European University

Marie Skłodowska Curie Action – Postdoctoral Fellowship 2023
Expression of interest – Hosting offer
(MSCA-PF-2024)

Contact Person/Scientist in charge **Name** *(data of the principal investigator of the research group/lab or scientific supervisor)*	Merve
Surname	Acer Kalafat
Email	acerm@itu.edu.tr
Laboratory /Department /Institute /Centre / **Name** *(data of the centre/department where the fellow would be located*	Flexible Systems Laboratory
Address	Istanbul Technical University Gumussuyu Campus 34437 No:65 Gumuşsuyu Beyoglu Istanbul TURKEY
Research Area *(Please select the research area: corresponding to the eight MSCA evaluation panels. You can select between one and up to three scientific areas per EOI)*	Social Sciences and Humanities (SOC) Economic Sciences (ECO) **Information Science and Engineering (ENG)** Environment and Geoscience (ENV) Life Sciences (LIF) Mathematics (MAT) Physics (PHY) Chemistry (CHE)
Brief description of the Centre/Research Group *(max. 1,600 characters including spaces: information about the research centre or research group, scientific staff. Please include URL if possible)*	Flexible Systems Laboratory was established in 2019 at Istanbul Technical University Mechanical Engineering Faculty in Gümüşsuyu Campus. The main focus of the lab is to develop solutions for smart, flexible, and soft robotic systems as well as polymeric materials for biomedical applications. We focus on design, development, characterization and application of embedded and wearable sensors in various fields particularly medical applications; fabrication of flexible, foldable and stretchable structures; manufacturing of tissue scaffolds and wound dressings; motion control of robotic systems; 3D printing, and modeling of flexible structures. **Field of Work:** Development of soft and flexible robotic systems; Foldable, origami-based mechanism design; Mechatronic system design and integration; Polymeric and textile-based wearable sensor design, development and characterization; Polymeric tissue scaffold and wound dressing design and development; 3D Printing technologies; Flexible (compliant) mechanism modeling; Machine learning applications; Control applications

Project description *(max. 1,800 characters including spaces: short description of the research project / research line where the fellow would be hosted and develop his /her project)*	Manufacturing with 3-Dimensional (3D) printers has begun to be used in many areas to create parts that cannot be manufactured with traditional manufacturing methods. The mechanical strength of parts manufactured with this method depends on the direction, and studies on determining the characteristics of this behavior have gained momentum. Additionally, by using topological optimization methods, complex shapes that cannot be manufactured with traditional methods can be obtained with the 3D method. However, the optimization method used creates the optimum geometry by taking traditional methods into account, and does not consider that the part will be manufactured with an additive manufacturing method. The new researcher will be welcome to work in determination of a manufacturing method that will use less material than a 100% solid part in case of shrinkage and have similar strength to this part. Standard tensile samples will be created using a single material for each method. In the tests to be carried out, the material properties and strength will be determined. Afterwards, the stress distribution on the parts will be obtained by performing finite element analysis of the tensile tests. Using this stress distribution behavior, curves where the stress remains constant will be determined. It is planned to use curve models to mathematically define these curves. Then, new tensile samples will be printed by writing the G-code following this path and the relevant tests will be carried out. This method will be used to determine the manufacturing path of parts subject to plane stress. 4 manufacturing methods will be used i.e., Melt Deposition Modeling (FDM), Sterolithography (SLA), Digital Light Manufacturing (DLP) and 3D printers working with the extrusion principle.
Applications: documents to be submitted and deadlines *(Please indicate the documents that the candidate fellow should submit to establish contact: CV, letter of motivation, letter of references, etc., please indicate deadline. Recommended deadline: April 2023)*	Interested research scholars are asked to send their CVs, letters of motivation, letters of references and their research plans to show how they can contribute to the project topic described above. Deadline: June 30th 2024.