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Newsletter n°1

Newsletter



THE FUTURE OF 3D BODY SCANNING IN ORTHOTICS

Various pathologies require the use of orthoses, medical devices designed to compensate for musculoskeletal disorders. These devices can involve various body parts (arms, hands, knees, ankles, etc.), but all present a common challenge: precise adaptation to the patient's anatomy. In the case of an ankle orthosis, measurements are currently taken using a plaster cast. A Certified Prosthetist-Orthotist (CPO) manually corrects the position of the foot, placing it in an immobilized state, and then creates a mold used for the manufacture of the orthosis. This procedure is time-consuming and can lack precision, sometimes leading to the need to make a second version of the orthosis for improved comfort.

With the introduction of digital methods (computer-aided design, 3D printing), the orthopedic profession expresses the need for a digital alternative to plaster molding. The use of optical scanners for precise measurements is hampered by obstacles created by the technician's hands, covering the foot and making it partially invisible to the optical scanner.

HelpMeWalk consortium proposes an innovative technological solution for measurements: a smart bandage equipped with hundreds of magnetic sensors. These sensors provide a set of digitized points representing the anatomical shape enveloped by the bandage, which is then reconstructed using a software. These measurements can be used to 3D print a personalized orthosis.

First, the smart bandage and sensor system will be developed by project partners, together with the software for calculating anatomical shapes. The device will then be deployed with orthopedic partners and tested on a group of 200 patients. Finally, the prototype will be manufactured, and documentation will be prepared for certification. This fast and precise technological solution is expected to reduce the time required for orthosis design, facilitate optimal adaptation of the orthosis, and decrease manufacturing costs. In the long term, the goal for the industrial partners is to market the 3D imaging smart bandage so that this innovation can benefit a larger audience. This technology will also contribute strengthening the innovative ecosystem in the Upper Rhine region in the field of orthopedic technology.

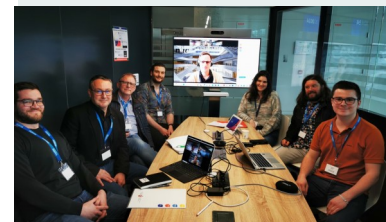
The HelpMeWalk project is part of the Science Offensive of the trinational Upper Rhine Metropolitan Region

KICK-OFF MEETING

The kick-off meeting of the HelpMeWalk project took place on Tuesday, March 12th at the Hôtel de la Région Grand Est in Strasbourg.



All project partners were present for this event.



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ASSOCIATED PARTNERS



The main associated partner of the project is the BellwaldTEC GmbH company, a start-up which is a spin-off of the FHNW, that develops and markets innovative solutions for body scan for orthopedic applications.



BellwaldTEC is developing a new and versatile digital measuring system for recording body surfaces.

The measurement principle is based on the determination of the spatial position in a magnetic field generated near the patient.

By using a magnetic field, the CPO's corrective hands are invisible to our scanning textile. When used in orthopedic technology, the corrective position of the limbs can be recorded under palpation, since the corrective hands of the CPO are invisible to magnetic fields.

CERTIFIED PROSTHETIST- ORTHOTIST

The CPO associated partners will contribute to the definition of the anatomical regions to be precisely measured.

They will carry out the validation study of the orthotic design using the intelligent bandage demonstrator.

Orthopedic centers will recruit patients for whom an orthosis will be made using the 3D scan obtained with the smart bandage.

Patients volunteers that will take part in the study will benefit from orthotics that are better customized and produced faster than the conventional method.

HelpMeWalk project aims to develop a smart bandage capable of digitizing in a few seconds the shape of a limb



Duotec is also an associated partner of the project.

It is a global electronics service provider, which works in innovative manufacturing technologies, as well as in basic research and the development of state-of-the-art microelectronics, sensor technology and connectivity solutions.

Duotec will collaborate with HFU in the development of a method of coating electronics to make them washable.

Duotec will be responsible for defining the specifications for the electronics, together with the partners BellwaldTEC, Université de Strasbourg, FHNW and HFU.

PROJECT PARTNERS

Université de Strasbourg - Unistra

The ICube Laboratory of the University of Strasbourg is the project coordinator. ICube is in charge of the design of the multilateration algorithm that accurately computes the position of each sensor from the magnetic field they measure as well as the integration of sensors in the bandage.

Fachhochschule Nordwestschweiz - FHNW

The FHNW is in charge of the design of the electronic hardware for this project. This encompasses the PCB boards on which magnetic sensors will be soldered as well as the control of the coils that will generate magnetic fields.

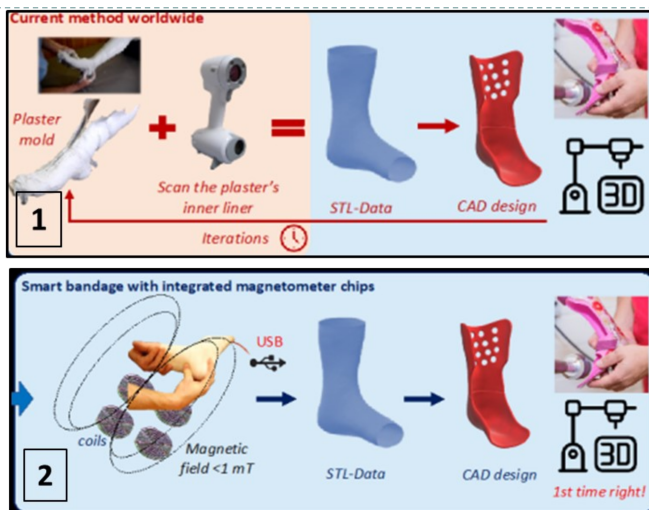
Hochschule Kaiserslautern - HS-KL

The HS-KL is in charge of the development of the algorithm providing the 3D model of the ankle from the scatter plot of the position of the sensors in the bandage.

Hochschule Furtwangen - HFU

The HFU is in charge of the encapsulation of sensors and electronic boards in a biocompatible polymer which aims at improving the robustness of the device towards mechanical stresses during usage (torsion, shear) and conditions of use (humidity, skin transpiration).

Intelligent bandage system saves time when taking anatomical measurements during orthosis development, compared with plaster molds



Workflow for current orthoses design (1) vs. future workflow with the smart bandage (2)

PARTNERS' TEAMS

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Bellwald, Switzerland

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duotec
Delémont, Switzerland

Vincent Aubry

SAVE SPACE AND MATERIALS

Plaster molding is a long and messy process. Once shaped and dry, the plaster mold is opened with a blade.

The mold is often filled to serve as a base for the design for the orthosis or the prosthesis. The plaster mold as a negative may also be scanned and a positive milled. In both cases, the molds or millings are kept for some time in the orthopedic practice or by subcontractors.

This can represent thousands of molds per year, depending on the size of the practice. As patient anatomy evolves over time, these molds become obsolete and become waste.



The system developed by the consortium will make it possible to avoid physically storing these molds, as a measurement provides a digital file with which one can immediately use by CAD.

1ST HELPMEWALK CONSORTIUM MEETING

On May 4, the first HelpMeWalk project consortium meeting was held at the Fachhochschule Nordwestschweiz (Muttenz, Switzerland).

The morning was dedicated to a visit of the FHNW laboratories with a presentation of the different projects carried out by Joris Pascal's team.

In the afternoon, duotec presented its expertise in the encapsulation and integration of electronic devices.

Finally, there were discussions between the project partners on the various project work packages: encapsulation of the measurement system in a resin, making it more rigid and less sensitive to humidity, fixing the sensors to the skin or to a suitable ankle support, available data and improving their quality with a view to their future use in reconstructing the 3D model, and a protocol for using the device.



HELPMEWALK AT OTWORLD



OTWorld is the leading international trade fair for CPOs.

Three of the HelpMeWalk project partners (BellwaldTEC, FHNW and Unistra) attended the OTWorld conference in Leipzig on May 14-17, 2024.

This conference was an opportunity for us to give a live demonstration of a preliminary version of the HelpMeWalk prototype to CPOs, to obtain very positive and pertinent feedback on its use and to think about room for improvement.

Ralf Schumacher also gave a keynote on this project during the conference

HELPMEWALK AT TECHT

A delegation from the HelpMeWalk project visited the TechTextil trade fair, which took place in Frankfurt from April 23rd to 26th 2024.

This visit was an opportunity for us to discover the latest technological innovations in smart textiles and to gain inspiration for the challenges we face in the HelpMeWalk project regarding the integration of sensors into textiles and the connection of sensors within the textiles.



Ralf Schumacher and Manon Lambert met a dozen companies that presented proof-of-concepts or prototypes with technical solutions that could potentially meet the needs of our project.

RESEARCH DAY AT THE FHNW

On November 7, a memorable day took place in Muttenz – the FHNW Research Day 2024. This event attracted many visitors eager to discover the latest advancements in research and technology.

Dr. Joris Pascal's team had the opportunity to present the prototype developed as part of the HelpMeWalk project to the general public. They showcased the first version of the intelligent bandage prototype, equipped with magnetic sensors for taking anatomical measurements of the ankle. The system is accompanied by modeling software that reconstructs the shape of the ankle, allowing for the creation of a personalized orthosis.

The feedback from the public was extremely positive, reflecting the interest generated by the presentation,



especially the participation of children who discovered the system with curiosity.

*« This technology from BellwaldTEC will revolutionize orthopedic technology »
Florence Ruepp - Managing Director, Basler Orthopädie René Ruepp AG, Basel*

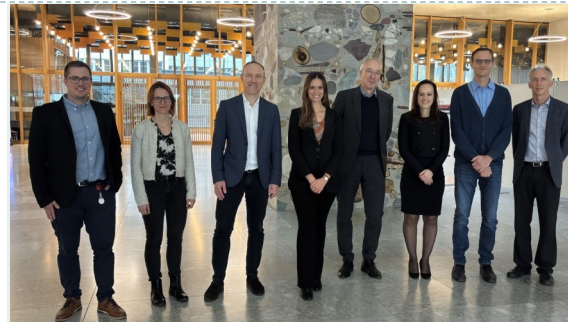
PRESENTATION OF THE FIRST PROTOTYPE TO THE INTERREG UPPER RHINE COMMITTEE

On November 12, 2024, Dr. Joris Pascal's team from the Hochschule für Life Sciences FHNW in Muttenz, Switzerland, had the honour of welcoming an Interreg Upper Rhine committee, in the presence of Ms Delia Bonsignore, European Commission referent.

The visit was an opportunity for Dr. Pascal to share the latest significant advances in the HelpMeWalk project.

During the meeting, a live demonstration of an early prototype was given, highlighting the promising results achieved through collaboration within the consortium, and the contribution of BellwadTEC.

The presentation provided a concrete demonstration of the innovations developed as part of our research, with the aim of creating an intelligent bandage that will enable digital measurements to be taken, in order to produce personalised orthoses more efficiently and thus help people suffering from orthopaedic disorders.



JOB POSITION

We are looking for a **Data Scientist Engineer**

University of Strasbourg - ICube laboratory

Job Description

The selected candidate will join the GAIA platform, which is specialized in data science, scientific computing, artificial intelligence, and computer graphics within the ICube laboratory.

The engineer will contribute to the Smart Bandage for Orthotic Body Scanning project in collaboration with FHNW. The main task is to solve a 3D positioning and sensor orientation problem within a magnetic field generated by coils using trilateration, by leveraging AI tools.

This position will involve close collaboration with the engineers of the GAIA platform and the project's partners: Fachhochschule Nordwestschweiz, Hochschule Kaiserslautern and the BellwaldTEC company.

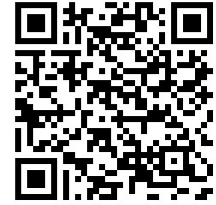
The job is based at the ICube laboratory, API Center, in Illkirch, France.

Application: Send CV and cover letter to Jean Rehbinde (rehbinder@unistra.fr)

WHERE TO FIND US

Scan the QR code

to access the agenda of upcoming events in which consortium members will be taking part.



Contact us



<http://www.helpmewalk.eu>



NEXT CONSORTIUM MEETING

The next consortium meeting of the HelpMeWalk project will take place on December 17th 2024. At the Hochschule Kaiserslautern - Campus Zweibrücken.

PROJECT FUNDING

The HelpMeWalk project is part of the Science Offensive of the trinational Upper Rhine Metropolitan Region, co-financed by the European Union via the Interreg Upper Rhine programme, the Grand Est Region, the Ministerium für Wissenschaft, Forschung und Kunst of the Land of Baden-Württemberg and the Ministerium für Wissenschaft und Gesundheit of the Land of Rhineland-Palatinate.

The Swiss Confederation and the Cantons of North-Western Switzerland are contributing to the funding of the Swiss partners in the project.



Kanton Basel-Stadt

