



EU Regulatory Conformance

Hereby, Sensixa Ltd declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

For the declaration of conformity, visit the Web site www.sensixa.com.

CE 0700

Notice: Observe the national local regulations in the location where the device is to be used. This device may be restricted for use in some or all member states of the European Union (EU)

FCC Statement

Hereby, Sensixa Ltd declares that

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by (manufacturer name) may void the FCC authorization to operate this equipment.

1.0 Introduction

The e-AR (ear-worn Activity Recognition) is a bio-inspired designed sensor which emulates the function of the human vestibular system in detecting body movements and orientations. By positioning the e-AR sensor on the user's ear, gait, body posture and activity information can be captured by the miniaturised sensor. It has been widely applied and trialled in sports, well being and healthcare applications.

From the trials conducted, numerous requests have been received for applying the e-AR sensor for other applications, such as long term activity monitoring for elderly patients. In response to the potential demands, the e-AR lite sensor has been designed targeting long term monitoring applications. This document provides the necessary information for the CE and FCC compliance examinations.

2.0 e-AR lite sensor system

The e-AR lite sensor mainly consists of an e-AR lite sensor and a base station. The ear-worn e-AR lite sensor is designed to capture the posture and activity of the user. The base station, on the other hand, is simply a charging station and an adaptor for linking the sensor to a PC. Figure 1 depicts the sensing system diagram.



Figure 1 e-AR lite sensor and base station

2.1 e-AR (ear-worn Activity Recognition) lite sensor

The e-AR (ear-worn Activity Recognition) lite sensor, as shown in Figure 2, is a bio-inspired sensor designed to emulate the main functions of the human vestibular system. By positioning the sensor on the ear, the sensitive sensor can capture the similar information as per the human inner ear, and detect the posture of the person.



Figure 2 The e-AR (ear-worn Activity Recognition Sensor) lite sensor

The e-AR sensor mainly consists of a MEMS based 3D accelerometer sensor, a microcontroller, a radio transceiver with USB interface, a flash memory and a rechargeable battery. The MEMS based 3D accelerometer is a micro mechanical sensor which can measure the acceleration with regard to gravity. The typical sampling frequency is 1Hz per axis. The sensor is designed with a microcontroller which can be programmed and configured for different applications. The low power radio transceiver, with maximum data rate of 2Mbps, enables real-time transmission of sensor data to a receiver, and the radio transceiver has a built-in USB interface where the sensor can plug onto a PC via the base station for downloading the sensor data. The on-board flash memory can be used to store sensor data, and it can store up to 1 week of raw accelerometer data. With the low power processor and radio transceiver, the e-AR lite sensor can operate continuously for 1 week after it is fully charged. In addition, to ensure reliability of the sensor, the sensor is designed to be water proofed and it can operate under up to 1 metre of water.

2.2 e-AR Lite base station

The base station is simply an adaptor for connecting the e-AR lite sensor to a PC, and it is a docking station for charging the battery of the e-AR lite sensor, as shown in Figure 3.

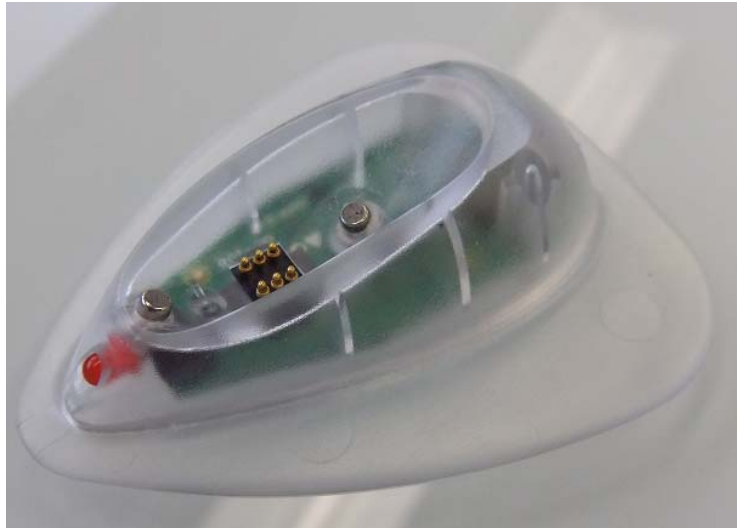
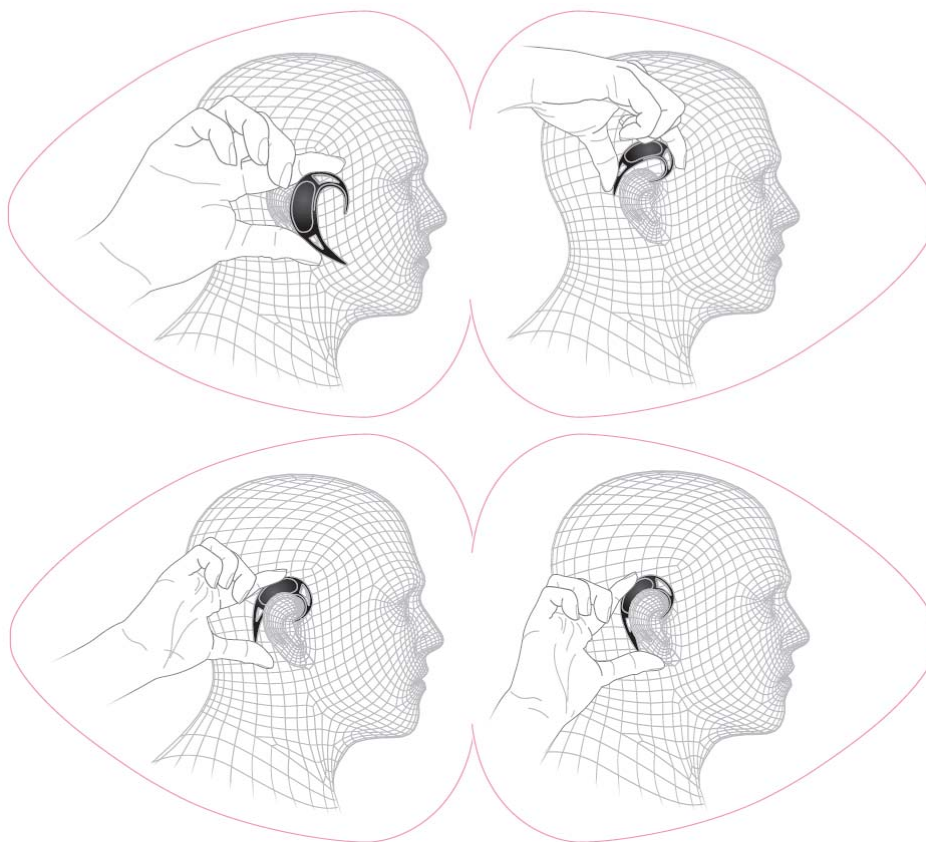


Figure 3 e-AR lite Base station

The base station is designed to connect to a PC or a USB power adaptor with a micro USB connector. To ease the docking of the e-AR lite sensor and provide secure connections, permanent magnets are embedded on the base station. When an e-AR lite sensor is docked onto the base station, the LED at the front of the base station will light up and the e-AR sensor will be directly connected to the attached PC via the connecting pins on the base station.



SAFETY INSTRUCTIONS

- Read, follow and retain all instructions, and heed all warnings.
- Do not use this apparatus in water, heavy rain or damp environment.
- Only use the attachments, accessories or cables provided or specified by Sensixa Ltd.
- Do not attempt to service yourselves and refer all servicing to qualified service personnel.
- Do not attempt to disassemble, drop, crush, bend, puncture, microwave, paint, shred, or incinerate the apparatus.
- Do not operate the apparatus beyond the specified temperature.
- Clean only with dry cloth.
- Keep away from small children, as it contains small parts which may present a choking hazard to small children.
- Do not use this apparatus near potentially explosive atmospheres.
- Do not use the apparatus in an aircraft, or environment that prohibits the use of wireless or electronic devices.
- If you use any personal medical device, such as pacemakers, hearing aid, consult the device manufacturer or your physician to determine if it is adequately shielded from radio emissions from the apparatus.
- Dispose the apparatus properly according to local laws and regulations.

LIMITATION OF LIABILITY

This instruction is provided "as is" without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for any particular purpose, or non-infringement of the third party's right.

This instruction could include technical inaccuracies or typographical errors. Changes are added to the information herein, at any time, for the improvements of this instruction and/or the corresponding product(s).

DISCLAIMER

In no event shall Sensixa Ltd., the product developer or the manufacturer, be liable to any party or any person, except for replacement or reasonable maintenance of the product, for the cases, including but not limited to below:

1. Any damage and loss, including without limitation, direct or indirect, special, consequential or exemplary, arising out of relating to the product;
2. Personal injury or any damage caused by inappropriate use or negligent operation of the user;
3. Unauthorised disassemble, repair or modification of the product by the user;
4. Inconvenience or any loss arising when sensor information is not acquired, stored or displayed, due to any reason or cause including any failure or problem of the product;
5. Any problem, consequential inconvenience, or loss or damage, arising out of the system combined by the devices of third party;
6. Any claim or action for damages, brought by any person or organisation due to violation of privacy with the result of data captured or information inferred by the sensor.

e-AR Lite sensor technical specification

e-AR Lite sensor Technical Specifications	
Operating voltage range	2.7-3.6V
Radio Operating frequency	2400-2483.5 MHz
Maximum radio output power	0dBm
Radio Receiver Sensitivity	-82 dBm
Maximum GFSK data rate	2Mbps
Operating Temperature	-10 to 40°C
Sensing Range	±3g
Sensing sampling frequency	1Hz to 500Hz
Extended Memory	16MB
Program memory	32KB (MSP430F2274), 32KB (nRF24LU1+)
RAM	1 KB(MSP320F2274), 2KB (nRF24LU1+)
Battery type	Lithium Polymer
Battery cycle life	≥300 cycles
Battery capacity	45mAh
Battery life	3 hours(real-time mode)/12 hours(storage mode)
Operating voltage	3V
Water resistant	IP67