UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Centre de Recerca en Enginyeria Biomèdica

Institut de Robòtica
i Informàtica Industrial

2 PhD POSITIONS IN UPPER LIMB MOVEMENT MONITORING AND REHABILITATION

PROJECT TITLE: ArmTracker: A state-of-the-art wearable system to assess upper limb motor function in real-life conditions for patients with Duchenne muscular dystrophy and spinal muscular atrophy

PROJECT DESCRIPTION

Duchenne muscular dystrophy (DMD) and spinal muscular atrophy (SMA) are two rare genetic conditions with onset in early childhood and characterized, until very recently, by progressive and devastating muscle weakness that led to inability or loss of ambulation, dependence, and premature death. Fortunately, recent unprecedented advances in gene therapy have opened a new era for DMD and SMA patients, substantially modifying the natural history of these disorders. In spite of this exciting context, the development of tools and methodologies used to evaluate and measure the response to these new therapies has not been proportional: motor function monitoring of DMD and SMA patients is still challenging, being restricted to the use of motor functional scales in an artificial environment. Sensitively measuring the motor function of DMD and SMA patients in real-life conditions is increasingly required in order to properly assess the patients' baseline condition and their response to the new high-priced therapies.

The purposes of the ArmTracker project are 1) refining a wearable sensing system that can gather continuous measurements on arm kinematics and 2) determining its feasibility to assess, in real-life conditions, the upper limb function of patients with DMD and SMA. Measured data will be analyzed applying machine learning methods. The correlations between clinical data, traditional motor function scales and the ArmTracker movement parameters will be analyzed. This project is funded by La Marató de TV3 and the consortium is composed by the Hospital Sant Joan de Déu, the Centre de Recerca en Enginyeria Biomèdica (CREB) at UPC, and the Institut de Robòtica i Informàtica Industrial (IRI) of CSIC-UPC.

YOUR TASKS

You will be involved in research and development tasks related to the project. Your tasks will include:

- Definition of technical and functional requirements of the monitoring device.
- Selection of sensors, microcontroller and battery.
- Design and development of the monitoring device.
- Design of machine learning algorithms to classify movement assessment metrics.
- Development of a software tool for storing data and provide relevant feedback
- Development of pilot studies with healthy participants and pediatric patients.
- Participating in a clinical study with DMD and SMA patients.
- Publishing scientific papers as part of the PhD thesis.
- Mentoring Master's and PhD students working on related topics.

YOUR PROFILE

- University degree in robotics, mechanical engineering or biomedical engineering.
- Experience in electronics, sensors, programming and human movement biomechanics.
- Creativity, curiosity and humbleness.
- Interpersonal, organizational and communication skills.
- Proficient in written and oral English.

INFORMATION AND APPLICATION

Apply by June 30th, 2021 by sending an email to josep.m.font@upc.edu and jobs@iri.upc.edu (Email subject: "PhD Position ArmTracker"). Applications should include the following documents:

- A cover letter specifying your relevant past experience and research interests.
- A complete CV including English proficiency level, nationality, date of birth, education and professional experience.
- Transcripts of BSc and MSc degrees.
- Contact information for at least two references.

The successful candidate will ideally start on July 15th, 2021 or as soon as possible after that date.

For questions, please contact jobs@iri.upc.edu.

OUR OFFER

- A three-year fully-funded PhD scholarship.
- Outstanding research and innovation ecosystem within the three project partners.
- Access to fully-equipped Motion Analysis Laboratory and Robotics Laboratory.
- Living in Barcelona, a modern city with a lot of opportunities for innovation in the HealthTech sector.
- Fun work atmosphere with social events.

THE ORGANIZATIONS

UPC. The Universitat Politècnica de Catalunya (http://www.upc.edu) is a public institution of research and higher education in the fields of engineering, architecture, sciences, and technology; and one of the leading technical universities in Europe. Every year, more than 6.000 Bachelor's and Master's students and more than 500 doctoral students graduate. The UPC has a high graduate employment rate: 93% of its graduates are in work and 76% find a job in less than three months. UPC is the Spanish university that has obtained more projects from Horizon 2020 framework.

CREB. Since 1983, the Research Centre for Biomedical Engineering (http://creb.upc.edu) at UPC has been serving the needs of research, technological development, innovation, and knowledge transfer of companies, hospitals and institutions related to the field of health technologies. Its multidisciplinary staff includes more than 80 researchers, doctors and graduates in engineering and other disciplines. Our research teams and facilities are in the heart of UPC campus, giving solution to any need or demand from the biomedical field. Our applied research is organized in seven research areas: Biomaterials; Biomedical Signals and Systems; Dosimetry and Medical Radiation; Computer Graphics; Biomechanical Engineering; Robotics and Vision; and Instrumentation and eHealth. From these areas we support and promote innovation and collaboration, as well as excellence in research, scholarship, and training. Within CREB, the BIOMEC Lab does research in multibody simulation of human movement and design of biomechatronic devices for clinical rehabilitation.

IRI. IRI is a Joint University Research Institute participated by the Spanish National Research Council (CSIC) and the Technical University of Catalonia (UPC) that conducts research in human-centered robotics and automatic control. The institute, is a key player in the Spanish robotics and automatic control scenes, and a valued participant in a large number of international collaborations including more than ten ongoing H2020 projects and an ERC Advanced Grant. It has been recognized as a Maria de Maeztu Excellence Unit, the main accreditation given by the Spanish Government to research units that stand out for the impact and international relevance of their results.