

COOPERATION PROFILE

H2020 Topic(s)	<p>NMBP:</p> <ul style="list-style-type: none"> - EEB-07: Integration of energy harvesting at building and district level; - NMBP-05: Advanced materials and innovative design for improved functionality and aesthetics in high-added value consumer goods <p>ICT:</p> <ul style="list-style-type: none"> - ICT-03: Smart system integration <p>Secure, clean and efficient energy:</p> <ul style="list-style-type: none"> - SCC-01: Smart Cities and Communities lighthouse projects <p>Cross cutting activities:</p> <ul style="list-style-type: none"> - IoT-01 Pilot3: Wearables for smart eco systems - IoT-03: R&I on IoT integration and platforms
Organisation name	University of Rijeka, Faculty of Engineering & Centre for Micro- and Nano-Sciences and Technologies
Department	Department of Mechanical Engineering Design
Address	Vukovarska 58, 51000 Rijeka
Website	http://www.riteh.uniri.hr/ , http://precenglab.riteh.uniri.hr/
Country	Croatia
First name and last name	Sasa Zelenika
E-mail address	sasa.zelenika@riteh.hr
Phone	++ 385 (0)51 651 538

Organisation description

University of Rijeka, Faculty of Engineering (RITEH), Croatia

The University of Rijeka was founded on May 17, 1973, as a logical expansion of higher education institutions in western Croatia. The first school of higher education was established in 1627 by the Jesuits and enjoyed equal status with the academies in the largest cities of the Austrian Empire. The University of Rijeka is presently composed of nine faculties, one art academy, four departments, University Libraries and the Students Centre.

The Faculty of Engineering was officially opened on November 8th, 1960, as the Faculty of Mechanical Engineering in Rijeka. Today, The Faculty of Engineering of the University of Rijeka is a leading higher education, scientific and research institution in the field of technical sciences not only at the University of Rijeka, but also in the region where it is situated. It is competitive on the European and the world knowledge market. The Faculty of Engineering actively collaborates with industrial, higher education and scientific institutions in its vicinity and farther away. It is also an institution which develops dynamically, and seeks to attain integration into European standards of science and higher education, always bearing in mind development of scientific research and teaching quality.

The Faculty is composed of 11 departments including Department of Mechanical Engineering Design where potential participants of a project are employed. Faculty of Engineering employs 69 professors, 34 lecturers and assistants and 18 junior researchers. Research and development activities of the Department of Mechanical Engineering are focused on three main areas: *Mechanical engineering design*: modeling, gear transmissions, planetary gears, high transverse contact ratio gears, material fatigue, alternative hydraulic systems, hybrid drives; *Precision engineering*: compliant mechanisms, structural analysis, integration into mechatronic devices, measurement techniques, equipment for synchrotron radiation; *Micro-systems technologies*: energy harvesting/scavenging, MEMS, handling, assembly and packaging, scaling effects, micro-fabrication.

Part of the personnel of the Department of Mechanical Engineering Design is also involved in the activities of the Centre for Micro- and Nano-Sciences and Technologies of the University of Rijeka. In fact, in the Laboratory for Precision Engineering and Micro- and Nano-Systems' Technologies of the Centre, advanced measurement technologies based on scanning probe microscopy (AFM/STM) and nanoindentation are the core of the engineering approach to the characterisation of materials at the micro/nano scales.

	I am offering	I am requesting
Project coordination		x
Project partnership	x	

I am offering...

Description

The RITEH team deals especially with **modelling, simulation, optimization and experimental assessment of energy harvesting solutions**, used for powering low consumption systems. RITEH has recently participated in the EU FP7 ICT-2009.9.1 project no. 269985 („Detection of Watercourse Contamination in Developing countries using Sensor Networks - Enlarged”; 2013-2015 - GOLDFISH) related to monitoring pollutants in river flows via autonomous wireless sensor networks. In the GOLDFISH project, the team developed and tested novel energy harvesting concepts for powering wireless networks of sensors, including suitable energy management electronics. RITEH has therefore an expertise in developing and applying sensor networks based on different energy harvesting principles.

This know-how and expertise can be used to **develop energy harvesting principles that can be integrated in smart cities and buildings, consumer goods, ICT, IoT and wearable components** with the goal of achieving intelligent control and monitoring of some characteristic parameters (temperature, humidity, pressure, etc.) as well as to increase their efficient use.

The team has also considerable experience in developing technological solutions (e.g. for powering sensors in the field of automotive industry), as well as related to the characterisation of innovative materials at the nanoscale.

General expertise categories of RITEH team:

Scientific research, energy harvesting solutions, mechatronics, nanometric precision positioning systems, control and data acquisition systems, noncontact interferometric measurements of displacements and vibrations, microsystems technologies, scanning probe microscopy (SPM), nanoindentation, tensile testing, additive 3D manufacturing technologies, reversed engineering and rapid prototyping, ...

Innovative aspects and main advantages

In 2014-2015 the RITEH team was involved also in the ERDF project “Research Infrastructure for Campus-based Laboratories and Centres at the University of Rijeka (RISK)” – a 24 million Euros grant aimed at building the scientific infrastructure capacities of the University of Rijeka, Croatia. In particular, the project team of the Faculty of Engineering was responsible for the herein acquired equipment of the Laboratory of Precision Engineering and Micro- and Nano-Systems Technologies of the Centre of Micro- and Nano-Sciences and Technologies.

In the frame of a potential cooperation, several **state-of-the-art devices** and other equipment of this Laboratory can thus be used to develop, prototype, manufacture and test the performances of the developed components:

- Bruker Dimension ICON scanning probe microscope (atomic force microscope, scanning tunnelling microscope, ...)
- Keysight Nano Indenter G200,
- Stratasys MC250 3D printer,
- a Shimadzu Autograph AGS-X tensile testing machine,
- Bandelin ultrasonic ultra-high vacuum cleaning facility,
- Haas 5-axes milling machine and 4-axes lathe.

Market application (Which market is most relevant for your product/service?)

The autonomous sensors based on the state-of-the-art energy harvesting principles create the preconditions towards an ICT-based solutions for the intelligent control of the of the characteristic parameters of **smart cities and buildings, consumer goods, ICT, IoT and wearable components**.