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## **EU Marie Skłodowska-Curie PhD Position in Biomechanics of the foot - Project STINTS ("Skin Tissue Integrity under Shear")**

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- **ORGANISATION/COMPANY**

University Grenoble Alpes

- **RESEARCH FIELD**

Biology › Biomechanics

Materials science › mechanical properties and medical imaging

Engineering › Materials engineering

- **RESEARCHER PROFILE**

First Stage Researcher (R1)

- **APPLICATION DEADLINE**

March 4<sup>th</sup> 2019

- **STARTING DATE**

June 3<sup>rd</sup> 2019

- **LOCATION**

France › Grenoble

- **TYPE OF CONTRACT**

Temporary

- **JOB STATUS**

Full-time

- **HOURS PER WEEK**

37.5

- **EU RESEARCH FRAMEWORK PROGRAMME**

H2020 / Marie Skłodowska-Curie Actions

- **MARIE CURIE GRANT AGREEMENT NUMBER**

811965

## Offer Description

**Title:** *Coupling of custom-mechanical biomechanical multi-scale multi-physics Finite Element foot modelling for simulation-driven support surface optimization (foot / shoe interaction).*

Applications are invited for an Early Stage Researcher (ESR) of **EU Marie Skłodowska-Curie Actions (MSCA)** to be hosted in the TIMC-IMAG research Laboratory of **Univ. Grenoble Alpes in France**. The position is for a fixed-term of 3 years starting in June 2019 and the successful applicant is expected to register for **PhD at the University of Grenoble Alpes**. This is one of the cohort of 13 ESRs of **STINTS** (<http://www.stints.eu>), an EU Innovative Training Network of MSCA participated by 6 leading European universities, 2 global industrial companies and 8 associated industrial partners. The main aim of STINTS is to develop new scientific insight into the complex biomechanical, biophysical and biochemical pathways affecting skin integrity and barrier function, following the exposure of the skin to prolonged pressure and shear forces that ultimately results in damage at the cellular level, e.g. pressure ulcers. This is critical since the prevention and treatment for patients with PUs is costly, with an estimated annual spend of health services across Europe ranging between €1.9–2.9 billion pa., increasing even more with an aging population.

This job opening is for a 3-year research position located mainly at the **University Grenoble Alpes**, France with secondments and visits to other organisations in the consortium (Eindhoven University of Technology & Tel Aviv University). It involves a 3-year PhD doctoral program, resulting in a PhD degree awarded by University Grenoble Alpes. The work aims at developing a generic model coupling procedure to simulate the adjustment of support surfaces (shoe and insole) on a biomechanical model of the foot in order to optimize the efficacy in terms of pressure ulcer prevention.

### Job Description:

- Perform novel research under the supervision of academic members of staff and an industrial advisor in the biomechanical musculoskeletal modeling of the human foot, and in the interaction of this model with external support surfaces.
- Study the integration of the micro-scale skin constitutive law developed at the Univ. of Eindhoven in the macro-scale skin/sub-dermal tissues/muscle model developed at Univ. Grenoble Alpes, in order to model the interaction between foot soft tissues and external devices (shoes and insoles).
- Understand and implement the multi-scale/physics of skin and sub-cutaneous fat models in normal, obese and diabetic subjects in interaction with the Tel Aviv University.
- Propose a coupling procedure and an iterative device design strategy based on the biomechanical simulation of the device/foot interaction during static stance and gait.
- Thanks to embedded measurements of the pressures at the skin / device interface, compute finite element simulations of soft tissues deformations in order to understand the risks for any deep tissue injury.
- In interaction with one of the industrial partner ([www.taxisense.com](http://www.taxisense.com)), contribute to the development of products and care procedures to minimize the occurrence of foot pressure ulcers.
- participate in the activities of the STINTS programme: attending training workshops, collaborating with network partners, and undertaking periodic secondments at STINTS partner organisations
- produce written outputs as required during their PhD studies and to contribute to engagement and dissemination activities of STINTS
- present regular progress reports as required by the STINTS program of research

**University Grenoble Alpes:** With around 80 laboratories which host 3700 PhD students, the University Grenoble Alpes (UGA) of Grenoble has developed top level research and is involved in significant collaboration between national research organizations and large instrument organizations situated in the Grenoble area. Grenoble is ranked as the 5<sup>th</sup> most Inventive city in

the world by Forbes (<http://www.forbes.com/pictures/efee45jeje/5-grenoble-france/>) and amongst the top three in Europe by the European iCapital contest ([http://europa.eu/rapid/press-release\\_IP-14-183\\_en.htm?locale=en](http://europa.eu/rapid/press-release_IP-14-183_en.htm?locale=en)). It is at the forefront of pedagogical innovations with MOOCs and shared interdisciplinary modules in critical thinking. Student Life is rated in the top 3 in France.

**TIMC-IMAG laboratory** (CAMI team: Computer Assisted Medical Intervention) is a 280 people Joint Research Unit (UGA and CNRS) on the Grenoble University Hospital site. The CAMI team includes researchers and students from diverse backgrounds (applied mathematics, computer science, biomechanics, robotics, instrumentation, and medicine). Its ultimate objective is clinical: assist the physician or surgeon in the successful execution of diagnostic or therapeutic interventions by minimizing invasiveness whilst improving accuracy. This objective results in interdisciplinary research, technological development, clinical evaluation and industrial dissemination. Sensitive early on to industrial transfer, the CAMI team has also been motor in the creation of 15 start-up companies in the field. Hundreds of thousands of patients have benefited from technologies developed by this team.

## Skills/Qualifications

### Personal requirements:

- Master's degree in Mechanical Engineering, Bioengineering, Computer Science or Materials Science or a closely related discipline
- Ability to work in a laboratory environment, interest for experimental research with the determination to understand the underlying physical fundamentals
- Excellent analysis skills and an analytical mind-set, as well as excellent oral and written communication skills
- Ability to work independently and as a member of a research team
- Ability to engage with interdisciplinary studies and technological areas
- Entry requirements include **English language requirements** being IELTS Academic 6.5 overall with 6.0 in each band or equivalent.

## Benefits

All benefits of Marie Skłodowska-Curie Early Stage Researchers will apply, including generous salary, mobility allowance and family allowance.

The 13 ESRs in the STINTS project will attend training courses in the various scientific aspects of the project and also professional skills. Effective collaboration between the ESRs will be critical to the success of the project.

## Eligibility criteria

**Eligibility:** Applicants must satisfy the eligibility requirements for an ESR under the Horizon 2020 ITN Programme; in particular, they should be eligible to be appointed as an ESR in France by satisfying the following criteria:

- to have less than four years research experience after Undergraduate/Masters graduation (this is cumulative research experience and does not include management/industrial or other work experience)
- to not hold a PhD degree (PhD candidates under 4 years of registration and before completion may apply)
- to have resided or carried out their main activity in France for less than 12 months (cumulative) in the three years prior to their recruitment.

## Selection process

The following application documents are required:

- Cover letter
- Curriculum vitae and a list of publications
- Academic transcripts, Duplicate of the Master's diploma
- The names, complete contact information and recommendation letter of two referees

The documents should be sent to Professor Payan at [Yohan.Payan@univ-grenoble-alpes.fr](mailto:Yohan.Payan@univ-grenoble-alpes.fr)

## Additional comments

Candidates from minorities underrepresented in science are strongly encouraged.

**Research Fields:** Biomechanics / Materials engineering / Engineering

**Career Stage:** Early Stage Researcher or 0-4 yrs. (Post graduate)

**Contact for additional details:** Informal enquiries are encouraged and should be directed to:

Professor Yohan Payan ([Yohan.Payan@univ-grenoble-alpes.fr](mailto:Yohan.Payan@univ-grenoble-alpes.fr)) - <https://www-timc.imag.fr/en/yohan-payan>

Dr. Marek Bucki ([marek.bucki@taxisense.com](mailto:marek.bucki@taxisense.com)) - <http://www.taxisense.com>

Dr. Antoine Perrier ([antoine.perrier@taxisense.com](mailto:antoine.perrier@taxisense.com)) - <http://www.taxisense.com>

### Work location:

University Grenoble Alpes  
TIMC-IMAG Laboratory  
Pavillon Taillefer – Faculty of Medicine  
38700 La Tronche  
France