calibrated. When this calibration is right, the LCD will show *"Horizontal done.Insert Vertical"* to continue with the vertical calibration.

It is really important not to disturb the system, trying to avoid vibrations, movements etc that could interfere in the sensors calibration. If after trying to calibrate the sensor five or six times, the LCD shows *"Horizontal calib failed. Retry"*, switch off the system as shown at step 6 (Shutting down the system), and switch on it again, being sure that the shoes are correctly placed in the horizontal box.

When the sensors calibration is finished, the LCD will show *"Plug, Switch on, Put on and Push"* and the blue LED will start blinking slowly.

Note: If the workbench is moved at any point of the process, it must be repeated this step to ensure the correct calibration relative to the ground.

4. Zowi calibration

After calibrating correctly the offset of the the sensors, it will proceed to calibrate as many Zowis as desired.

To calibrate each Zowi, place it at the workbench with the face looking to the operator (or with the connector looking to the operator depending on the program loaded in the system initially, by default the option with the connector looking to the operator is loaded) and put the shoes at each foot, paying attention to use the correct shoe (top, bottom). After this, switch on Zowi, plug it and push the button. The LCD will show *"initiating communication"*.

The Raspberry Pi will try to upload the calibration program to the Zowi board. There are three possible situations:

- The calibration program is uploaded correctly. The system will continue with the calibration of each joint.
- The Zowi board does not respond after 40 seconds. The LCD will show *"Timeout. Check Zowi and push"*. Check Zowi is switched on and push the button to retry.
- The Zowi board responds but it is impossible to upload the calibration program. The LCD will show *"Connection fault. Check Zowi"*. Check Zowi is plugged and push button to retry.

When the calibration program is uploaded correctly, the LCD will show *"Communication OK. Calibrating..."* and the LED will blink quickly. Zowi will move its hips and feet to calibrate them. After various iterations trying to calibrate the four joints, there are three possible situations:

- The calibration has failed. It has been impossible to reach a calibrated position. The LCD will show *"CALIBRATION FAILED"* and the red LED will turn on. The LCD will show *"Push for a new calibration"* after a second.
- The calibration is right, so the Raspberry Pi will try to upload the Final Test program. The LCD will show *"Calibration OK. Loading Test Prg"*. If it is not possible to upload this program the LCD will show *"CALIBRATION FAILED"* and the red LED will turn on. The LCD will show *"Push for a new calibration"* after a second.
- The calibration is right, so the Raspberry Pi will try to upload the Final Test program. The LCD will show *"Calibration OK. Loading Test Prg"*. If the program is uploaded correctly the green LED will turn on and the LCD will show *"Push for a new calibration"*.

Once the process is done, switch off Zowi and unplug it. It is possible to connect other Zowi to repeat the Zowi calibration pushing the button.

5. Reset the system

At any point of the process, excepting for the step 2(Switching on the system) and 6 (Shutting down), it is possible to switch to “1” the front switch, and the system will change to step 3 (IMUs calibration).

6. Shutting down the system

At step 3 (IMUs calibration), it is possible to switch off the whole system. To do it, it is necessary to push the button for at least two seconds. The LCD will show “*Shutting down...*” and afterwards, the LCD will show nothing. When this happens, switch off the power switch (at the back side).