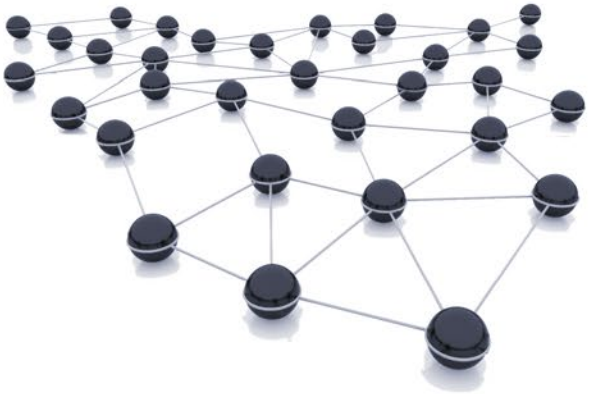
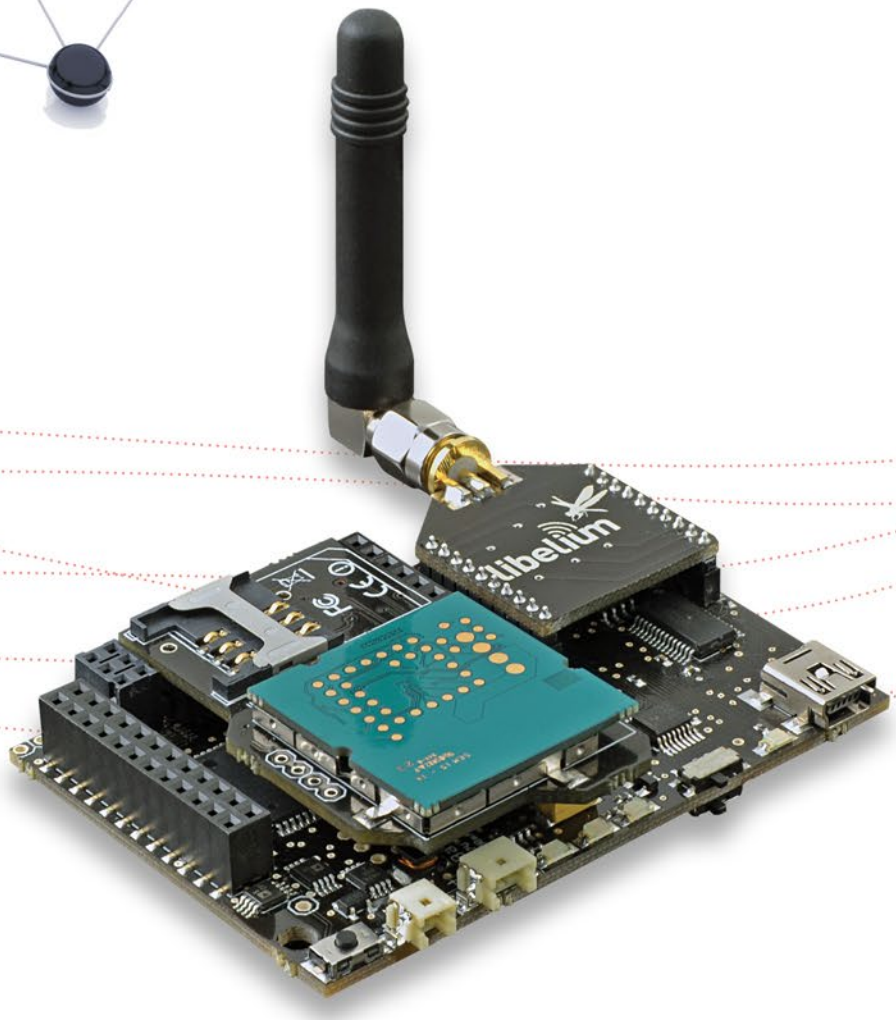
Waspmote Demo

Software Guide





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Document Version: v4.0 - 1/2014

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1. Material needed

- 4 Waspmotes
- 1 Gateway
- 4 Batteries
- 5 XBee 802.15.4
- 5 Antennas
- 1 Gases Sensor Board
- 1 Events Sensor Board
- 1 Humidity Sensor, 1 Temperature Sensor, 1 CO Sensor, 1 O_2 Sensor
- 1 PIR Sensor, 1 Liquid Presence Sensor, 1 Pressure Sensor, 1 Hall-Effect Sensor, Luminosity Sensor
- Waspmote-IDE
- Waspmote Demo Application

2. General considerations

- Waspmote Demo Application can be downloaded from **http://www.libelium.com/development/waspmote**
- Waspmote-IDE is required to upload the demo codes to the Waspmotes. Waspmote-IDE can be downloaded from **http://www.libelium.com/development/waspmote**
- Waspmote Gateway must be connected to your computer
- 4 different Waspmotes running the 'demo' codes are needed
- All the Waspmotes can be running at the same time, but the interruption detection gets slower due to the application limitations used to show the data in the computer. If you want a faster detection, please use one Waspmote at a time
- It is recommended not to connect more peripherals while running the demo
- It runs over Linux, Windows and Mac OS
- Pressing 'q' goes to initial screen at any moment
- Pressing 'r' resets all the interruptions in the demo (accelerometer and event ones)
- Pressing 'ESC' will exit the demo

***Note**: We have detected unstability in Mac OS. It is better to use Linux or Windows versions. To be fixed in the following demo version.*

3. Waspmote demo application

- The initial screen allows you to select the USB port:

Figure 1: Waspmote demo initial screen

- Once the right serial port has been selected, the main demo screen will appear

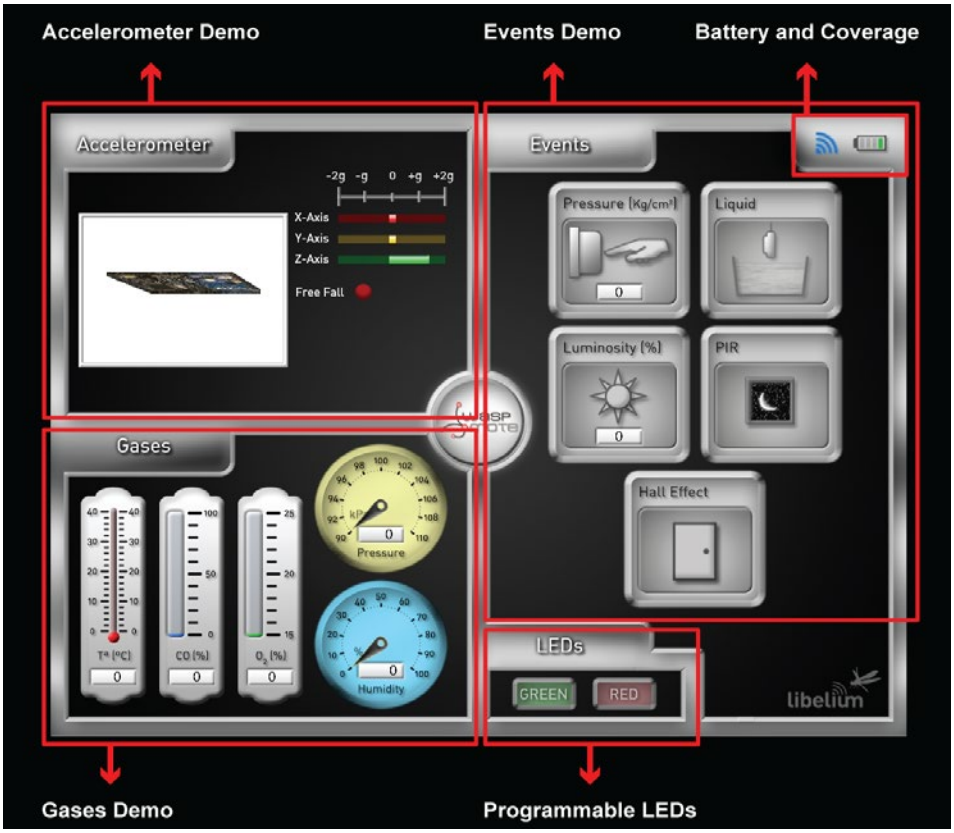


Figure 2: Waspmote demo main screen

- The main demo screen is divided in five parts:
  - Accelerometer: it shows the accelerometer's data
  - Gases: it shows the sensor measurements
  - Events: it shows the sensor events
  - Programmable LEDs: switch ON/OFF the green and red LEDs
  - Battery and coverage: it shows the battery and coverage. Only the Accelerometer demo sends this information.

4. Waspmote codes

- Waspmote demo consists of 4 different applications that provide a little show of its great potential. These 4 different applications are: Accelerometer Demo, Gases Board Demo, Events Board Demo and Programmable LEDs Demo
- Each code (.pde) must be uploaded to a different Waspmote. These ones send the data to the Waspmote Gateway which must be connected to your computer.
- This demo is only intended to be executed with 802.15.4 XBees. However, if the user wants, the pde's can be modified to send via ZigBee or 868 XBees, for example.
- By default, the MAC address set in the codes will not be a good value because your kit will have different XBee modules. So, please choose one XBee to be placed on the Waspmote Gateway and set its MAC address as the address destination in the 4 codes.

4.1. Preliminary steps

- First of all, get the XBee from the Gateway and note its MAC down.

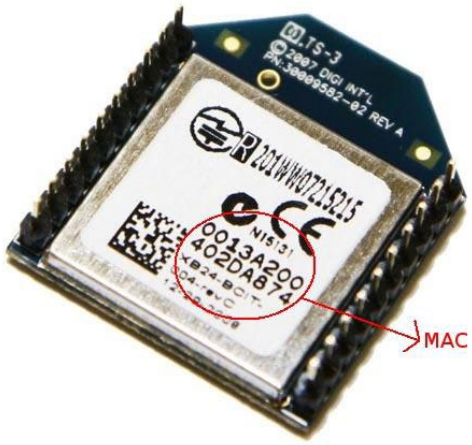


Figure 3: XBee module MAC address

- This MAC should be set in the demo codes, replacing the MAC address that is set in the DESTINATION definition:

```
char* DESTINATION="0013A2004061097E";
```

- Once the MAC has been changed, you have to upload each code to a different Waspmote

4.2. Accelerometer

- The Accelerometer Demo consists of a Waspmote sending the acceleration on the 3 axis and the interruptions captured every 100ms to the Waspmote Gateway.
- This demo shows the acceleration on the 3 axis (from -2g to +2g). Also, it shows if a free-fall interruption is generated. Besides, it shows a 3D representation of Waspmote that moves in real time.
- Limitations: the 3D representation only moves as the real one in one axis, so if you are going to show it to other clients, please have this in mind.
- Pressing 'r' will reset all the interruptions
- Code: demo_test_1

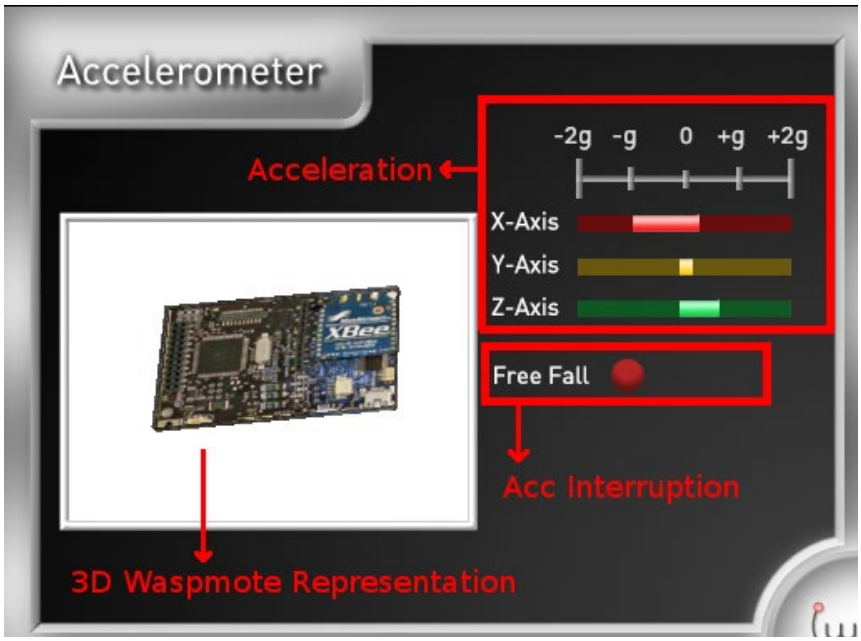


Figure 4: Accelerometer demo

4.3. Gases board

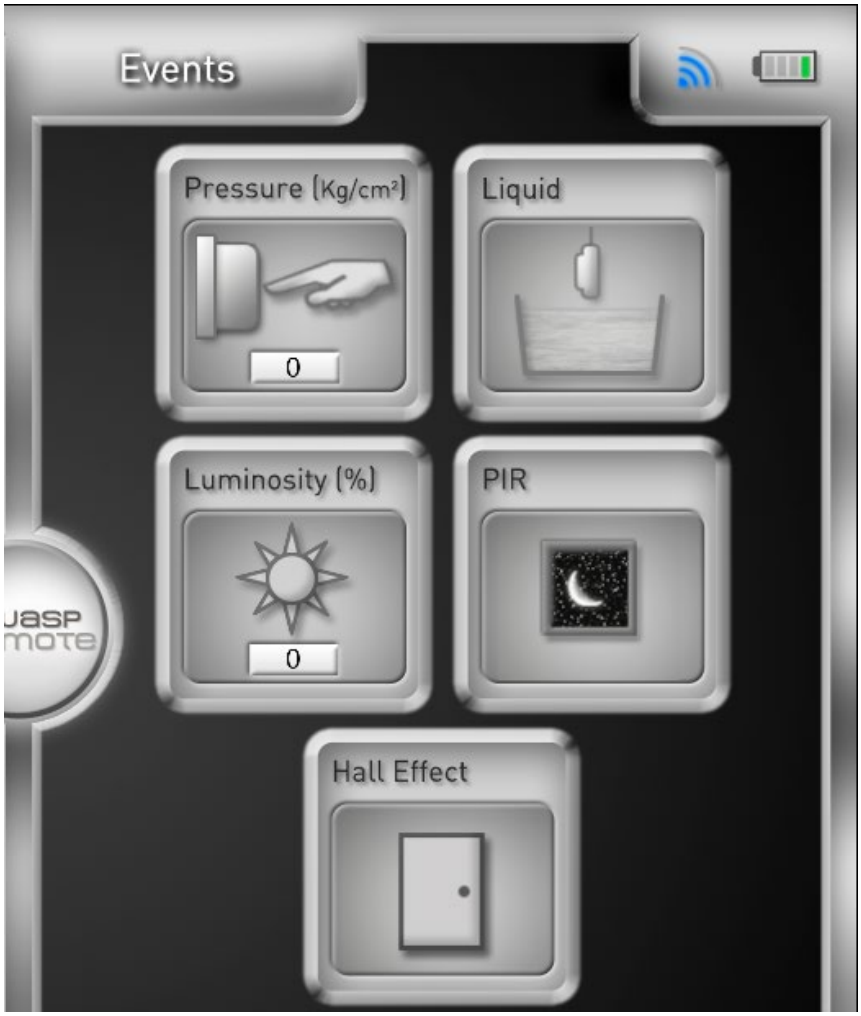
- The Gases Board Demo consists of a Waspmote sending the humidity, temperature, pressure, O_2 and CO concentration every second to the Waspmote Gateway.
- This demo shows the temperature (from 0ºC to 40ºC), the humidity (%), the CO concentration (%), the O_2 concentration (%) and the pressure (from 90 to 110 kPa). These values are got every second from the gases board and they are sent to the Waspmote Gateway. This representation is in real time.
- The sensors required for this demo are: temperature, CO, O_2, pressure and humidity.
- Code: demo_test_3

***Note**: The CO concentration is in fact the range between 0v and 3V3 returned by the sensor. The O_2 sensor concentration is calculated with a default calibration value. So, keep in mind that this demo is just used to show the potential of the platform as there is not any calibration process.*

Figure 5: Gases demo

4.4. Events board

- The Events Board Demo consists of a Waspmote sending the luminosity and pressure every second to the Waspmote Gateway. If any interruption is generated, it will be sent to the Waspmote Gateway immediately.
- This demo shows the luminosity (%) and the pressure (from 0 to 15 Kg/cm2). It also shows if PIR, liquid or hall effect have generated an interruption.
- The sensors that may generate an interruption are: pressure, liquid, PIR and hall effect.
- The sensors required for this demo are: luminosity, pressure, liquid, PIR and hall effect.
- Code: demo_test_2



4.5. Programmable LEDs

- Waspmote has two different programmable LEDs. A green LED and a red LED.
- This demo permits to set on and off both LEDs just clicking the corresponding button in the screen. This is just an example how Waspmote could be used to trigger some kind of wireless actuator system.
- Code: demo_test_4

Figure 6: Programmable LEDs demo

4.6. Battery level and coverage

- Accelerometer Demo also sends the battery level and XBee coverage. These data are not sent by the other demo Waspmotes
- The battery level is divided into 4 sections, corresponding each one to a 25% level
- The coverage is divided into 4 sections, corresponding each one to a 25% level . Try results disconnecting one antenna (or both) or getting away some distance.

5. Running the demo on your computer

- Install Waspmote-IDE
- Change the destination MAC address in the demo codes and upload each code to a different Waspmote
- Connect the Waspmote Gateway to your computer (check antennas are placed)
- Launch the Waspmote Demo executable
- Once the port has been selected properly, the demo screen will appear. It is divided on 4 parts: Accelerometer, Gases, Events and Programmable LEDs
- The information may have an initial delay because of the start-up of the devices, so don't worry if it takes some seconds to start receiving data
- The accelerometer part shows a 3D Waspmote which moves like the real one. If a free fall is detected, it is shown in the appropriate circle. Pressing 'r' will reset the interruption counter and visual boxes
- The Gases part shows the value of different sensors from the Gases Board
- The events part shows 6 sensors from the events board. All the sensors generate interruptions but the luminosity sensor. Pressing 'r' will reset the visual interruptions
- The Programmable LEDs part will send a message to Waspmote, switching on/off the specified LED.

6. Documentation Changelog

From 0.3 to 4.0

- Developed different changes in DEMO application so as to upgrade it from Waspmote v11 to Waspmote PRO. This document now refers exclusively to Waspmote PRO.