Home as central location for Health
a paradigm shift

Health

Innovation
Translation

Complexity
Translation

Conflicts of interest:
Philippe Cinquin is co-founder of SentinHealth

Philippe.Cinquin@univ-grenoble-alpes.fr
Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment.

Baruch Spinoza

conatus... Ethique III, 6

Everything, as much as it can, strives to persevere in its being.
Innate

Microbiological factors

Acquired

Genomics

Environmental factors

Metabolomics

Psycho-social factors

Proteomics

Transcriptomics
Grenoble hosts one of the 4 French Interdisciplinary Institutes for Artificial Intelligence

MIAI @ Grenoble Alpes (Head E. Gaussier)

MIAI
Multidisciplinary Institute in Artificial Intelligence
Deep Care: *Real life data* to empower patient!

*T1 Empowerment by smart data capture in real life*
**Instrumented Jackets:**
- Deformable sensors integrated in tissue
- Already industrialized for animals
- On-going developments for human beings

**Patented virtual flowmeter**
- Respiratory and cardiac flows
- Validated at TIMC-IMAG
- On-going developments for human beings

**Bluetooth acquisition platform:**
- Multisensor electronics (accelerometer, ECG, ...)
- Integrated and evolutive platform
- Advanced AI for physiological parameters interpretation
- Distant and web-based Data Acquisition and Visualization
PRODUCT

Connected Harness
Inertial Sensors

MySmartMove
Data Processing
and Fusion

Digital tablet or smartphone applications
VELIS : Heart Rehabilitation in real life by connected bike and multimodal signal processing (ECG, body power, ...)

![eBikeLabs Logo]

![Bike Ride Image]

![Data Graphs]

- Flat Part
- Ascent
- Descent

![Map Route]

- Distance: 25.8km
- Elevation: 751m

**Patients**
- BPM
- Heart Rate (BPM)
- Power (W)
- Speed (km/h)
- Cadence (rpm)
- Pedal Force

**Human Power**
- Power (W)
- Speed (km/h)
- Cadence (rpm)
- Pedal Force

**Motor Power**
- Power (W)
- Speed (km/h)
- Cadence (rpm)
- Pedal Force

**Féquence Cardiaque**
- Frequency Cardiaque (FRC)
- Power humaine (W)

**Vitesse**
- Speed (km/h)
- Cadence (rpm)
- Pedal Force

**Fréquence de Pedaleage**
- Pedaleage Frequency
- Power (W)

**Distance**
- 25.8km
- 751m
Integrating 3 Health Sensors in VELIS

- Reconstruction of mean cycling, detection of activity (dancing, sitting, ...)
- Measuring and characterizing posture and movements of trunk

- Fuctionnal Respiratory Monitoring
- Non-invasive measure of heart flow

- VELIS: Heart Rehabilitation in real life by connected bike and multimodal signal processing (ECG, body power, ...)

MySmartMove

eBikeLabs

PARIS 2024
Microbiota

- One body
  - $10^{12}$ cells
  - 25,000 genes
  - Billions of bacteria
    - $3 \times 10^{13}$ to $10^{14}$ bacteria
    - 400 to 1200 ≠ Bacteria
    - $3.3 \times 10^6$ genes
- Virus
- Fungi
- Skin, mouth, vagina, placenta?, brain?, gut

- Its role
  - Digestion
  - Immunity maturation
  - Protection

We are an holobiont
Holos Greek for whole
Biont: Organism
Multiple Sampling by a Swallowable Swelling Robot

Gastro-resistant barrier dissolves

Individual plugs with programmed delayed opening

First plug dissolves ...

Second plug ...

Third plug ...

Capsules are freed

Multiples samples in various parts of intestinal tract
From sampling to intestomics-based personalized medicine
(proof of concept clinical trial scheduled Q1 2020, Pelican Health creation 2020)

Sample analysis
Clinical data

A. I

1) **Clinical Trials**: Statistical characterization of intestomics heterogeneity in pathologies

2) **New patient**: Deep-learning based estimation of probabilities of pathologies
Renew chronic diseases monitoring

The instance of early detection of Heart Failure relapses

**SentinHealth** is a French MedTech company specialized in integrated care solutions for monitoring and preventing exacerbations of major chronic diseases.
SERENE-IoT Secured & Energy Efficient Healthcare solutions using IoT Technologies

Music: https://www.bensound.com
Ongoing Clinical Study: Flowchart of the patient

Inclusion visit: Start of the study for the patient.
- Information about the protocol and signed consent during a consultation with the clinician.

Installation of the connected pump at the patient home.

Follow-up of the patient during 4 weeks:
- Smartphone app to change transmission modality.
- Clinical research assistant visits the patient once a week to change transmission modality.

Deinstallation of the connected pump: End of the study for the patient.
- Questionnaire to the patient to evaluate its interest in using the connected pump.
Deep Care
realize aspirations, satisfy needs, cope with environment

Health Issues:
Predict, Personalize
Prevent, Participate

Real life data to empower patient!

T1 Empowerment by smart data capture
T2 Empowerment by smart data fusion

T3 Empowerment by Health Institution Optimization

T4 Individual and Social adherence model
- Ethical issues
- Cost / benefit ratio perceived by the patient
- Mechanisms of acceptability
- Conditions of adherence and appropriation
- Influence of communication and technical design choices on acceptability, acceptance and adherence.

Serious game
(antibiotic resistance)
Simulators
Inversed Numerical Pedagogy

Health Issues:

Participatory Health Project
Deep Care: interdisciplinarity, openness

TIMC >25 years “information = key to understand life and act on health”

AGEIS, CIC, GIN, GIPSA-LAB, LBFA, LETI, LRB, LIG, LJK, TIMA, VERIMAG
+ U. SHS (CERAG, GAEL GRESEC, LIP, PPL)
+ several CHUGA Depts
+ ...
+ very open (Patients Associations, Patients University, ...)

Confirmed ~800 k€/year

National and International Partnerships

Labcoms

Public Health Research Clinical Departments

Data Institute Health Technologies Institute

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In'Test Medical

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