

Deliverable 3.3

"Helicopter sensors description and installation procedure"

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With the support of



Project Acronym:

HELICOPTER

Project full title:

HEalthy Life support through COmPrehensive Tracking of individual
and Environmental Behaviors

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1. INTRODUCTION

The Helicopter System uses clinical devices and a home sensors network, in order to monitor the behaviour of people living in their homes.

All sensors and devices use wireless technologies, to simplify the installation phases, minimizing the invasiveness.

In this document a brief description of the Helicopter System user's documentation is provided.

In chapter 2, the devices of the home sensors network are presented in details. To set up the wireless sensors network, an automatic procedure has been developed and a software installation tool has been devised. The automatic tool, guides the installer to insert, one by one, the device in the wireless network.

In chapter 3, a step by step sequence of operations, needed to install the home sensors network, is illustrated.

In chapter 4, the clinical devices and the instruction of use are presented.



2. HOME SENSORS DESCRIPTION

The wireless sensors network of the Helicopter System is composed of devices that communicate with the the Supervisor System PC (the Lenovo ThinkCentre M53) by the means of a ZigBee connection.

Devices must be prepared and placed in the right place in the home and then inserted in the network.

Before, the network must be created and then the devices can “enter” in the network according to the procedure described in chapter 3.

Device of the wireless sensor networks are presented below.

NETWORK COORDINATOR

Is the basic element of the wireless network.

It plays a key role in the handling of the wireless sensors network, enabling the communication between the sensors and the Supervisor System PC (the Lenovo ThinkCentre M53).

It consists of a USB-key that must be plugged into a USB port of the Supervisor System PC.

Power supply: via USB.



ROUTER

Is the device that extends the wireless network covering.

It is used only in case a device is too far from the Supervisor System PC, or an obstacle (as walls or furniture) reduces the intensity of the radio signal.

Power supply: via standard USB Power Adapter.



WEARABLE MuSA (Multi-Sensor Assistant)

Is the wearable wireless sensor which allows to request assistance by pressing the help button.

It also allows to automatically identify a fall.

Furthermore, it enable the identification of the person who is wearing it.

Power supply: internal rechargeable battery, that are recharged by a microUSB Power Adapter.

WARNING: The battery will likely be depleted before the first usage: keep the USB cable plugged in from the moment you start installing this device to (at least) the moment you finish the whole installation



BED

Is used to check the presence of a person on the bed.

It consists of a pad to be placed on top of the mattress (under the bed sheet) and connected to the wireless transmitter.

The photo on the right shows the BED Transmitter.

Power supply: two AA alkaline batteries.



The photo on the right shows the BED pad (dimensions: 66 x 51 cm).



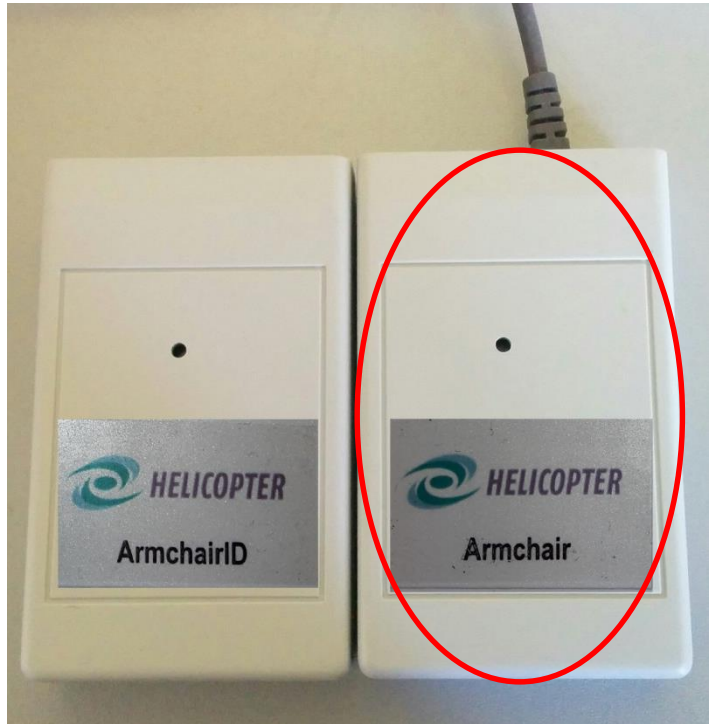
CHAIR

Is used to check the presence of the person on the chair/armchair.

It consists of a pad to be placed on top of the chair/armchair (under the eventual cushion) and connected to the wireless transmitter.

The photo on the right shows the CHAIR Transmitter.

Power supply: two AA alkaline batteries.



The photo on the right shows the CHAIR/ARMCHAIR pad dimensions (dimensions: 38 x 25 cm)



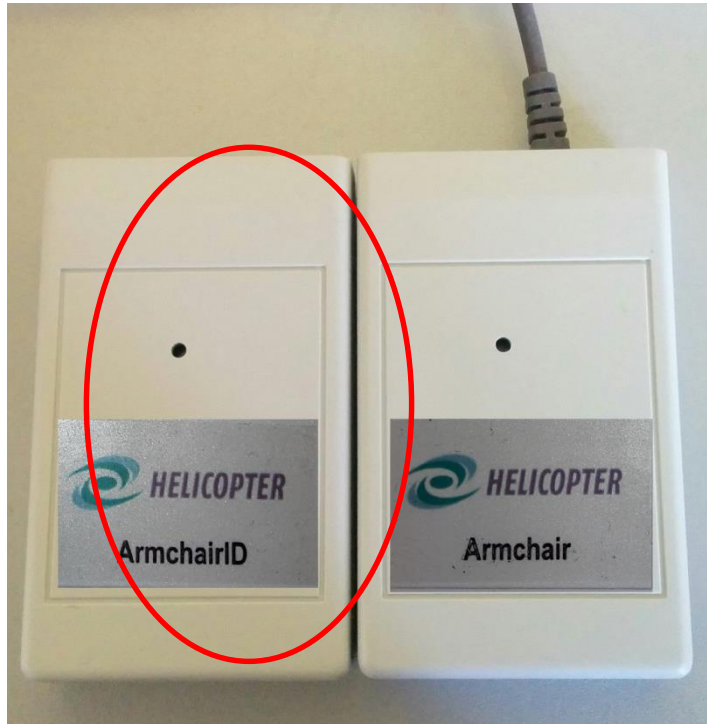
CHAIR ID

Is associated to the chair sensor and it enables the identification of the person sitting (or standing up) on the chair.

The photo on the right shows the CHAIR Identifier Module.

Power supply: two AA alkaline batteries.

WARNING: if only one wearable is included in a kit, do **NOT** install this device!



FRIDGE

Is placed on one of the shelf of the fridge, in order to detect if the door is open/closed, and other local parameter (as the temperature and the humidity).

The photo on the right shows the FRIDGE Transmitter Module.

Power supply: two AA alkaline batteries.



FRIDGE ID

Is associated to the fridge sensor and it allows to identify who is opening/closing the fridge.

The photo on the right shows the FRIDGE Identifier Module.

Power supply: two AA alkaline batteries.

WARNING: if only one wearable is included in a kit, do **NOT** install this device!



DRAWER

Is used to check if a drawer is open or closed and it identifies who is performing the action (who is opening or who is closing the drawer).

It is composed by the Transmitter and the Magnetic Contact.

The Magnetic Contact must be connected to the Transmitter by means of a short wired connection.

The Transmitter must be placed inside the drawer (on the mobile part).

The photo on the right shows the DRAWER Transmitter Module.

Power supply: two AA alkaline batteries.



The photo on the right shows the DRAWER Magnetic Contact.

The Magnetic Contact has two elements: the contact and the magnet.

The Contact is fixed on the mobile part of the drawer and is connected with the Transmitter by a short cable provided by a jack connector.

The Magnet is fixed on the stationary part of the furniture.

Contact and Magnet should be installed in parallel, and they have to correspond to each other, when the drawer is closed.



WC

It allows to know if someone is using the WC and it identifies that person.

Power supply: **four** AA alkaline batteries.

NOTICE: despite being composed of two boxes, the WC sensor is a “single sensor” and NOT a “dual sensor”. For this reason, during the installation procedure it requires a single operation to be included in the network.



CLINICAL

It identifies the person who presses the button (the button is different from the one showed in the picture).

It must be used before taking any measurement with the clinical sensor.

It enables the identification of the person that is using the clinical devices.

Power supply: two AA alkaline batteries.

WARNING: if only one wearable is included in a kit, do **NOT** install this device!



3. HOME SENSORS INSTALLATION PROCEDURE

3.1. SERVER SETUP:

Use Tuxboot to create an image of the OS on a USB Stick. Download the .ISO from

https://sigmund.eng.unipr.it/clonezilla-live-HELICOPTER_2015-11-14-img.iso

(username helicopter-pilot-setup, password H3l1-P1l0t)

Power up the Server and enter the BIOS by pressing F1. In the "Power" tab select "After Power Loss" and select "Power On", in the Security tab check that "Secure Boot" is disabled, in the Startup tab select "Boot Mode" and select "Legacy Only", and enable the Keyboardless operation.

Turn off the Server, plug in the Installation Stick and turn it on. The Clonezilla screen shows up: select "Clonezilla live with HELICOPTER..." and proceed with the installation.

When the installation is over enter the BIOS again and in the Startup tab select "Primary Boot Sequence" and move the Sata 1 Hard Drive at the top

3.2 INTERNET CONNECTION CONFIGURATION:

The local internet network must be configured to allow the access to the MicroServer. In order to do so:

- Configure the local Router\Gateway to reserve a fixed IP address for the server
- Configure the NAT service to allow the access from internet to the MicroServer on the SSH port (22)
- Configure the firewall to allow this access

After that, create a configuration file via the VSRO utility available at:

<http://vision-systems.ro:8590/HSConfigure/>

(pay attention to the HS ID parameters!)

Then copy the generated file ('hs.properties') to the folder /HSCONFIG in a USB stick (do not use the same USB stick used for the installation). Plug the USB stick and the Coordinator into the server (the Coordinator must be placed in the USB **port 4** in the **back** of the PC) and switch it on. The configuration should start automatically and last at most 5 minutes. After that remove the USB stick and leave the Coordinator plugged in.

If the Server is not connected via cable to the LAN you will need to configure the WiFi connection manually (but you will still need to do the above passage because of the HS ID). Follow this guide to do so

<http://askubuntu.com/questions/464507/ubuntu-14-04-server-wifi-wpa2-personal>

(to login into the Serve: Username: helicopter-user Password: hel1c0pt3r-p@ss).

Otherwise you will have to buy a WiFi-to-Ethernet adapter, and link the server to the adapter using a Ethernet cable (highly recommended).

3.3 ZIGBEE NETWORK INSTALLATION PROCEDURE

- Insert the Coordinator USB-key in the frontal USB port (1) of the PC (only PC below), switch on the PC and check that the green light on the Coordinator is ON.
- Using his personal laptop or another computer, connected to the same local network (home LAN) of the PC, open the browser (**N.B. Firefox ver. 42.0 is highly recommended**)
- Type in the browser navigation bar the IP address of the PC, as set in the auto configuration utility, provided from VISRO
- Proceed with ONE SENSOR AT A TIME.

PAY ATTENTION: DO NOT PUT BATTERIES INSIDE SENSORS NOT CURRENTLY INSTALLING!

1. To insert a sensor into the network, you must OPEN the network, by gently pressing the button on the coordinator, using a non-conductive instrument (like a toothpick)





2. put the batteries in the sensor you are installing:
 - **"Single sensors"**: open the battery slot and put the batteries in; then close the slot and wait until it appears in the installation page
 - **"Double sensors"** (EXCEPT for the toilet sensor): open the battery slots, put the batteries in the right slot (seen from the back with the battery slot at the bottom) before, and check that the sensor appears in the installation page; then proceed opening again the network (see above, point 1) and put the batteries in the left slot, then wait for it to appears in the installation page. Close the slots.
 - **WC sensor**: is a "single sensor" (despite being composed of two boxes); open the battery slots; put the batteries in the right slot (seen from the back with the battery slot at the bottom) before and then put the batteries in the left slot; wait for it appears in the installation page. Close the slots.
 - **ROUTER** (only in case of problem): if a sensor does not appear in the installation page it could be a problem related to the covering of the wireless network, for example because the sensor is too far from the Coordinator or there are some obstacles (as walls or furniture); to extend the wireless network covering range a Router is needed. In order to install a Router, first open the network (see above, point 1) and plug the router in a standard USB power supply. Then wait for the Router to appear on the installation page. Once the router is installed, you must repeat the inclusion procedure of the sensor for which the installation procedure did not correctly go through. So, remove the batteries from the sensor , open the network as explained in point 1, reinsert the batteries in the sensor and wait again for it to appear on the installation page.
 - Once all the sensors appear in the installation page, click "Done". Be careful, it's an irreversible operation!

RESET PROCEDURE

In case a sensor does not appear on the installation tool page, despite having a good radio signal, you can try the reset procedure as follows:

- a. Remove the batteries
- b. Press the button on the front and, while it is still pressed, insert the batteries
- c. Finally, after about 3 s, release the button
- d. PLEASE NOTE that, in case of a double sensor (EXCEPT for the toilet sensors, see below) for which one did not get included, the above procedure should be carried out just on the non-included part. Obviously, if both sensors did not get included, the procedure must be done for both.
- e. RESET PROCEDURE FOR THE TOILET SENSOR: for this device, only one part features a reset button (namely, the one with the small hole). In this case, remove the batteries only from this part, and follow the above steps.
- f. RESET PROCEDURE FOR THE MUSA DEVICE: you cannot remove the batteries from this device so you have to turn it off by pressing the blue On\Off button on the front (keep it pressed for about 4 seconds. It blinks THREE times when it turns OFF, it blinks SIX times when it turns ON). Turn the device OFF and release the blue button. Then press the red button and while keeping it pressed push the blue button and keep them pressed together. When the device turns ON, release the blue button but keep the red button pressed for other 3 seconds. The device takes about 12 seconds to turn on (before the green led starts blinking), so you'll have to keep pressed the two buttons for this whole time, until you see the green led blinking. Then release the blue button and keep the red one pressed



4. CLINICAL DEVICES USER'S DOCUMENTATION

METEDA provides the clinical devices for the control of the most important clinical parameters. All the devices use the bluetooth technology for the data exchange. Simple and easy to use even by elderly people and without the assistance of a caregiver (formal or informal).

Precision Scale

The Precision Scale with bluetooth communication system provides highly accurate and precise measurements to 0.2 lb (0.1 kg). This scale has a "motion tolerance mode" to provide an accurate reading for those patients who are unsteady on the scale, a feature especially beneficial for elderly or fatigued patients. This scale has a high weight capacity of 450 lb (200 kg).



Instruction

We advise you to weigh yourself every day in the morning, preferably before breakfast. Touch the blue button (indicated by the arrow), wait for the "0" and step on the scale. The weight will be sent directly to the database that contains all data relevant to the user. To be identified by the system you need to wear the "Musa" sensor.

Blood pressure monitor

Fully automatic Blood Pressure monitor validated to highest grade, 100 measurement memory, Irregular Heartbeat Indicator, Clock display updates when data is transmitted. Is equipped with Bluetooth® wireless communication technology, giving it extended and advanced capabilities. Ideal for the home and professional health provider. Professional accuracy via oscillometric method. One button operation, this device allows to measure the:



- Systolic pressure (mmHg)
- Diastolic pressure (mmHg)



- Pulse rate (bpm)

Instruction

We recommend you to use this device when requested by the system or in case of need. Switch on the instrument by pressing the button indicated by the arrow, to wear the bracelet as shown in the figure placed on the same bracelet and start the measurement by pressing the button again. The measurement will be sent directly to the database that contains all data relevant to the user. To be identified by the system you need to wear the "Musa" sensor.

Blood glucose monitor

ForaCare is designed to let the maximum ease of use. No coding is required. Only takes 0.5uL blood sample and you get a result within 5 sec. It has an alarm function to remind a user to take 4 measurements a day. Memory for up to 1000 testing results with before/after meal/quality control indicator and date/time. Additionally, the strip ejector helps prevent contagion from blood. The blood glucose monitor can check the glucose level in only one unit of measurement: mg/dL or mmol/L.



Instruction

We recommend you to use this device when requested by the system or in case of need (if not diabetic people; for diabetic people follow the doctor instruction). Switch on the instrument by pressing the button indicated by the arrow, prick your finger and place a drop of blood on the strip. Now insert the strip into the meter and wait a few seconds. The measurement will be sent directly to the database that contains all data relevant to the user. To be identified by the system you need to wear the "Musa" sensor.

CLINICAL DEVICE FEATURES

- Measurement frequency:
 - Devices could be used multiple times during the day (max ~4 times a day)



- Measurement payload:
 - Small json objects containing monitored variables, timestamp, unique user id
- Transmission protocol
 - Bluetooth SPP
- Basic programmability features:
 - set device timer, memory configuration, unit of measures.

