

# SYSTEM ARCHITECTURE



### **SAFETY SHOE**

#### SEND:

- Shoe ID
- State (battery, network...)
- detected fall

#### RECEIVE:

- Rescue status
- Request of localization



### **IoT NETWORK**

Aggregates and manage all incoming messages. Get network localization info (TDOA)

### **IoT PLATFORM**

Data Management (helpers, wearer, administrator). Front end for users



### **DATABASE**



Secure database, certified to store health data



Calls and SMS automation service



# GEOLOCATION



Precise outdoor positioning with GPS and GNSS



**Network** 

Relative positioning indoor and outdoor using network (TDOA)



Indoor positioning using Bluetooth





### LOSS OF VERTICALITY

### Our algorithm detects:

- irregular foot acceleration
- Missteps
- irregular foot rotation

User tests done with a detection success ratio **over 80**%



Ongoing study in partnership with a health institute specialized in aging people:

- Foot rotations
- unusual immobility
- unusual step frequency
- Analysis and testing done in biomechanical lab



- ★ Best in class Radio performances
- ★ Enhancement due to proximity of human body and ground
- ★ Shoe Comfort
- ★ 3 months battery, at least, on one charge

Communication (GPS, LoRa, BLE)



Fall detection (Sensors, BLE, haptics)



# **USE OF BLUETOOTH**

- ★ Possibility to communicate simultaneously with several devices
- ★ Fallback solution using a smartphone or a beacon
- ★ OTA updates
- ★ Statistics upload











# NETWORKS

## IoT



Cellular	LPWAN - LAN	LPWAN Cellular
3G <b>2</b> 4G	LoRa*	NB-IoT LTE-M
Pros:	Pros:	Pros:
<ul> <li>Long Range</li> </ul>	<ul> <li>Long Range</li> </ul>	<ul><li>Long range</li></ul>
	Ultra Low Power	Lowpower
<ul><li>High data rates</li></ul>	• Ollia Low Power	<ul><li>Low power</li></ul>
<ul><li>High data rates</li><li>Coverage (GSM)</li></ul>	Price	3GPP standard
$\Theta$		
<ul><li>Coverage (GSM)</li></ul>	• Price	• 3GPP standard
<ul><li>Coverage (GSM)</li></ul>	<ul><li>Price</li><li>Coverage on demand</li></ul>	<ul><li>3GPP standard</li><li>existing infrastructure</li></ul>



#### **FALL DETECTION STANDBY ACTIVE** Await foot and movement Algorithm detection (fall) Foot detected User foot gesture (Alert) detection Network registration Periodic status update Sole Vibration (user alert and rescue) Fall monitoring active (Configurable) Gesture monitoring active Get GPS position Network: send & acknowledge periodic status update

(battery, network)



## PLATEFORME UX DESIGN







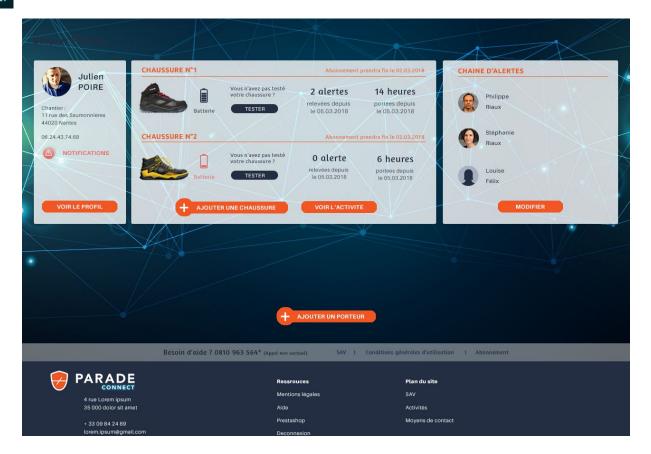
**PARADE** 

## **PLATFORM UX DESIGN**

### PARADE E

#### Bonjour Philippe,



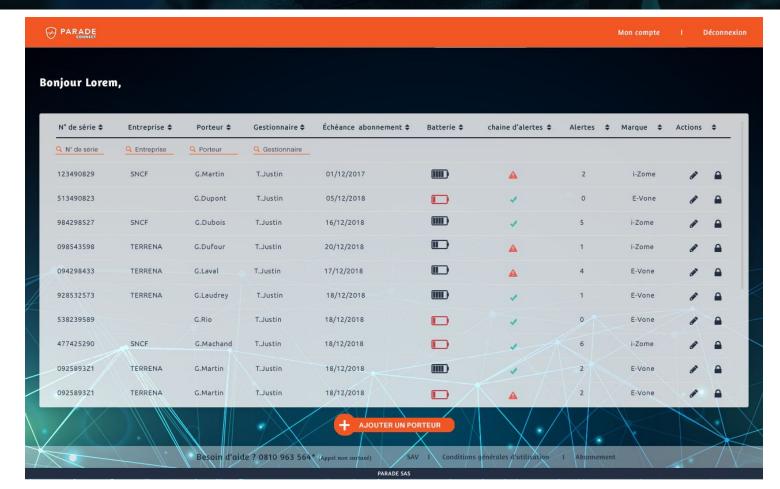






PARADE

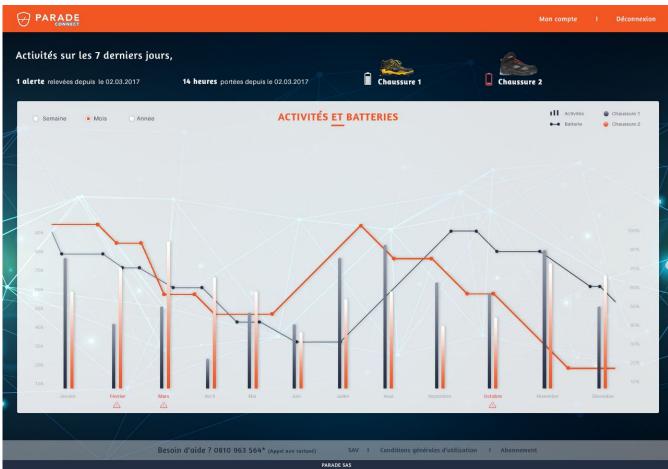
## **PLATFORM UX DESIGN**





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