Keeping People Safe

Minds for Meta

23-08-2022

SMARTHERO solution

A Unique End-To-End Personal Protection Service

SMARTHERO monitors employees biometric data & geolocation 24/7.

In a life-threatening emergency, the AI automatically alerts the operations centre, where operators can immediately alert the Team Manager and/or Project Manager that will deploy the nearest emergency services.

SMAiRTHERO Ecosystem

Lone Workers can use SmairtHero during the entire day. All is needed is an Internet connection.

Working outdoor, at home or on the road, employees always have a caretaker watching at them.

SMARTHERO technology at glance

BIOMETRIC SENSOR

- 1.5 Day battery life
- Bluetooth Long Range

DETECT:
- Every single heart-beat 24/7
- Skin temperature
- SpO2
- PPG
- Rip out detection
- Detection of accidents & falls

HARDWARE:
- IP68
- Panic button
- USB-C for charge

SMARTPHONE APP

- Android 5+ with GMS
- Apple 12+
- BLE
- (for Android only at least 1,5 GB RAM)

ARTIFICIAL INTELLIGENCE

- AI / ML Features
- Scalable & powerful
- Filters false alarms
- Automatically alerts
- Cloud-based
- MICROSOFT AZURE Farm
- API FHIR connector (Medical Record)

OPERATIONS CENTRE

- WebApp ready to use
- Multilingual

Operators can see:
- GPS location
- Live analysis of biometrics

SMARTHERO Certifications

Biometric Sensor Certifications

CE 0425 Medical Device

RoHS

SSL Encryption

IP68

Italian Ministry of Health

System & Company Certifications

GDPR

OWASP NIST

2021/22 Penetration Tests Certifications

UNI CEI EN ISO 13485:2016 Engineering & production of wearable medical device

UNI EN ISO 9001:2015 Quality of work process

Italian Ministry of Defence

Patents End-to-end System

USA 10,796,550 B2 Dated 6-10-2020

JPO

JAPAN 2019-536345 Dated May 2022

European Patent Office

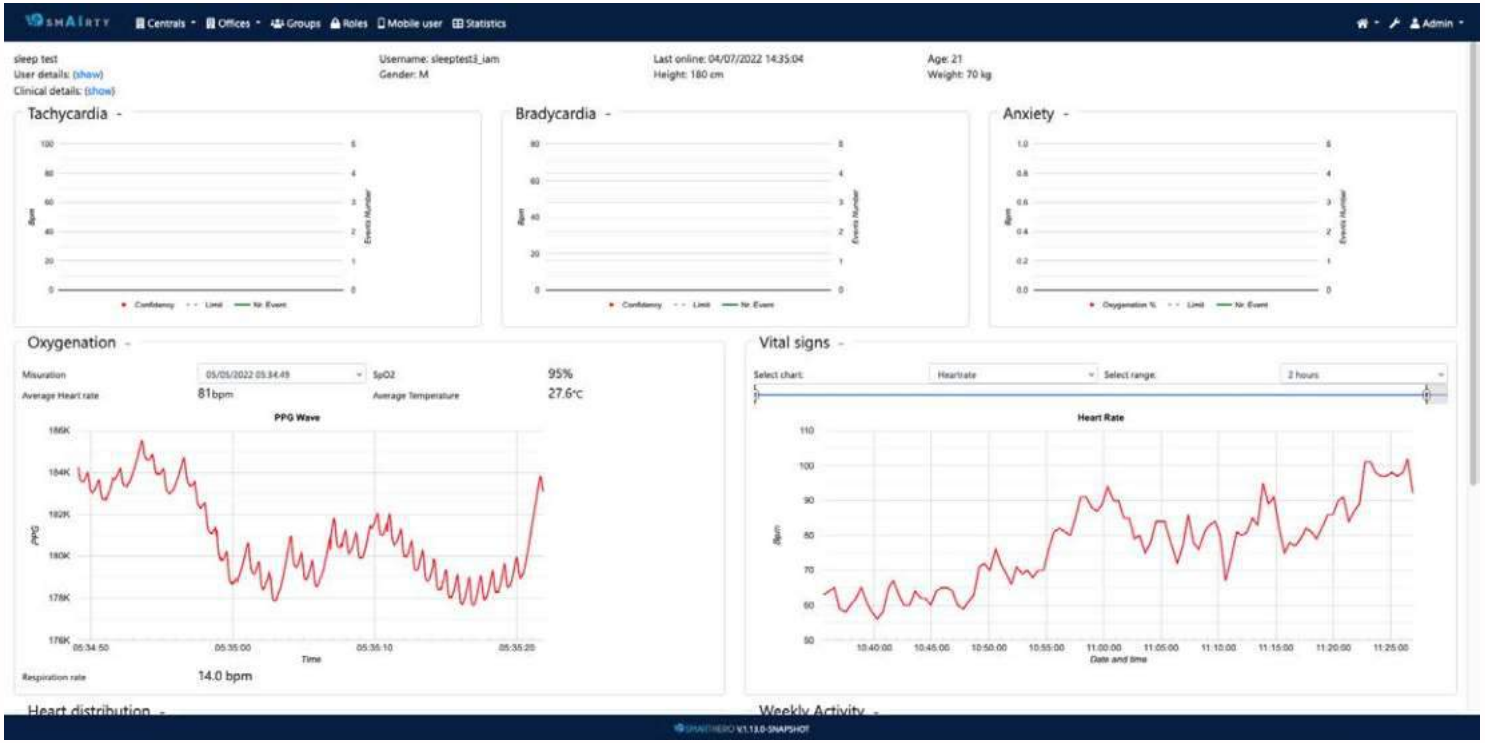
Australian Government IP Australia

Pending Patentes: EU; China; Australia

SMARTHERO Diagnosis support

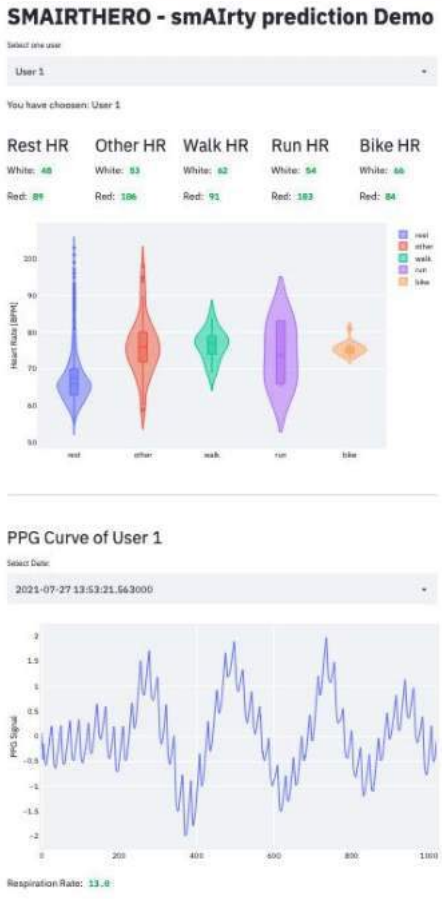
Medical dashboard to see diagnosis aid data in real time and to see those recorded over time

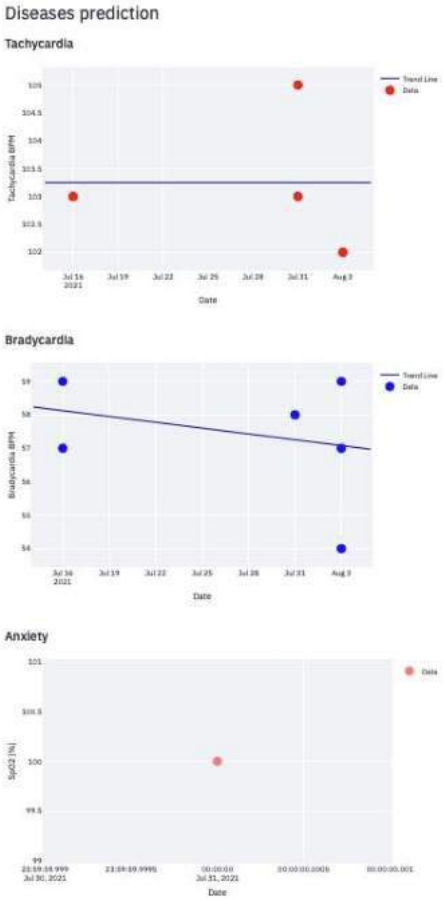
SMARTHERO Diagnosis support

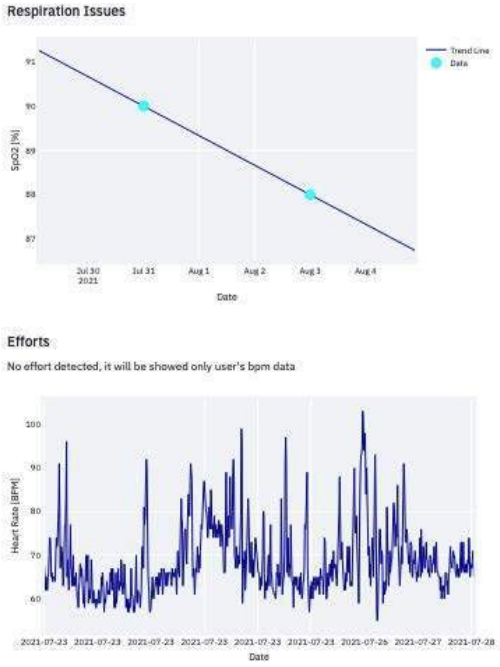


Medical dashboard to see diagnosis aid data in real time and to see those recorded over time

SMAiRTHERO Diagnosis support





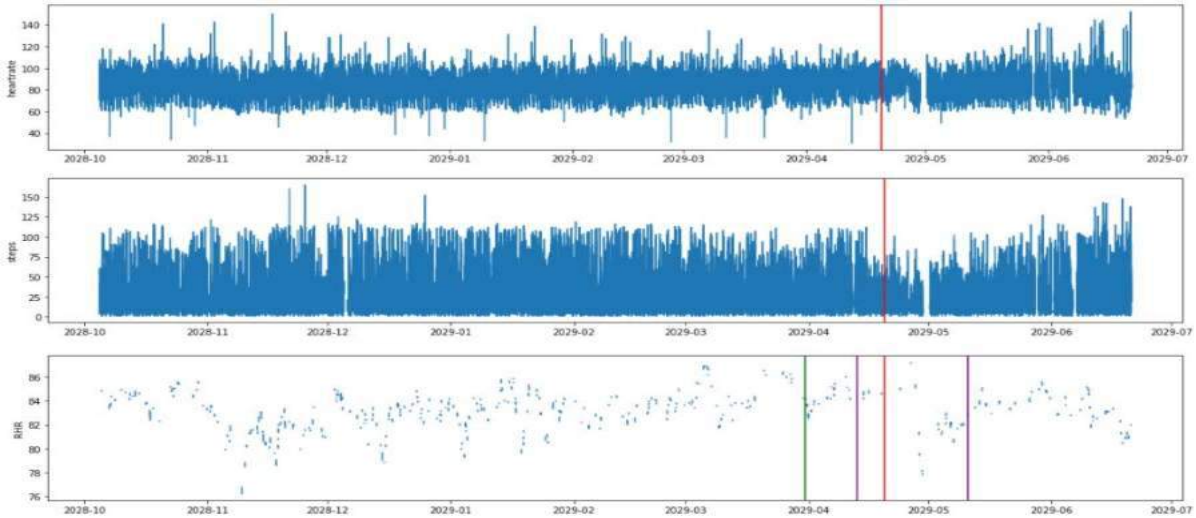


Examples of patients, suffering from various pathologies

SMAiRTHERO Covid Detection from wearables using LSTM Neural Network

MAIS

- Detect anomalous points and patterns in vital signs as deviation from baseline
- The Neural Network learn the baseline and is able to early identify anomalies
- Could be an alarm bell for Covid (or other disease) onset



Symptom date
Divide baseline from the detection period
Infectous period

SMAiRTHERO IoT Platform

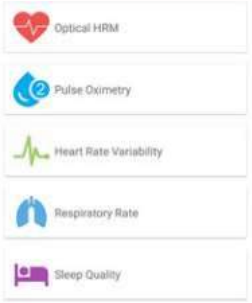
The system is designed as an IoT platform

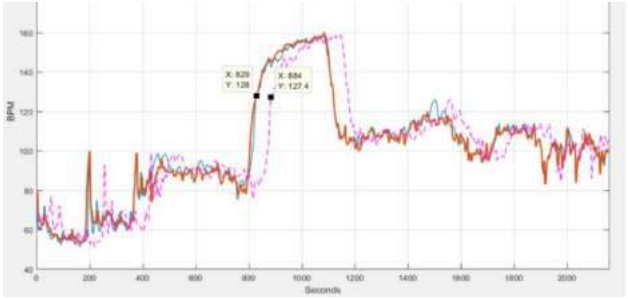
- ➢ It can read other sensors that are already available (scales, sphygmomanometers, environmental sensors, etc.)
- ➢ It can simply collect data and make it available via the back-office
- ➢ We can identify new use cases with the customer and train the AI engine for those purposes

Both the hardware, the software and the AI engine are entirely owned by MAIS, which internally owns the skillset to develop various custom applications.
A couple of examples:

- ➢ Using our ecosystem to periodically collect biometric data that will enrich the patient's online medical record
- ➢ Use our ecosystem for the collection of useful data to give a key to understand the state of health of the person and any positive or negative derivatives

SMARTHERO Medical quality





HRM and heart rate variability are very similar to data taken with the electrocardiogram

Only Android

SMARTHERO AI … Dataset

The Goal was to create an AI engine that could collect data about user X and build a digital avatar that would give us the correct centroids and patterns about X and be able to modify them over time.

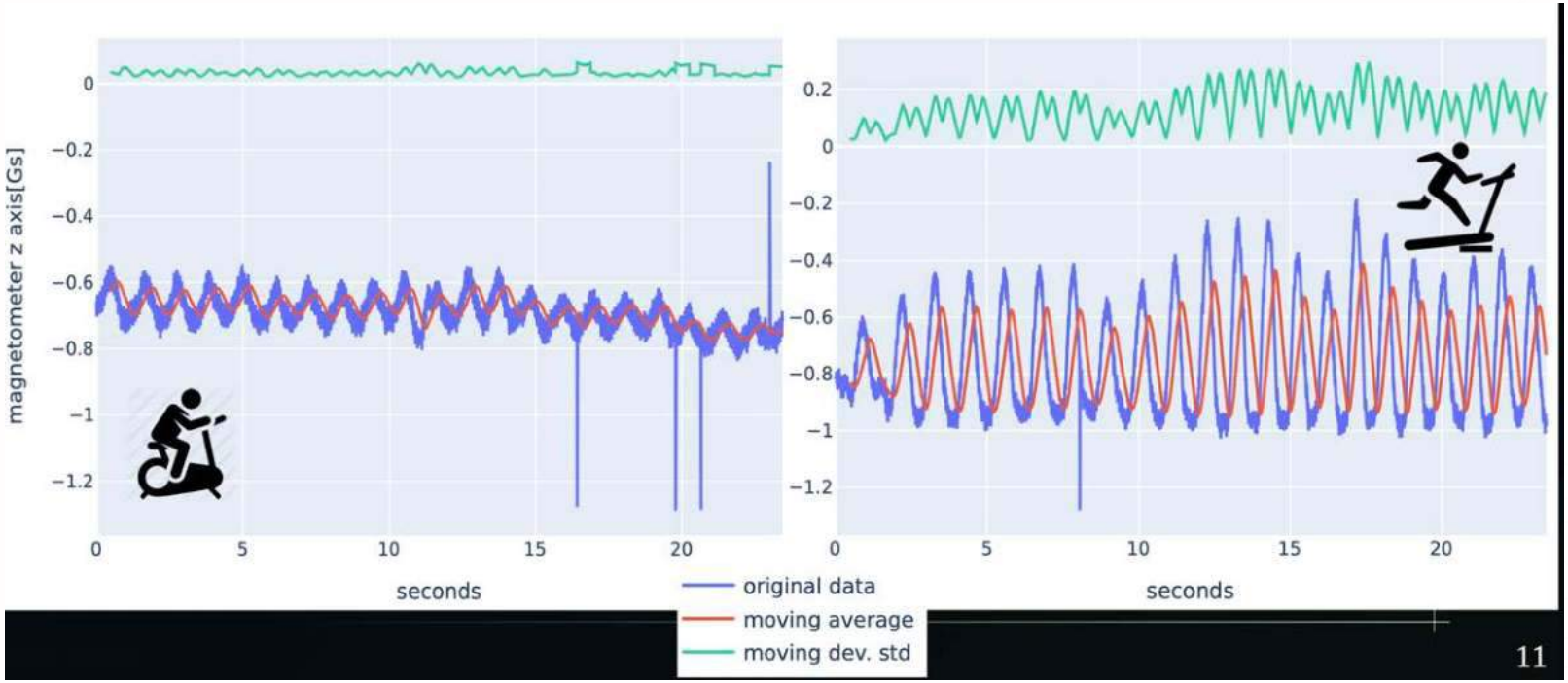
To do this, we chose a supervised approach.
We downloaded from Physionet.org some dataset.
We collected a large amount of data with our devices, using subjects who lent themselves to the data collection
The population was of different sexes, ages, and lifestyles.

For each subject, we collected data while:
Was sleeping
Working at a computer (sedentary activity)
Walking
Running
Cycling at low intensity
Cycling at high intensity

We labelled all the data.
We cleaned the datasets.

SMARTHERO AI … Features Extraction

From original data to processed data



SMARTHERO AI … Features Extraction

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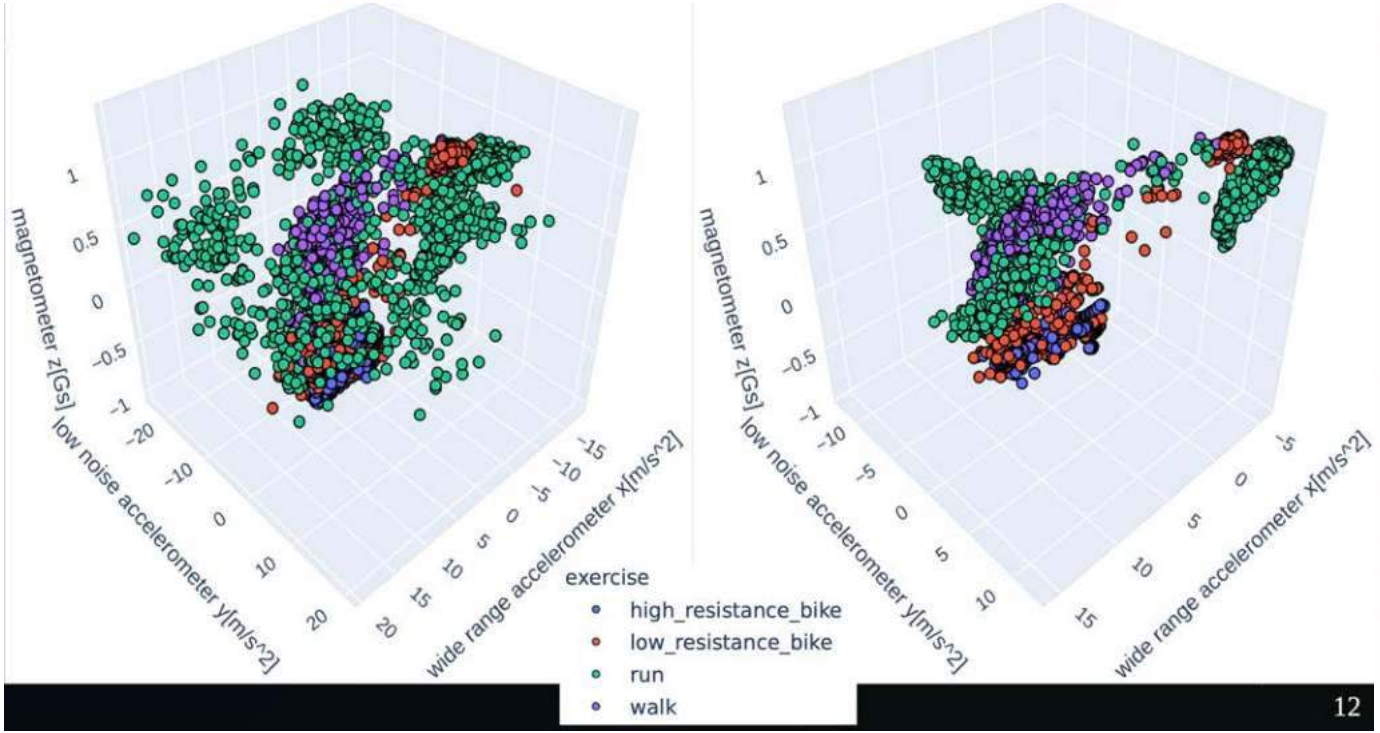


SMARTHERO AI ... Algorithms

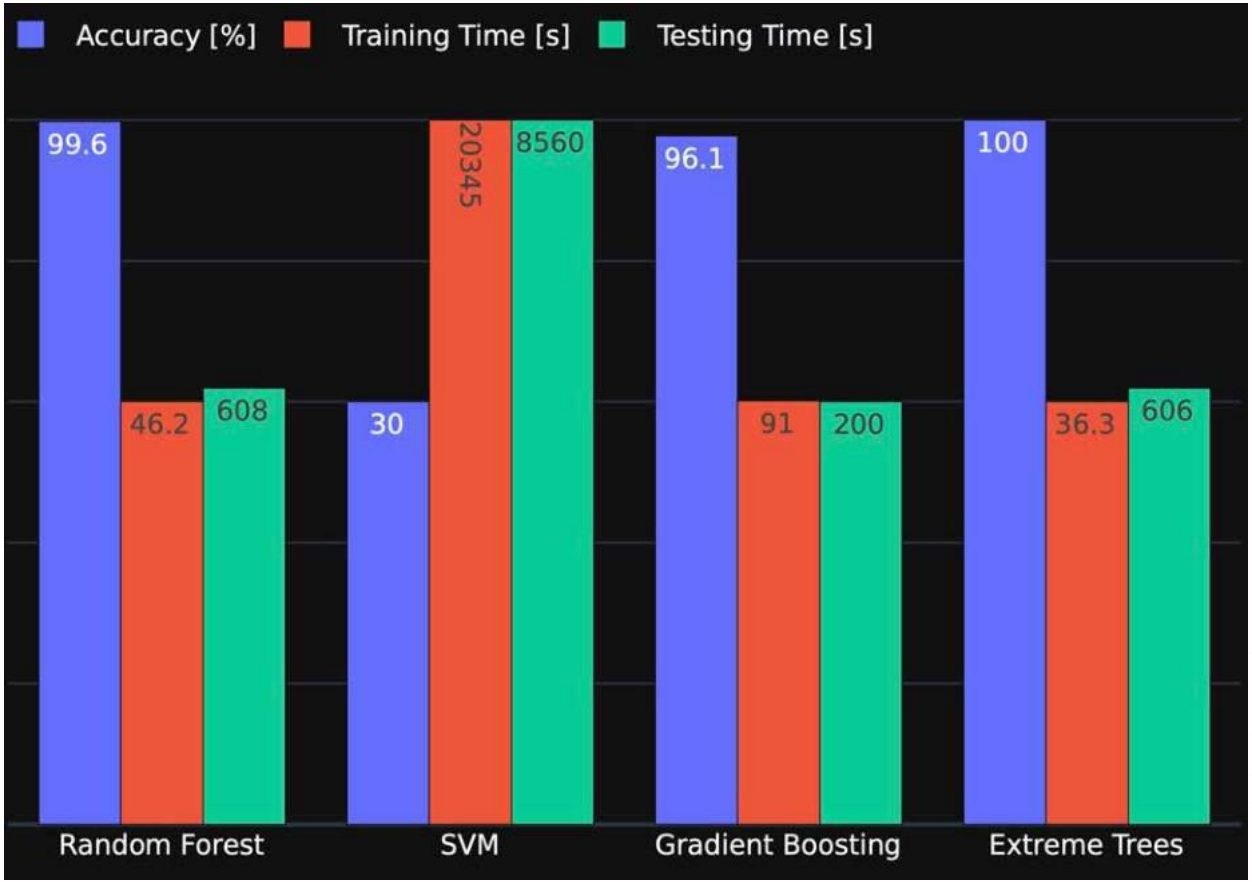
Algorithms used in the training phase:

Random Forest

SVM Support Vector Machine

Gradient Boosting

Extra Trees



SMARTHERO AI … Features Importance

Features importance

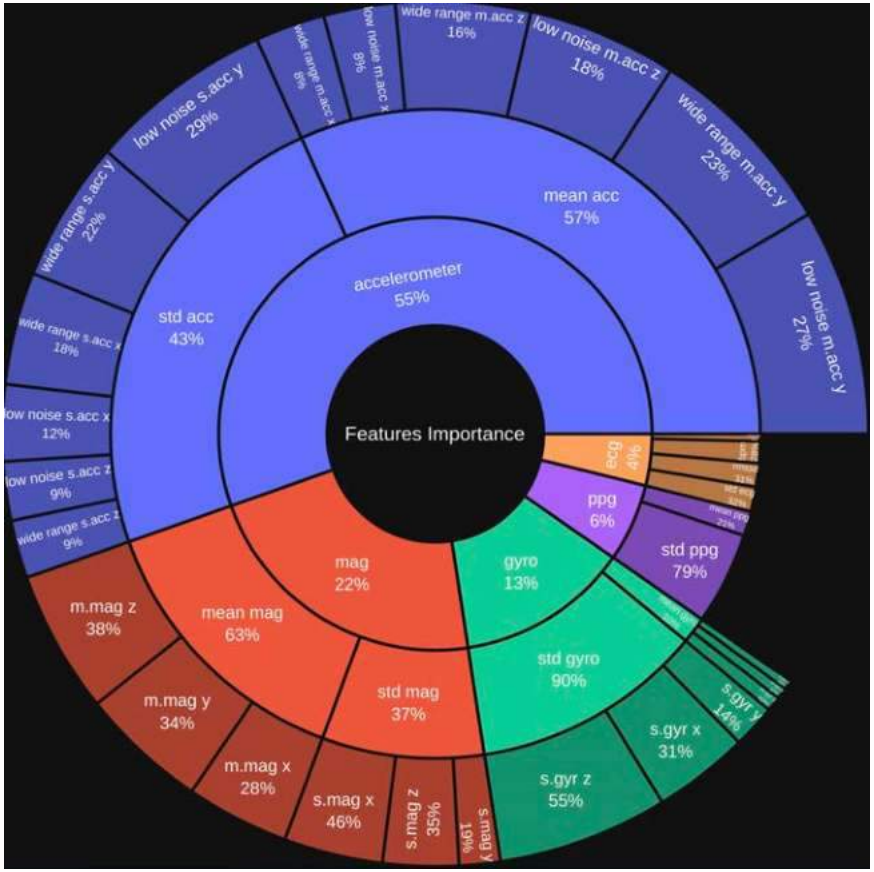
1) Accelerometer

2) Magnetometer

3) Gyroscope

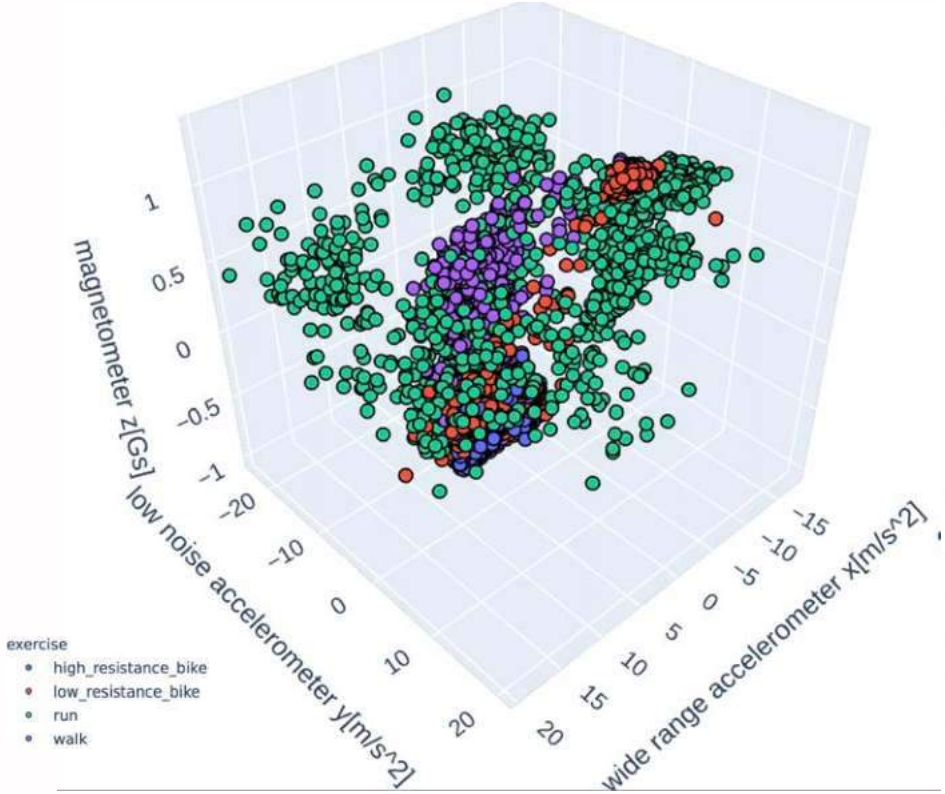
4) PPG

5) ECG



AI … Centroids

1. The engine has now been trained to process a certain type of dataset and extract centroids that indicate the comfort zone during a each type of activity
2. Then we can use our device to collect an appropriate amount of data, typically two weeks of continuous use, to create an appropriate dataset(X) of subject X
3. We give the dataset(X) to the AI engine which finds the centroids of X for the various types of activities
4. These are the foundations of the Digital Avatar
5. Start again from point 2 to have the avatar always updated every two weeks



SMARTHERO CORPORATE Case Study

MAIS

CORPORATE - Engineers Force protection on the job and during leisure time

FIELD ENGINEER

WIFI, Mobile or Satellite connection

Centralised OPERATIONS CENTRE
Operator

TEAM LEADER
Field Engineer
responsible for team

SMARTHERO Security Officers Use Case

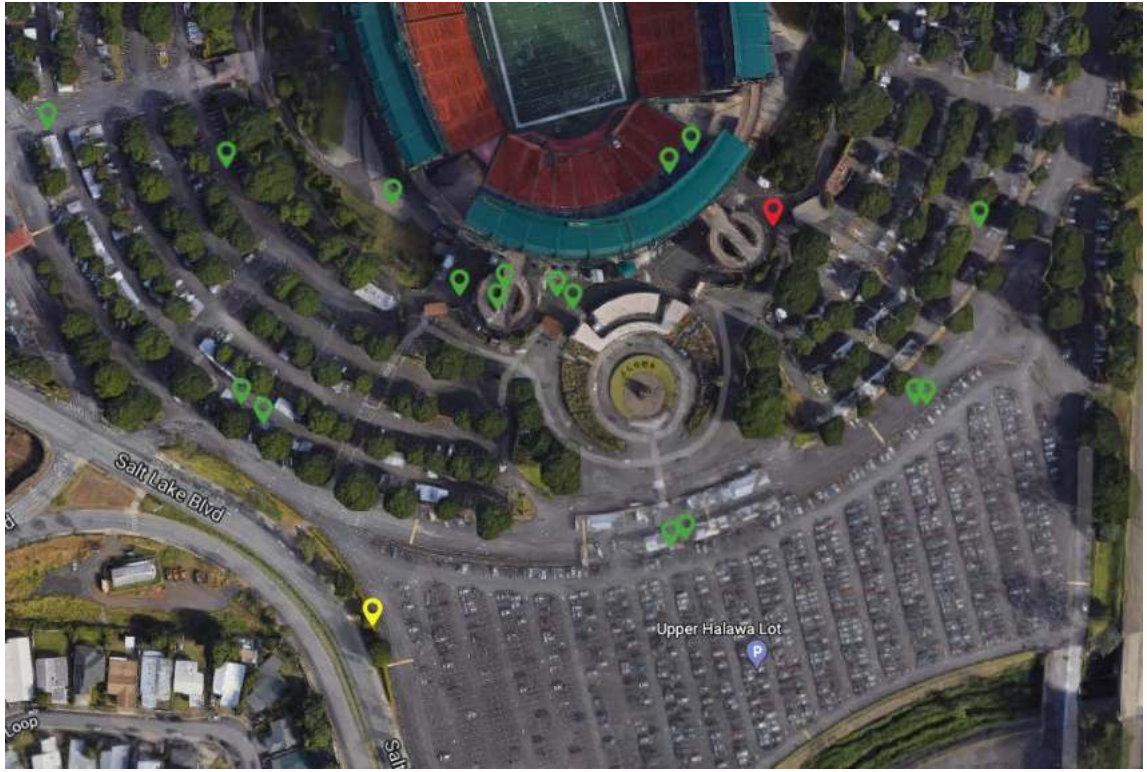
MAIS

SECURITY OFFICER

OPERATIONS CENTRE

TEAM LEADER

SMARTHERO Operation Centre Map View



The operations center is able to constantly display and monitor the position and physical state of the operators on the satellite map, following their movement in real time.

In case of need, when the color of the symbol (Green, Red, Yellow) changes, the operator of the operations center can click on the symbol and see the details of the officer in the field and proceed with the necessary actions proportionate to the conditions detected.

The single operator can be identified by a serial number or by his name.

This function is particularly important and useful in the event of sports or mass events when there are many agents deployed on the field, to also allow monitoring of the concentration of operational forces.

SMARTHERO OPERATION Use Case

MAIS

OPERATIONS CENTRE

THIRD PARTIES SENSORS

SOLDIER

TEAM LEADER

SMARTHERO Children at School case study

WITH INDIVIDUAL PHONE
(one phone per user)

Children

Devices

Android / Apple Smartphone

AI

OPERATIONS CENTRE
Operator

Max distance device-phone
30 mt indoor - 70 mt outdoor

School Building
GEOFENCE

School Health Supervisor

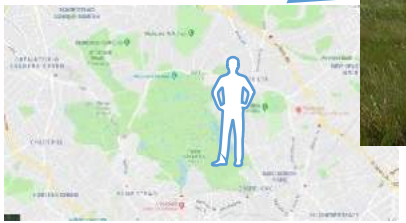
SMARTHERO CORPORATE Case Study

MAIS

CORPORATE - Engineers Force protection on the job and during leisure time

FIELD ENGINEER

CUSTOMER'S OPERATIONS CENTRE
Operator



TEAM LEADER
Field Engineer responsible for team

SMARTHERO ELDERLY at Home case study

MAIS

PRIVATE HOME

GEOFENCE

LONG RANGE VERSION
IOT or SMARTPHONE at HOME

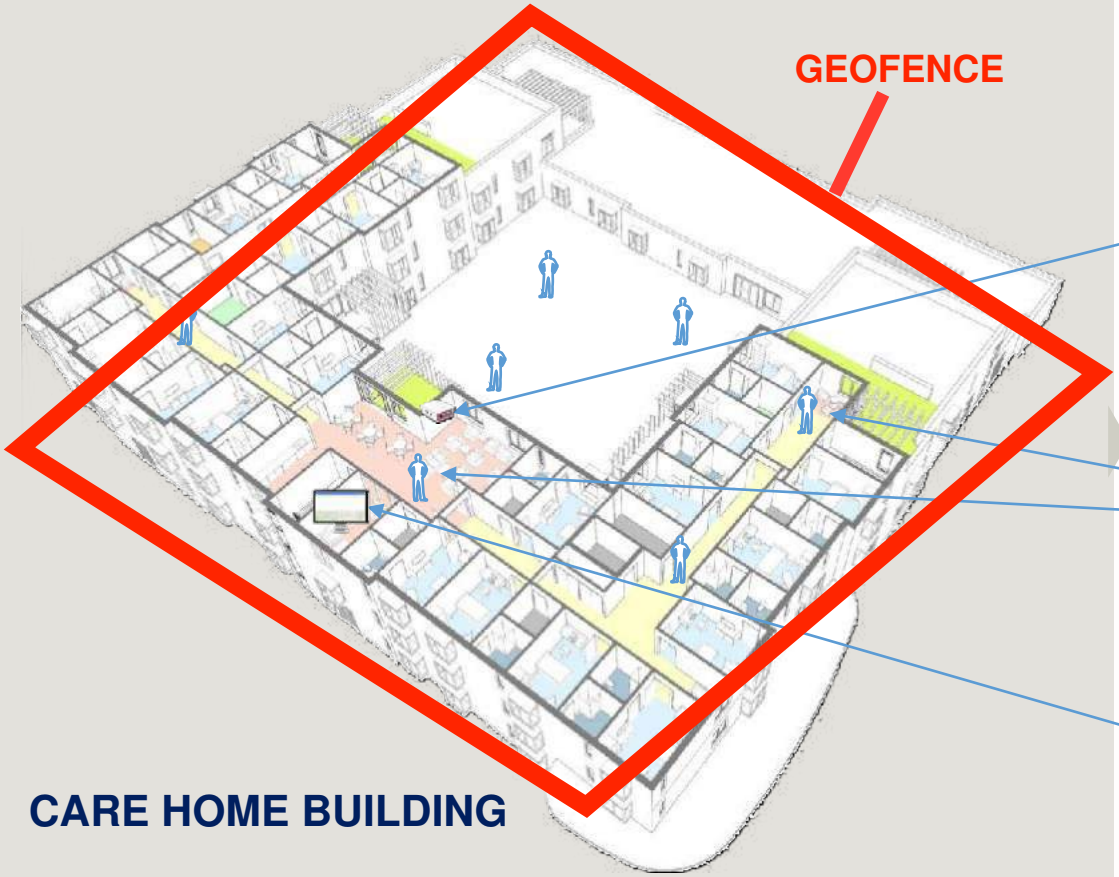
TABLET or SMARTPHONE

Bluetooth:
20m indoor
30m outdoor

Up to 7 Users / devices connected to one IOT or smartphone

Operation Centre

SMARTHERO ELDERLY Care case study



LONG RANGE VERSION
NO NEED FOR SMARTPHONE

Android Tablet

Bluetooth:
20m indoor
30m outdoor

7 Users / devices connected to each IOT Platform

Nurse's Room Monitoring web app

SMARTHERO Council Home Care case study

MAIS

COUNTY COUNCIL APPLICATION

OPERATIONS CENTRE
Operator

AI

Users

Devices

Basic Android Smartphone

Care home Building

GEOFENCE

References

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