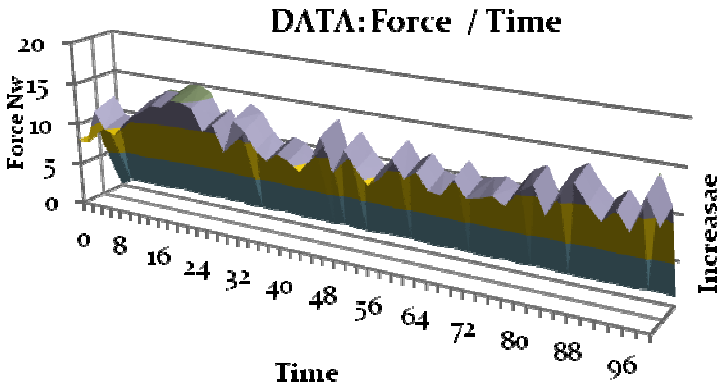
PROJECT SMART STICK

The self-powered crutch that monitors and collects limb movement data provided with geolocation (GPS) as a Data Science tool for remote analysis for REHABILITATION



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ABSTRACT

In the HEALTH field we offer a PRODUCT + SERVICE to the Person structured in **monitoring, data collection and Back - up, rehabilitation / prevention, assistance and emergency.**

There is the Real-time monitoring of physical limb movement.

We offer the collection and back - up of the data of the movement parameters such as force, speed, times.

There is the rehabilitation / prevention of physical functions through data analysis to optimize recovery times and through specific movement programs to prevent or delay the onset of pathologies.
Assistance is available at all times remotely based on physical responses to support re-education with alarm for anomalous data and geolocation with emergency intervention in case of alarm.

TARGET

Our OBJECTIVE is to provide an aid with APP that provides the physical parameters of the movement of the limbs in real time with geolocation which is recharged Out Grid from the movement.
From a remote location, the Doctor has real-time data on the user movement parameters in a dedicated file.
This information is constantly stored on the Server / Cloud and the Doctor analyzing it can also see the performance of physical performance in the time, optimize recovery times after a trauma with specific exercises and detect if there is an anomaly in walking.

As a cost analysis:
The price of a crutch is around 30 Euros.
The cost for the user for the visit of orthopedist with physical tests in the testing laboratory starts from 130 Euros.
Added to this there is the loss of profit due to recovery and for potentially longer recovery times.

Here, remotely and automatically, there is the collection of data that also allow real-time feedback.

We assume to sell the HARDWARE system to be integrated into the crutch for 25 Euros and a subscription to the service about of 5 Euros / month depending on the VARIABLES chosen (with SIM CARD cost not included).

The cost of the aid is around 18 Euros, the solution uses intelligence, memory, GPS and smartphone network!
As a plus, a Power Bank is included in the aid, which has a market price of 12 Euros.

The price of a separate GPS is around 100 and needs memory (datalogger) and intelligence, in the smartphone with a simple APP we have all the things with low cost.

PRODUCT; CHALLENGE vs RESULT

Challenge:	Result:
COLLECT REAL DATA ON THE MOVEMENT OF THE LIMBS SUCH AS SPEED, STRENGTH, TIMES	New application for remote Collection, control, data processing.
Give feedback on large amounts of data to customize and optimize training / maintenance programs	Remote monitoring with data analysis and Improvement of physical efficiency, possible reduction of recovery times.
Use small movements to produce electricity by powering the accessory, check the movements and position of the user	New PRODUCT in Healthcare, sport, wearable,
Propose low cost systems	Reduction of the complexity of the SENSORISTICS and new electricity generation system for self-supply
Quick and easy installation	The Product can be installed in any crutch and stick knob
Low environmental impact	The solution does not use polluting materials. Fully recyclable
Reduction of CO_2 emissions	The system uses in a new way renewable sources (the movement of the limbs of the body) for self-feeding

APPLICATIONS:
The smartphone with APP (or an optional Wi - Fi card) provides information on limb movement: Speed, time per step, interval between steps, stop time and Geolocation (GPS).
This information is constantly stored and the Doctor analyzing it can see the performance trend in the time, SUGGEST THE RE-EDUCATION PROGRAM to reduce recovery times.

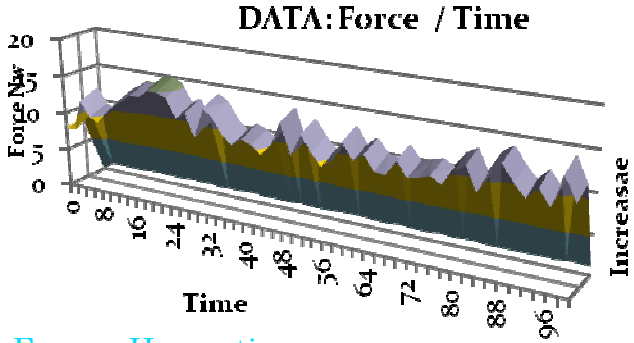
PRODUCT

PROBLEM: I have a limitation in physical movement, temporary or permanent
BUT: BY MONITORING MY PERFORMANCE I CAN MAKE THE RE-EDUCATION IN MORE PERFORMING MANNER AND OPTIMIZE MY RECOVERY TIMES.
I have the doctor's control of the limb movement parameters
Recovery times are reduced
For my safety I can have information on my position.

How does it work ?
The arm makes pressure in the handle of the crutch or stick.
The system generates electricity with an electrical output signal as a function of force and speed apply
The data goes to the Smartphone and from this to the Doctor's Server (CLOUD)

Result:
Information on:
The physical movements of the arm and leg, speed of the limbs, time for step, the interval between steps, the stop time.
The position with GPS (Tracking)
THE TREND IN THE TIME OF MY PHYSICAL MOVEMENT PARAMETERS

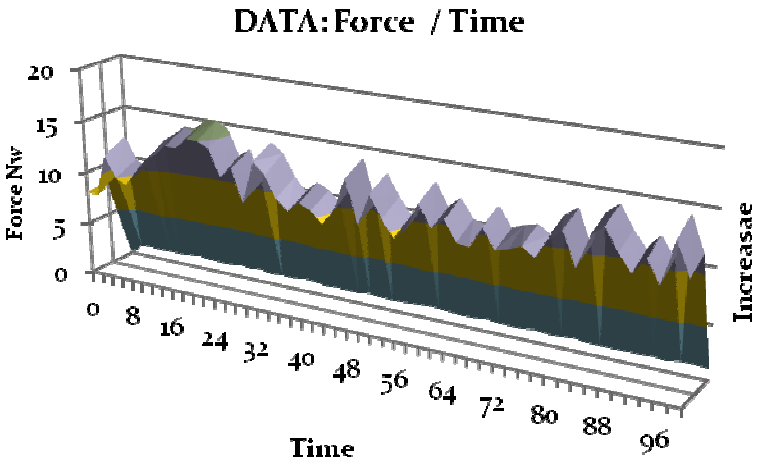
HISTORICAL Biomedical Data:



PROTOTYPE, SAMPLE

PROTOTYPE, SAMPLE
System

Spare parts



Biometric Data

Actual Electric Performance and CO2 Reduction

Below there are the Description of the Results obtained for the application with the connection of a Smartphone, if we use a Wi-Fi card or an internal GPS the electrical performance increases

For Green Sustainability the table contains information on reduction of CO2 according to the production of electricity

Electric Performance

Function	Value
pressure Cycles / hour = Movements or pressure / hours	2700
Energy production in 1 hour in mWh =	150
Energy consumption mWh / minutes in STD –BY = (Standard smartphone)	1.6
Energy consumption mWh / minutes in CALL (Standard smartphone)	12
Energy consumption mWh / minutes of WEB connection = (Standard smartphone)	12
Availability minutes in STD –BY = With 1 hour walk	93.75
Availability minutes in CALL With 1 hour walk	12.5
WEB connection minutes = With 1 hour walk	12.5

Table Reduction of CO2

Function	Value
Energy production in mWh for 1 user 1 hour	150
Hour / day of walking for 1 user	2.5
Energy production in mWh for 1 user 1 DAY	375
Number of day / year of use	365
Energy production in Wh for 1 user 1 YEAR	136.8
CO2 reduction in grams per 1 KWh	766.8
CO2 reduction in grams for 1 user in 1 YEAR	104.9
CO2 reduction in KILOgrams per 1000 users in 1 YEAR	104.9
CO2 reduction in KILOgrams per 10000 users in 1 YEAR	1049.5
CO2 reduction in KILOgrams for 50,000 users in 1 YEAR	5247.7

Note: The energy is function of the size and the speed and stroke of the movements

MARKET

The market is GLOBAL and MULTI - SIDE, the data provided are supportive to ORTHOPEDIC DOCTORS, assistance to the elderly and disabled, Social Services and ULSS and secondly the sport in Nordic Walking

As an audience of users across Europe, for example, there are about 739 million people and 19% are over 65 years old, about 140 million people; the potential customer in health care is approximately 10% approximately 14 million people. One option is to propose data collection also in the SPORT and OUTDOOR sector (and here also to FRAGILE USERS); Nordic Walking poles users are located in over 40 countries and in 2007 there were over 7.5 million people (Wikipedia), at this time about 6 million people are estimated in Europe.

USERS
orthopedic doctor for rehabilitation
post trauma patient
family of disabled / elderly
social services / CEOD
Local Health
Social services department

COMPETITOR

ACTUAL SITUATION

Since now Crutches are passive accessories, for this application after an analysis of the patents filed in the WIPO (World Patent Data Bank) we have no direct competitors.

To analyse the value of the movements of the arms and steps such as times, speed and force, there is only the laboratory where the PC and the sensor are located, but only for internal analysis.

The existing solution to track and locate users and Tracking are systems with GPS but they do not allow to obtain the values of the physical movement; these GPS have an internal battery subject to exhaustion here instead the energy for the power supply is provided by the movement but there is also an internal Power Bank for security.

A surrogate product can be the smartwatch or the smartphone but they always need external charging and they don' t give the real values of the walking parameters given by the arm.

BUSINESS MODEL

My idea for the plan to productization and commercialization is licensing, joint venture or other collaboration options of their technology to a company interested in manufacturing, marketing and selling SmartStick™, as well as in collaborating on any further development of the technology

I have the documentation in progress for the deposit of the patent in Italy.

In addition, I am in the process of drafting an international patent application for further protection of the Intellectual Property Rights.

FOR PANDEMIA AND COVID 19

It is a **Telemedicine service** that also allows **Remote Medical Examination** on pathologies, including those of a chronic nature, especially on Geriatric Patients that they are in this moment particularly fragile.

It protects both doctors and patients: distance and no physical contact.

It is a **Data analysis tool** aimed at both monitoring the conditions of physical fragility and continuous tracking with alerting that optimizes the management of impacts on the Health system.

It is a **Disease prognosis tracker**, a predictive system for the development and course of the disease / pathology with qualitative and quantitative data.

STATUS, TIMELINE AND MILESTONE

We’ ll register the PATENT

We’ ll continue the tests, study new solution, develop industrialization.

I can provide my experience on the generator to obtain energy from slow and small amplitude movements, there are more technical construction possibilities also for others applications that I am evaluating and which would be possible to implement.

I have to industrialize the generator well and have assistance for the Power Bank, Wi-Fi, the APP and data collection on the server.

It is necessary to have the skills to offer the complete product as a medical aid. For this reason, apart from the generator, I need assistance on everything to make a successful global solution.

We have other studies underway for other applications.