



ACROSS

Centre of Research Excellence
for Advanced Cooperative Systems





Centre of Research Excellence
for Advanced Cooperative Systems

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Zagreb, 2014.

Welcome Message

Welcome to the Centre of Research Excellence for Advanced Cooperative Systems!

The Centre of Research Excellence for Advanced Cooperative Systems (ACROSS Research Centre) is an interdepartmental research centre at the University of Zagreb Faculty of Electrical Engineering and Computing (UNIZG-FER). Its establishment and operation is funded by the European FP-7 Capacities "Research Potential" program [285939, FP7-REGPOT-2011-1].

The Centre research activities focus on four major Strategic Research Domains: Cooperative Cognitive and Robotic Systems, Cooperative Networked Embedded Systems, Cooperative Renewable Energy Systems, Cooperative Control Methods. While the first three strategic research domains are application-oriented, the fourth strategic research domain is of paramount importance for advanced cooperative systems in general, as a fundamental enabling technology. Possible applications of these advanced cooperative systems are numerous: advanced flexible manufacturing, renewable and sustainable energy, home and office automation, transport, logistics, environmental monitoring, healthcare, security and surveillance, human augmentation etc.

The Global Objective of the ACROSS Research Centre is to be at the forefront of research and development of novel methodologies and advanced engineering approaches for cooperative systems as well as to act as a point of contact between academia and industry, providing an infrastructure for scientific exchange in the area of cooperative systems related to robotics, networked embedded systems and renewable energy systems.

The ACROSS Team, which comprises fourteen research groups from seven UNIZG-FER Departments, possesses the required multi-disciplinary R&D expertise for achieving the Global Objective. The Team is organised in four research teams, one for each strategic research domain. These teams have been formed according to the complementary expertise of research groups. The ACROSS Team tightly collaborates with sixteen leading EU research centres and three Croatian partner companies.

To ensure that the Centre activities remain in line with its objectives and the work plan strategy, and that the existing collective expertise of UNIZG-FER researchers and EU experts is fully exploited, an external Steering Committee is established to continually assess the progress and make recommendations to the Centre managerial team. The members of the Steering Committee are distinguished scientists in ACROSS strategic research domains, senior managers from industry as well as representatives of public authorities and funding agencies.

I invite you to visit us in person or via the web at <http://across.fer.unizg.hr>. Please feel free to contact us for further information.

With my best wishes,



Ivan Petrović, Ph.D.

Professor and Head of the ACROSS Research Centre
University of Zagreb, Faculty of Electrical Engineering and Computing

ACROSS - Centre of Research Excellence for Advanced Cooperative Systems

ACROSS – the Centre of Research Excellence for Advanced Cooperative Systems - aims to unlock and strengthen research potential of the **Faculty of Electrical Engineering and Computing** at the **University of Zagreb** for the benefit of national and EU community. It represents the forefront of research and development of novel methodologies and advanced engineering approaches for cooperative systems.

The Centre has been founded within the ACROSS project, which received the research funding from the **Seventh Framework Programme of the European Union** (Grant Agreement No. 285939 FP7-REGPOT-2011-1).

The Centre acts as a point of contact between academia and industry, providing an infrastructure for scientific exchange in the area of cooperative systems related to robotics, networked embedded systems and renewable energy systems.

The ACROSS Team comprises fourteen research groups from seven UNIZG-FER Departments:

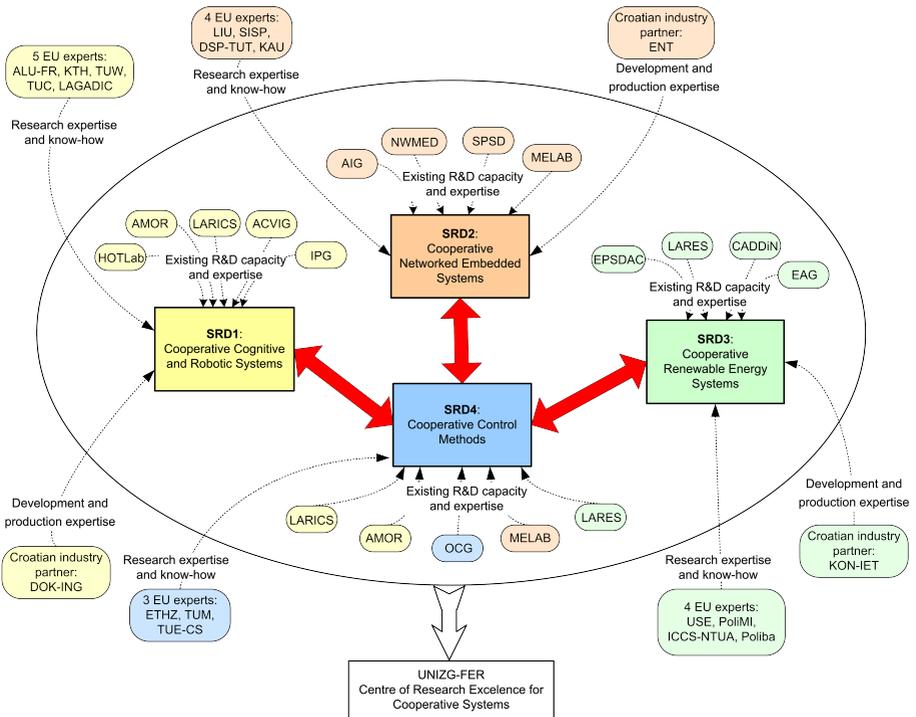
DEPARTMENTS	<ul style="list-style-type: none"> ■ Department of Control and Computer Engineering ■ Department of Electronic Systems and Information Processing ■ Department of Electronics, Microelectronics, Computer and Intelligent Systems 	
	<ul style="list-style-type: none"> ■ Department of Telecommunications ■ Department of Electrical Machines, Drives and Automation ■ Department of Energy and Power Systems ■ Department of Electroacoustics 	
	RESEARCH GROUPS	<ul style="list-style-type: none"> ■ Autonomous Mobile Robotics group (AMOR) ■ Laboratory for Robotics and Intelligent Control Systems (LARICS) ■ Laboratory for Renewable Energy Systems (LARES) ■ Optimal Control Group (OCG) ■ Image Processing Group (IPG) ■ Signal Processing and System Design Group (SPSD) ■ Advanced Instrumentation Group (AIG) ■ Applied Cognition and Vision Group (ACVIG) ■ Human-Oriented Technologies Laboratory (HOTLab) ■ Networked Media Group (NWMED) ■ Mechatronic Laboratory (MELAB) ■ Electric Power System Dynamics, Automatization and Control Group (EPSDAC) ■ Computer Aided Design of Distribution Networks Group (CADDiN) ■ Environmental Noise Control Group (ENC)

The research activities of the Centre focus on **four major Strategic Research Domains** (SRDs):

- **SRD1 - Cooperative Cognitive and Robotic Systems,**
- **SRD2 - Cooperative Networked Embedded Systems,**
- **SRD3 - Cooperative Renewable Energy Systems,**
- **SRD4 - Cooperative Control Methods.**

The complete ACROSS Team is organized in four research teams, one for each SRD. These SRD teams have been formed according to the complementary expertise of research groups:

- The SRD1 Team consists of five research groups (HOTLab, AMOR, LARICS, ACVIG and IPG) from four Departments.
- The SRD2 Team consists of four research groups (AIG, NWMED, SPSD, and MELAB) from three Departments.
- The SRD3 Team consists of four research groups (EPSDAC, LARES, CADDiN and EAG) from three Departments.
- The SRD4 Team consists of five research groups (OCG, LARICS, AMOR, MELAB and LARES) from two Departments.



One major objective of the ACROSS, improvement of UNIZG-FER research infrastructure, is achieved with the **establishment of 3 laboratories**, one for each SRD:

- **Laboratory for Cognitive and Robotic Systems,**
- **Laboratory for Cooperative Networked Embedded Systems,**
- **Laboratory for Renewable Energy Systems.**

Sixteen research collaborating partners from 10 EU countries and Switzerland and 3 industrial collaborating partners from Croatia contribute to the success of the ACROSS (6 partners for SRD1, 5 partners for SRD2, 5 partners for SDR3, and 3 partners for SRD4). Partners have been carefully chosen based on their internationally recognized research, complementary skills and strong presence in these domains, as well as their competences in product design and development in respective SRDs.

SRD1: Cooperative Cognitive and Robotic Systems

Laboratory for Cognitive and Robotic Systems

The main focus of the research in the Laboratory for Cognitive and Robotic Systems is the development of cooperative Multi-Robot Systems (MRSs) as they can often be used to fulfill the tasks that are difficult to be accomplished by an individual robot, especially in the presence of uncertainties, incomplete information, distributed control, and asynchronous computation. Many practical and potential applications, such as unmanned aerial vehicles (UAVs), autonomous underwater vehicles (AUVs), ground mobile robots, and other robot-based applications in hazardous and/or unknown environments can benefit from the use of MRSs.

Research objectives and major research activities of UNIZG-FER in this research domain can be structured in six topics:

- Autonomous Navigation of Mobile Robots
- Unmanned Aerial Vehicles
- Manipulation and Grasping
- Cooperative Multi-Robot Systems
- Human-Robot Cooperative Systems
- Cognitive vision-based systems

The research potential unlocked by ACROSS enables much higher intensity of (existing) research activities in cognitive systems and robotics with the aim to extend systems engineering to the design of individual and cooperative robotic systems that can carry out various useful tasks, such as manipulation and grasping, exploration and navigation, monitoring and control, situation assessment, communication and interaction, autonomously or in cooperation with people and/or distributed smart environments, in circumstances that have not been planned for explicitly at the design time.

The SRD1 Team consists of five research groups: HOTLab, AMOR, LARICS, ACVIG and IPG.

AMOR – Autonomous Mobile Robotics Group

(http://act.rasip.fer.hr/groups_amor.php)

AMOR group is a part of the Department of Control and Computer Engineering, UNIZG-FER. It is intensively researching autonomous navigation of mobile robots in unknown dynamic environments, mobile manipulation, cooperative robot-robot and human-robot systems and robot embodiments in the iSpace. Various methods from control theory and estimation, sensor fusion as well as the artificial intelligence have been successfully applied. Group currently consists of 5 Postdoc and 5 PhD students directed by prof. Ivan Petrović. AMOR group has available a lot of research equipment, including mobile platforms, lightweight manipulators and many advanced sensors for environment perception. The group is active in several national and international research projects.

LARICS – Laboratory for Robotics and Intelligent Control Systems

(<http://larics.rasip.fer.hr>)

LARICS is a research group within the Department of Control and Computer Engineering, Faculty of Electrical Engineering and Computing, University of Zagreb. LARICS research activities are in the fields of robotics, intelligent control, flexible manufacturing systems, unmanned aerial vehicles, formation control, process control, embedded systems, and industrial control systems. Two professors (S. Bogdan and Z. Kovačić) and nine Ph.D. students currently work in LARICS. LARICS research equipment consists of laboratory models of robotized manufacturing cells (with educational robots Rhino XR-3, Rhino XR-4, and Mitsubishi Movemaster), one industrial SCARA robot, 5 mobile robots (Wifibot), a small-size helicopter, a blimp, and a quadrotor. There are also several mechatronic and robotic devices built in the Lab (prototype of exploration mobile robot, planar manipulators, self-balancing two-wheeled robot, hyper-redundant tentacle robot, quadruped robot, mobile robot platform).

IPG – Image Processing Group

(<http://www.fer.unizg.hr/ipg>)

IPG is a part of the Department of Electronic Systems and Information Processing, UNIZG-FER. IPG conducts research in the theory and applications of image processing and computer vision methods in areas such as biometric security, biomedicine, visual inspection, and automotive applications. IPG is directed by Professor Sven Lončarić and consists of professors Damir Seršić and Marko Subašić, two postdoctoral fellows, and two PhD students. IPG research equipment includes computer workstations, industrial digital video cameras, network pan-tilt cameras, a thermovision camera, a high-performance computing cluster, equipment for 3-D visualization of virtual environments. The group has participated in several international R&D projects such as FP7, COST B21, a series of CEEPUS projects on biomedical image processing (1998-2008), and industrial projects with Siemens PSE, Austria, on face image analysis (2005-2008), Philips Healthcare, Netherlands on biomedical video processing and analysis (2005-2009), and a number of other partners in industry.

ACVIG - Applied Cognition and Vision Group

ACVIG is a part of the Department of Electronics, Microelectronics, Computer and Intelligent Systems, Faculty of Electrical Engineering and Computing, University of Zagreb. The group researches various subfields of computer vision, machine learning and natural language processing. Our recent work focuses on object detection and recognition, appearance-based navigation with a single perspective camera, statistical properties of two-view geometry, as well as on machine learning approaches to object detection and content based image retrieval. Members of the group are Bojana Dalbelo Bašić, Zoran Kalafatić and Siniša Šegvić, as well as four junior researchers (3 Ph.D. students, 2 postdoc). The group has access to adequate computing (workstations, servers) and vision equipment (cameras, lenses, pan-tilt units).

HOTLab – Human-Oriented Technologies Laboratory

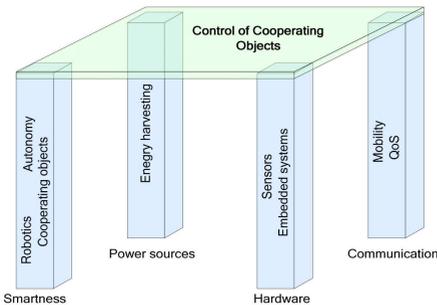
(<http://hotlab.fer.hr>)

HOTLab is a part of the Department of telecommunications, Faculty of electrical engineering and computing, University of Zagreb. In our research we explore and develop technological means to analyse and simulate people and their behavior, with a strong interest in applications of such technologies. We blend techniques from various fields, including computer graphics, computer vision, virtual & augmented reality, machine learning and speech technologies, to achieve goals such as fully automatic tracking of facial features in video, automatic animation of talking virtual characters from speech or text input and embodied conversational agents using multimodal behavior to communicate with users. Potential applications of such technologies include marketing and communications, games and entertainment, aid for the disabled, military training, automotive and industrial safety, identity verification and others. Other than national and EU research funding, HOTLab has applied research projects with companies in Croatia and Sweden. HOTLab currently consists of two researchers and one post-doc directed by prof. Igor S. Pandžić.

SRD2: Cooperative Networked Embedded Systems

Laboratory for Cooperative Networked Embedded Systems

The research of the Laboratory for Cooperative Networked Embedded Systems is directed towards smart, communicating, energy-efficient devices to provide universal in-home and mobile access to information and services. Key components cover Smartness, Power sources, Hardware, and Communication. Specific research includes:



- networked robotic systems, and smart cooperating objects (Smartness pillar)
- low power digital design, energy scavenging, and energy management (Power sources pillar)
- wireless sensor networks, including multimodal and signal processing intensive nodes (Hardware pillar)
- time synchronization, image and other multimedia transmission issues and QoS in networked systems (Communication pillar).

The research is predominantly focused on wireless sensor networks (WSNs) and on integration of mobile robots into wireless sensor networks employed for surveillance and monitoring of indoor and outdoor environments. WSNs can be easily applied in surveillance and monitoring installations whereas the sensors are capable of responding to activities requiring intervention, such as intrusions or fire.

Research objectives and major research activities of UNIZG-FER in this research domain can be structured in five topics as follow:

- Embedded Networked Sensor Systems
- Signal and Information Processing
- Quality and Service Adaptation for Networked Media
- Robot embodiment in networked embedded environments
- Embedded Control Systems

The SRD2 Team consists of four research groups: AIG, NWMED, SPSD and MELAB.

MELAB – Mechatronics Laboratory

MELAB is a part of the Department of Electrical Machines, Drives and Automation, Faculty of Electrical Engineering and Computing, University of Zagreb. The research activities include analysis, modeling and control of complex mechatronic systems with special attention given to advanced control and estimation techniques applied to manipulation tasks. The laboratory equipment consists of modular electromechanical systems with various levels of complexity. The group consists of two professors (F. Kolonić and J. Matuško) and two PhD students.

AIG - Advanced Instrumentation Group

(<http://www.fer.unizg.hr/aig>)

AIG is a part of the Department of Electronic Systems and Information Processing, Faculty of Electrical Engineering and Computing, University of Zagreb. AIG fields of research are intelligent electromagnetic sensors, measurement and instrumentation, harsh environment electronic, multimodal and intensive signal processing sensor nodes, wireless sensor networks, energy harvesting and management for networked embedded systems. The group has gained experience on interdisciplinary and multidisciplinary projects in biomedicine, agriculture, hydrocarbon exploration, home automation and traffic. AIG currently consists of 1 post-doc researcher, 2 full-time PhD students, 4 part-time PhD students and 7 MSc students directed by Prof. Vedran Bilas. AIG uses high-end measurement equipment, has state-of-the-art simulation tools, design and development tools for digital system design and embedded design.

NWMED – Networked Media Group

(http://www.fer.unizg.hr/tel/en/research/research_groups/netmedia)

NWMED is a research group within the Mobility Lab in the Department of Telecommunications, Faculty of Electrical Engineering and Computing, University of Zagreb. The research goal of the NWMED group is to gain deeper comprehension of the quality of service (QoS) and quality of experience (QoE) requirements for advanced and interactive multimedia services such as networked virtual environments, and complex relationships between the application-level and network-level QoS. The focus is on application/session level control signalling, negotiation, and adaptation of QoS for media-rich services in the heterogeneous Internet Protocol based (“all-IP”) environment of the converged 3rd generation network and beyond. The NWMED group currently consists of assistant professor Lea Skorin-Kapov, two postdoctoral researchers Ognjen Dobrijevic and Mirko Suznjevic, and two PhD students directed by professor Maja Matijasevic. The group uses the computer and networking resources in the Dept. of Telecommunications, as well as virtual reality equipment, shared with the HOTLab group; and various platforms and open-source, commercial, and in-house developed software and tools supporting the reconfigurable laboratory network testbed.

SPSD - Signal Processing and System Design Group

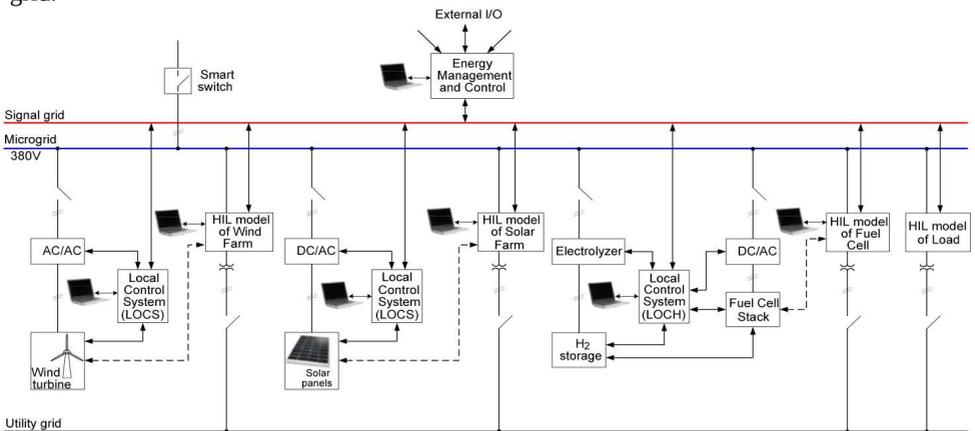
SPSD is a part of the Department of Electronic Systems and Information Processing of the Faculty of Electrical Engineering and Computing, University of Zagreb. The main activities of its researchers are related to signal processing, specifically in speech and audio as well as in communications. They are also involved in the application of signal processing algorithms on digital signal processors (DSPs) and field programmable gate arrays (FPGAs), as well as in embedded system design. SPSD group currently consists of two professors and two postdoctoral researchers. SPSD group has several DSP and FPGA development systems and the equipped laboratory for the research and development in the fields of speech and audio processing and signal processing for communications.

SRD3: Cooperative Renewable Energy Systems

Laboratory for Renewable Energy Systems

The aim of the Laboratory for Renewable Energy Systems is to extend systems engineering to design more efficient energy conversion and to lower the cost of renewable energy sources. Additionally, there is a very challenging task how to ensure the best integration of distributed energy generators, organized as a micro grid, with utility grid using dynamically reconfigurable ICT architectures, technologies and tools. To ensure this, new proactive cooperative control systems based on platforms integrating (near) real-time information from wireless sensor networks and external information systems, such as weather forecasts, should be designed.

The micro grid enables new research directions in the Laboratory for Renewable Energy Systems. It allows us to tackle a new, very challenging research problem: “How to ensure the best cooperation of distributed energy generators, organized as a micro grid, with utility grid using dynamically reconfigurable ICT architectures, technologies and tools?” To resolve this, the micro grid cooperative control system will use agent-based technologies and advanced control methods to effectively control generation and storage devices connected to the micro grid.



Research objectives and major research activities of UNIZG-FER in this research domain can be structured in six subtopics as follow:

- Wind Turbine and Wind Farm Control
- Hydrogen Storage and Fuel Cells
- Solar Energy
- Environmental Noise Control
- Interaction between RES and utility grid
- Microgrids

The SRD3 Team consists of four research groups: EPSDAC, LARES, CADDiN and EAG.

EPSDAC – Electric Power System Dynamics, Automatization and Control Group

EPSDAC group is a part of the Department of Energy and Power Systems at UNIZG-FER. Its research aim is to advance both fundamental knowledge and the applications of electrical power engineering across a broad range by working on fundamental scientific projects, in partnership with industry, transnational institutions, electric utilities etc. The group possesses a lot of modeling experience with specialist software for different purposes (PSS/E, ETAP, NEPLAN, LabView, MATLAB, GOTIC, RELAP,...). Specific group goals include modeling and evaluation of connection and influence of renewable energy sources on electric power systems, improving models and methodologies for power system analysis, electric power system operation and control and electric power quality. These issues are essential to the higher share interconnection of renewable energy sources (solar, wind, and hydro).

LARES - Laboratory for Renewable Energy Sources (<http://www.lares.fer.hr/>)

LARES is a part of the Department of Control and Computer Engineering, Faculty of Electrical Engineering and Computing, University of Zagreb. As a part of Department's ACG Group, LARES is applying different advanced control methods to control renewable energy sources, particularly wind turbines/wind farms, and energy storages, particularly the hydrogen storage and electrical energy production using fuel cells. LARES currently consists of 2 professors (N. Perić and Ž. Ban), 7 full-time PhD students and 11 part-time PhD students from industry. In order to enhance experimental research, a specific laboratory infrastructure has been established with the following basic components: wind turbine, blower, electrolyser and fuel cell stack with appropriate control systems.

CADDiN – Computer Aided Design of Distribution Networks Group

CADDiN is a part of the Department of Energy and Power Systems at UNIZG-FER. Its research is focused on developing algorithms and software applications for distribution network optimal planning with high penetration of distributed generation. The group also researches optimal scheduling and economic dispatch of intermittent and non-intermittent distributed generation, storage and controllable loads within virtual power plants (VPP) and microgrids. CADDiN currently consists of two PhD students directed by prof. Davor Škrlec and two key experts: prof. Davor Škrlec and prof. Marko Delimar.

ENC – Environmental Noise Control Group

ENC is a part of the Department of Electroacoustics at UNIZG-FER. Its research is focused on measurement of outdoor and indoor imission and emission noise levels, characterization of noise sources, calculation of noise transmission paths, design of noise control systems and measures, development of acoustical measurement systems, methods and noise prediction software. The group's key experts are Prof. Hrvoje Domitrović and Asst. prof. Kristian Jambrošić, in collaboration with other colleagues and PhD students in the field of noise control.

SRD4: Cooperative Control Methods

Strategic research domains SRD1-SRD3 are application oriented and therefore correspond to establishment of three laboratories. Since SRD4 is concerned with cooperative control, in general, it is being led by the OCG, which has a high-ranking expertise in optimal and robust control of hybrid systems, and participation of other research groups will bring expertise in control of robotic systems (LARICS, AMOR), embedded systems (MELAB) and renewable energy systems (LARES).

The research focuses on the modified multi-agent framework of cooperative control where the optimal controller of a hybrid system is embedded in the core of an agent. The abstract “agent state” is replaced with a hybrid automata and a controller, while the “agent process” retains its intelligence and coordination function. This makes it possible to represent systems with multiple modes and to design suitable control laws that are valid for each of these modes.

While there has been substantial work in cooperative control over the past decade, there are still many open problems that remain to be solved. Here we provide a brief review of some of the future challenges in cooperative control. The topics listed here are not intended to be exhaustive, but rather to be indicative of the classes of problems which remain open:

- Integrated control, communications and computer science
- Verification and validation
- Higher levels of decision making
- Networked control systems
- Flexibility of the cooperative system
- Robustness to variable time delays

The SRD4 Team consists of five research groups: OCG, LARICS, MELAB, AMOR and LARES.

OCG - Optimal Control Group (<http://act.rasip.fer.hr>)

OCG group is a part of the Department of Control and Computer Engineering, UNIZG-FER. The group is researching theoretical and practical aspects of computing optimal control strategies for control systems that achieve pre-specified system criteria in terms of performance, constraints satisfaction, and robustness to the presence of noise and/or model uncertainties. The specific areas of interest include model based predictive control, application of mathematical programming and computational geometry in control, distributed control, system identification, and digital implementation of optimal control laws. OCG has available several computer platforms equipped with software for optimal control law computations and experimental test-benches for real-time implementation of optimal control strategies (automotive electronic throttle control, magnetic levitation system).

LARICS – Laboratory for Robotics and Intelligent Control Systems – see page 5

MELAB - Mechatronics Laboratory – see page 8

AMOR – Autonomous Mobile Robotics Group – see page 4

LARES - Laboratory for Renewable Energy Sources – see page 11

Facilities



Laboratories founded by ACROSS (Laboratory for Cognitive and Robotic Systems, Laboratory for Cooperative Networked Embedded Systems and Laboratory for Renewable Energy Systems) are built around the presently existing equipment from the research groups which form each laboratory, combined with the newly acquired equipment dedicated for joint research.

The research groups which form the laboratories have agreed to integrate selected existing equipment and new equipment funded by ACROSS, and are now equipped with state-of-the-art equipment to complement and enhance current research and development capabilities.

Equipment in Laboratory for Cognitive and Robotic Systems:

- Complete robotic systems:
 - Aerial robotics (1 AscTec Pelican, 5 ArduCopter Quads, 10 AR drone Parrots)
 - 6 humanoid robots Nao from Aldebaran Robotics
 - High performance outdoor platform Robotnik Guardian
 - 4 in/out-door platforms Clearpath Husky equipped with LIDAR, IMU and GPS
 - 2 light-weight 7 DOF arm manipulators Kinova Jaco for service operations
 - 2 high performance industrial 7 DOF arm manipulators Schunk Powerball
 - 1 two arm Baxter Research Robot
 - Team of 4 indoor holonomic platforms AndyMark
 - 3 fully equipped mobile robots Pioneer 3DX,
 - 1 mobile robot Pioneer 3AT (without GPS),
 - 5 small-size AmigoBot mobile robots,
 - 5 small-size mobile robots (Wifibot),
 - 1 Magellan mobile robot,
- High performance exteroceptive sensors:
 - High speed thermo-vision camera
 - 3D laser scanner Velodyne HDL-32E

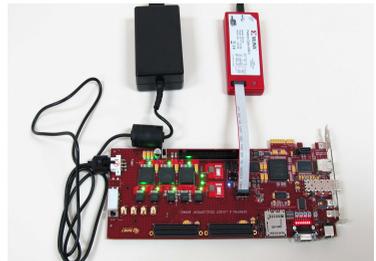


- 3D laser scanner The FARO Focus3D X 330
- Position tracking device, equipment for active and passive 3-D stereo visualization, a 3-D digitizer
- Accessories
 - Set of sensors, mounting adapters, spare embedded computers, batteries and other accessories



Equipment in Laboratory for Cooperative Networked Embedded Systems:

- Equipment for signal processing
 - Spectral/Network analyzer
 - Arbitrary waveform generator
 - Logic analyzers
 - Digital oscilloscope
 - Environmental test chamber
 - Universal counter
 - Precision impedance analyzer
 - Universal source
- Development systems for embedded systems
 - FPGA development system
- Equipment for wireless sensor networks:
 - Wireless sensor nodes with accessories
 - Wireless sensor network energy harvesting equipment
- Equipment for smart networked environments
 - Canon high resolution CMOS digital single-lens reflex camera system
 - FLIR high performance infrared camera
 - Axis network imaging system
 - C-mount lenses for industrial video cameras
 - Industrial digital video cameras
 - Tripods and accessories
- Embedded systems and DSP development tools:
 - Microchip, Intel, Analog Devices
- Dedicated simulation packages:
 - COMSOL, Altium (annual licences)





Equipment in Laboratory for Renewable Energy Systems:

- Photovoltaic system and microgrid
 - Photovoltaic modules and accessories
 - Supporting mechanical structures for photovoltaic panels and solar irradiance sensors
 - Power converters and batteries for the photovoltaic system and microgrid
 - Power production/consumption meters and network analyzer
 - Electrical installations for the photovoltaic system and microgrid
- Control and measurement equipment for photovoltaic system and microgrid
 - Equipment for global horizontal, ground-reflected, direct and diffuse solar irradiance measurement
 - Equipment for measurements of overall solar irradiance on at least 7 independent and distanced surfaces
 - Pyranometer
 - Compact device for simultaneous measurement of global horizontal solar irradiance, diffuse solar irradiance and sunshine status
 - Anemometer
 - Wind direction vane
 - Process control and monitoring system
 - Workstations
- Odeon Auditorium
- Program Packages for Power System Analysis and Engineering Research
 - NEPLAN, DigSilent Power Factory, PSS/E, ETAP, ALGOR, FLUENT

General UNIZG-FER's Computing Infrastructure

- MATLAB – Software Package for Technical Computing
- LabView – A visual programming language
- High-performance computing cluster

Key Experts

28 key experts from the Faculty of Electrical Engineering and Computing from 7 departments form the ACROSS Team:

Research Group name	Key experts
Autonomous Mobile Robotics group (AMOR)	Prof. Ivan Petrović
Laboratory for Robotics and Intelligent Control Systems (LARICS)	Prof. Zdenko Kovačić Prof. Stjepan Bogdan
Laboratory for Renewable Energy Systems (LARES)	Prof. Nedjeljko Perić Prof. Željko Ban
Optimal Control Group (OCG)	Prof. Mato Baotić Prof. Mario Vašak
Image Processing Group (IPG)	Prof. Sven Lončarić Prof. Damir Seršić Prof. Marko Subašić
Signal Processing and System Design Group (SPSD)	Prof. Mladen Vučić Prof. Davor Petrinović
Advanced Instrumentation Group (AIG)	Prof. Vedran Bilas Prof. Igor Lacković
Applied Cognition and Vision Group (ACVIG)	Prof. Bojana Dalbelo Bašić Prof. Zoran Kalafatić Prof. Siniša Šegvić
Human-Oriented Technologies Laboratory (HOTLab)	Prof. Igor S. Pandžić
Networked Media Group (NWMED)	Prof. Maja Matijašević Prof. Ivana Podnar Žarko
Mechatronic Laboratory (MELAB)	Prof. Fetah Kolonić Prof. Jadranko Matuško
Electric Power System Dynamics, Automatization and Control Group (EPSDAC)	Prof. Igor Kuzle Prof. Zdenko Šimić
Computer Aided Design of Distribution Networks Group (CADDiN)	Prof. Davor Škrlec Prof. Marko Delimar
Environmental Noise Control Group (ENC)	Prof. Hrvoje Domitrović Prof. Kristian Jambrošić



Ivan Petrović

AMOR - Autonomous Mobile Robotics Group

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Prof. Ivan Petrović is the Head of ACROSS Research Centre at UNIZG-FER. He has 30 years of professional experience in R&D of automatic control theory and its applications. His recent research is focused on the advanced control and optimal estimation techniques and their application in control and navigation of autonomous mobile robots and vehicles. He co-authored more than 40 journal and 160 conference papers. He is an Editor-in-Chief of the *Automatika* journal. He has actively participated as a collaborator or principal investigator in more than twenty projects. Results of his research effort have been implemented in several industrial products. He is a member of IEEE, IFAC – Vice Chair of TC on Robotics and FIRA – Executive committee. He is a member of the Croatian Academy of Engineering, a member of the Steering Committee of KoREMA and Vicepresident of the Croatian Society for Robotics.



Zdenko Kovačić

LARICS - Laboratory for Robotics and Intelligent Control Systems

www.fer.unizg.hr/zdenko.kovacic

e-mail: zdenko.kovacic@fer.hr

Prof. Zdenko Kovačić has 30 years of professional experience in the field of control and robotics. He conducted more than 20 R&D projects and some results were successfully implemented in several industrial products. In the last five years his research interests are mainly in intelligent control techniques, robot control, human-robot interaction, professional service robotics, and special robotic applications. He is a member of IEEE, IFAC . He is the member of the Steering Committee of the Croatian Society for Robotics.



Stjepan Bogdan

LARICS - Laboratory for Robotics and Intelligent Control Systems

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e-mail: stjepan.bogdan@fer.hr

Prof. Stjepan Bogdan has 22 years of professional experience in R&D projects in the field of automatic control theory and its applications. He conducted several R&D projects and his research results are successfully implemented in several industrial products. In the last five years his research interests are focused on task planning and decision making in complex systems, unmanned aerial vehicles, and formation control. He is a member of IEEE.

Nedjeljko Perić

LARES - Laboratory for Renewable Energy Sources

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Prof. Željko Ban (1962) was with the Institute of Electrical Engineering of the Končar Corporation since 1985 to 1988 where he worked on research problems related to automatic control. In 1988 he joined the Department of Control and Computer Engineering at UNIZG-FER. Besides teaching activities, his research work was related to modeling, optimization and control of systems based on optimal and adaptive control algorithms. Last few years his research activities are related to the control of the hydrogen-based energy sources.



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Mato Baotić, the leader of the Optimal Control Group, is an Associate Professor at DCCE, UNIZG-FER. He received Dr. Sc. ETH Zurich degree in 2005. His research interests include optimal and model predictive control, hybrid systems, and mathematical programming. He co-authored more than 30 journal and conference papers in the field of optimal control of constrained linear and hybrid systems. He participated in Marie Curie Transfer of Knowledge FP7 Programme, NOE HYCON, and FP7 project AEOLUS - Distributed Control of Large-Scale Offshore Wind Farms.





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Prof. Sven Lončarić has been active in the area of image processing and computer vision research since 1990 and is the Head of the Image Processing Group. He earned his doctoral degree as a Fulbright scholar from University of Cincinnati, USA in 1994. He was an assistant professor at New Jersey Institute of Technology from 2001-2003. He is an Editor-in-Chief of the Journal of Computing and Information Technology and an Associate Editor of EURASIP Journal of Image and Video Processing. He was the IEEE Croatia Section Chair from 2005-2008, and is a member of the Croatian Academy of Engineering. He has founded a series of int'l research symposia ISPA, and organized 10th Int'l Summer School on Image Processing in 2000. He was national coordinator for several CEEPUS projects and a partner in an FP7-NoE networking project.



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Bojana Dalbelo-Bašić, full professor, currently manages national research project "Knowledge discovery in textual data", technological project "Intelligent text analysis", and three projects with industry partners. She is currently participating in the ESF VAAG project and she participated in several international programs (TEMPUS, CEEPUS). She managed and participated at several international projects. She was an invited professor at Univeriste de Rennes, Rennes, France and Katholieke Universiteit Leuven, Belgium. She is a co-director of Language and Cognitive Neuroscience doctoral study. Her research interests are in machine learning, data and text mining and natural language processing. She is an IEEE member.

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Siniša Šegvić, assistant professor, currently manages a bilateral Croatian–Austrian research project and a three-year research project with industrial partners; has managed one Croatian national project, and has participated on several foreign research. He was at a one year postdoc position at INRIA Rennes (the Lagadic group, 2005/06). He has also been at TU Graz (the EMT institute, 2006/07). His research interests are in multi-view geometry, vision-based navigation and mapping, as well as in object recognition approaches based on machine learning. He is an IEEE member.



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Igor S. Pandžić is a full professor at FER, with the research interests in computer graphics, computer vision and virtual environments, particularly face tracking and animation, embodied conversational agents, and their applications in mobile environments. Formerly he worked as a Senior Assistant at MIRALab, Univ. of Geneva, Switzerland, where he obtained his PhD in 1998. The same year he worked as visiting scientist at AT&T Labs, USA. In 2001-2002 he was a visiting scientist in the Image Coding Group at the University of Linköping, Sweden, and in 2005 at the Department of Intelligence Science and Technology, Kyoto Univ., Japan. He was one of the key contributors to the Facial Animation specification in the MPEG-4 International Standard (ISO Certificate of Appreciation, 2000.) He has been active in international research collaborations within the EU research, as well as in national research projects and collaboration with industry.





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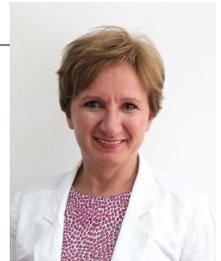
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Ms. Mirjana Stjepanović has a long experience working operationally and strategically in international (UN, Ronco Consulting Corp, OSCE) and national institutions (Ministry of Science, Education and Sports, Ministry of Culture and Ministry of Environmental Protection, Physical Planning and Building). Her particular experience includes monitoring and evaluation of projects, managing all stages of procurement and finance processes, infrastructure and quality management of EC, World Bank and USAID funded projects. She has graduated from the University of Zagreb Faculty of Economics.



Reinforcing Human Potential

An important goal the ACROSS program is dedicated to the increase of human potential of Faculty of Electrical Engineering and Computing, University of Zagreb, through the recruitment of experienced researchers and return of recognized Croatian experts from abroad. In the first year of the project, fourteen experienced researchers were employed at the UNIZG-FER in their respective research groups, three of them returning from abroad. It is also worth mentioning that six researchers hired by ACROSS are female, thus successfully achieving appropriate gender balance as another of the project goals.

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Davorin Ambruš received his M.Sc. degrees in Electrical Engineering, major Industrial Electronics, from UNIZG-FER, in 1999 and 2005, respectively. He started his professional career at Brodarski institut Ltd. in 2000, as a research assistant at the Control Engineering Department. Davorin has been employed by the ACROSS project since 2012. as a member of the AIG research group. He is currently pursuing towards his Ph.D. His research interests are in the area of low frequency electromagnetic instrumentation, model based measurements, harsh environment electronics and networked embedded systems. His current research is mainly focused on the development of advanced metal detectors and related signal processing algorithms for humanitarian demining applications.



Goran Banjac received his Masters degree in Electrical Engineering and Information Technology with highest honor (summa cum laude) from UNIZG-FER in 2013, and is currently working towards his Ph.D. thesis. In 2013, he joined the Department of Control and Computer Engineering as a research assistant on the FP7-STREP UrbanWater. Goran has been employed within the ACROSS project since 2014. His main research activities are in the area of optimal control and system identification with focus on applications within water distribution systems.



Vedran Bobanac received his Masters degree in Electrical Engineering in 2007. from UNIZG-FER. After graduation he was employed in the company BOBLab, where he worked on projects which included vibration measurement (data acquisition), data analysis and presentation of results in a form of measurement report. Since 2008, he has been employed as a research assistant in the LARES research group at UNIZG-FER. He has been working on a project entitled Multicriterial Control of Wind Turbine. Vedran has been employed by ACROSS since 2011. He is currently working towards his Ph.D. His research interests encompass robust control of nonlinear systems, optimal control and application of advanced control methods to wind turbines.





Robert Bregović received the Dipl.Ing. and M.Sc. degrees in electrical engineering from the Faculty of Electrical Engineering and Computing, University of Zagreb, Zagreb, Croatia, in 1994 and 1998, respectively, and the Dr. Tech. degree in information technology from the Tampere University of Technology, Tampere, Finland, in 2003. From 1994 to 1998, he was an Assistant at the Department of Electronic Systems and Information Processing, Faculty of Electrical Engineering and Computing, University of Zagreb. Since 1999 he is with the Department of Signal Processing, Tampere University of Technology, where he is currently working as a Senior Researcher. In 2005 and 2006 he was a visiting Research Fellow at Nanyang Technological University, Singapore, and in 2013 he was a Senior Researcher at Holografika Kft. Budapest. His research interests are in the design of filters and filter banks, multi-dimensional signal analysis and light field sensing, processing and display.



Karla Brkić received her Masters degree from UNIZG-FER in 2007, and her PhD from UNIZG-FER in 2013.. She has been employed by the ACROSS project since 2012. She works as a research assistant in the Applied Cognition and Vision Group (ACVIG) at the Department of Electronics, Microelectronics, Computer and Intelligent Systems of UNIZG-FER. Her main research activities are in the area of representation and reasoning about spatio-temporal data in computer vision.



Mario Bukal received his Doctoral degree in mathematics at Vienna University of Technology in June 2012. Since December 2008, he worked as a project assistant at the Institute for Analysis and Scientific Computing, Vienna University of Technology. He has been employed by the ACROSS project since 2012, as a research associate in the OCG research group at UNIZG-FER. His research interests are in dynamical systems and optimization problems on discrete structures related to discrete mass transportation, nonlinear nonparametric estimation filters, inverse kinematics problems, numerical schemes for partial differential equations, and other application areas.

Igor Cvišić received the Masters degree in Electrical Engineering in 2001 from UNIZG-FER. He worked at DAMCO as an R&D Engineer, and has been employed by the ACROSS project since 2011. He works as a research assistant in the Autonomous Mobile Robotics group at UNIZG-FER, where he started his Ph.D. studies with research related to cooperative localisation. He successfully coordinated and developed more than 10 different custom made industrial automated systems based on manipulation guided by computer vision. His main research interests include robotics vision, system control and automation, electronics and autonomous flying vehicles.



Marija Đakulović (born Seder) received her Doctoral degree in Electrical Engineering at UNIZG-FER in May 2010. Since May 2004 she worked as a research and teaching assistant at UNIZG-FER. She has been employed by the ACROSS project since 2014, as a research associate in the AMOR research group at UNIZG-FER. Her main research interests are mobile robotics, especially path planning, graph searching, coverage planning, motion planning and control, obstacle avoidance and environment exploration.



Domagoj Herceg received his Masters degree with honors (*magna cum laude*) from the UNIZG-FER in 2011, and is currently working towards his Ph.D. thesis. He has been employed by the ACROSS project since 2012., as a research assistant and a member of the AMOR research group at the Department of Control and Computer Engineering at the same university. His main areas of interest are advanced control (optimal, robust and cooperative control) and planning methods with focus on applications in the domain of mobile robotics.





Marko Horvat received his Ph.D. degree in Electrical Engineering from UNIZG-FER in 2010. At present, he holds the position as experienced researcher with the Centre of Research Excellence for Advanced Cooperative Systems (ACROSS) as a member of the Environmental Noise Control Group within SRD3. His research interests extend over the fields of environmental noise control, product sound quality, room and building acoustics, virtual acoustics, sound reinforcement and electroacoustics. Professional aspect of his work includes acoustic design and planning, and various kinds of observation/verification measurements, mostly in noise control and room/building acoustics. He is a member of the Acoustical Society of Croatia under European Acoustics Association and of the Audio Engineering Society.



Krunoslav Ivešić received his M. Eng. (dipl. ing.) degree in Electrical Engineering, major Telecommunications, at the Faculty of Electrical Engineering and Computing, University of Zagreb (FER-UNIZG), Croatia in 2009. Since September 2009 he had been employed as a research associate in the Networked Media Research Group at the Department of Telecommunications at FER-UNIZG and since September 2009 he has been employed as a research assistant at the same group where he is currently working towards his Ph.D. degree. He has been employed by the ACROSS project since 2013. His research interests include multimedia services, resource allocation and admission control.



Vana Jeličić received her Masters degree in Electrical Engineering, major Industrial Electronics, from FER in 2009. She joined the AIG laboratory in 2007, as a Masters student, performing research in the field of intelligent sensors and sensor networks (end of study with emphasis to scientific research). Vana has been employed by the ACROSS project since 2012. Her main research activities and interests are in the area of smart sensors and wireless sensor networks (WSNs), with focus on power management in wireless sensor networks with high-consuming sensors.

Josip Krapac is a post-doctoral fellow at ACVIG group of ACROSS project since July 2013. He graduated from UniZG-FER in 2001, where he was employed from 2002 as teaching and research assistant until 2006, when he obtained MSc in computer vision. He obtained his PhD in 2011 from University of Caen, France and spend most of his PhD in LEAR group of INIRA Grenoble. During his PhD he developed new image representations for image re-ranking and general object categorization. Until July 2013 he was a post-doc in TEXMEX group of INRIA Rennes working on problem of logo categorization. His interests include computer vision and application of machine learning models on problems in computer vision, with emphasis on learning image representations. Besides Croatian, he speaks English and French.



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Ivan Maurović received his Master of Science in Electrical Engineering and Information Technology degree with honors (*cum laude*), in 2010 from UniZG-FER. In 2011, he joined the Department of Control and Computer Engineering as a research assistant on SEE-ERA.NET PLUS project ThermalMapper and he enrolled into the postgraduate (doctoral) programme. He is a member of AMOR research group. Ivan has been employed by the ACROSS project since 2012. His main research activities are in the area of autonomous mobile robot control and exploration strategies in complex environments including 3D exploration problem.



Goran Molnar received his PhD degree in Electrical Engineering from UNIZG-FER in 2010. In 2001, he was employed as Teaching and Research Assistant at the Department of Electronic Systems and Information Processing. From 2010 to 2013, he worked as Senior Teaching and Research Assistant at the same department. His research interests include design of analog and digital filters, signal processing for communications, software radio receivers, embedded system design, system on chip design, and FPGA implementation of digital systems. He participated as a collaborator in three scientific projects and one technological project, all granted by the Croatian Ministry of science, education and sport. He is a member of IEEE, and IEEE Circuits and Systems and Signal Processing Societies.

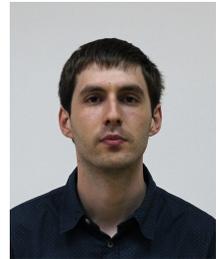


Ivana Palunko received her masters degree in Electrical Engineering from FER in 2007., and completed her Ph.D program in August 2012 in University of New Mexico, Albuquerque, NM. She has been employed by ACROSS since 2012, as a postdoctoral researcher at the Department of Control and Computer Engineering. Her research is mainly oriented in the field of modeling and control of unmanned aerial vehicles. The tools utilized in her research are: modeling of nonlinear systems, nonlinear control, Lyapunov stability, adaptive control, bifurcation theory, optimal control, reinforcement learning, optimization theory. These tools are applied to problems in the area of load transportation using aerial robots.

Tomislav Petković received his Dipl. Eng. in Electrical Engineering in 2002, his MSc in Electronics in 2006, and his PhD in Electronics in 2010, all from the University of Zagreb, Croatia. From 2002 till 2013 he was a research and teaching assistant at the Department of Electronic Systems and Information Processing at the Faculty of Electrical Engineering and Computing, University of Zagreb. From 2013 he is a researcher on the ACROSS FP7 project. His main fields of interest are biomedical image processing and analysis, particularly the X-ray imaging modality, and visual quality control in industrial production. He is a member of IEEE, ACM and CROMBES.



Pavle Prentašić received his Masters degree in Computer Science with highest honor (summa cum laude) from UNIZG-FER in 2012. Since September 2012 he has been employed as a research associate in the Image Processing Group at the Department of Electronic Systems and Information Processing at UNIZG-FER, where he is currently working towards his Ph.D degree. He has been employed by the ACROSS project since 2013. His main fields of interest are biomedical image processing and analysis, machine learning and pattern recognition with focus on applications in health care systems.



Vasko Sazdovski received the M.Sc. degree in electrical engineering from the Institute of Automation and Systems Engineering, Faculty of Electrical Engineering and Information Technologies, University of Ss. Cyril and Methodius, Skopje, R. Macedonia in 2010 (field of mobile robotics). From 2006 until 2012 studied for a part time PhD at the Centre for Autonomous Systems, Department for Informatics and Systems Engineering, Cranfield Defence and Security, Cranfield University, Swindon, United Kingdom (field of Vision aided Inertial Navigation). His research interests are in Robotics, automation and systems engineering. He is particularly interested in: Sensor and data fusion, Stochastic filtering and estimation techniques, Stochastic control techniques. From July 2013 he started with postdoctoral research studies within the ACROSS Research Centre. He is a member of AMOR research group.





Vedrana Spudić received her masters degree in Electrical Engineering, major Control and Computer Engineering, from UNIZG-FER, in 2007. Vedrana was employed at UNIZG-FER as a research assistant in 2008, at the Department of Control and Computer Engineering, and is currently working towards her Ph.D. She has been working on the ACROSS project, as a member of the OCG group, since 2011. Her main research activities are in the areas of wind turbine and wind farm optimal control, in particular: wind farm modelling, conceptual design of wind farm optimal control based on wind farm aerodynamics, wind turbine control for load reduction and cooperative control of wind turbines in a wind farm.



Mirko Sužnjević received his Masters degree in Electrical Engineering, major Telecommunications and Informatics, from UNIZG-FER in 2006, and his Ph.D. in 2012 from the same university. He has been employed at FER in 2006 as a research associate in the Department of Telecommunications, and he advanced to a research assistant position in 2008. Mirko has been employed by the ACROSS project since 2012. He works as a research assistant in the NWMED research group, at the same department. His research interests are in the area of networked virtual environments, with focus on Massively Multiplayer Online Role-Playing Games, including quality of service, and session and network traffic characterization and modeling based on virtual context and application level player behaviour.



Tajana Šimunić Rosing is currently a Full Professor of Computer Science and Adjunct Professor in the Electrical and Computer Engineering Department at UCSD. She is currently heading the effort in SmartCities as a part of DARPA and industry funded TerraSwarm center. Prior to that she led the energy efficient datacenters theme as a part of the MuSyC center. Her research interests are energy efficient computing, embedded and wireless systems. Prior to this she was a full time researcher at HP Labs while being leading research part-time at Stanford University. She finished her PhD in 2001 at Stanford University, concurrently with finishing her Masters in Engineering Management. Her PhD topic was Dynamic Management of Power Consumption. Prior to pursuing the PhD, she worked as a Senior Design Engineer at Altera Corporation.

Domagoj Tolić completed his Ph.D program in August 2012 in University of New Mexico, Albuquerque, NM. He also graduated from the Mathematics Department of University of Zagreb with a Bachelor Degree in Mathematics in 2008. Domagoj has been employed by ACROSS since 2012 and joined the Laboratory for Robotics and Intelligent Control Systems (LARICS), as a postdoctoral researcher at the Department of Control and Computer Engineering, FER-UNIZG. His research focuses on stability and estimation under intermittent information for nonlinear control systems. The developed theory is applied to problems in the area of multi-agent robotics.



Matija Zidar received his Master of Electrical Engineering degree from FER in 2009. He continued his research and education towards Ph.D. at the same Faculty, working as a research associate at the Department of Energy and Power Systems from 2009. He has been employed by the ACROSS project since 2012. The main topic of his research is power distribution networks planning, with a special focus on control systems and network topology optimization, taking into account distributed generation. His recent research activities have been oriented towards developing enhanced algorithms for electric distribution grid network analyses, more specifically for analysing low voltage distribution grids.



Collaborating Experts

The ACROSS Team conducts the project in tight collaboration with 16 leading EU experts from 10 EU Members States and Switzerland and 3 experts from Croatian partner companies.

	Collaborating Institution	Expert Name
SRD1: Cooperative and Robotic Systems	Albert-Ludwigs-Universität Freiburg, Institut für Informatik, Autonome Intelligente Systeme (ALU-FR), Germany	Prof. Wolfram Burgard
	Kungliga Tekniska Höskolan (The Royal Institute of Technology), Stockholm (KTH), Sweden	Prof. Danica Kragić
	Technische Universität Wien (Vienna University of Technology) (TUW), Austria	Prof. Markus Vincze
	Technical University of Crete, Chania (TUC), Greece	Prof. Nikos Tsouveloudis
	IRISA/INRIA Rennes (LAGADIC), France	Prof. François Chaumette
	DOK-ING Ltd. (DOK-ING), Croatia	Zoran Bošković
SRD2: Cooperative Networked Embedded Systems	Linköping University, Linköping (LIU), Sweden	Prof. Robert Forchheimer
	University of Manchester (SISP), United Kingdom	Prof. Tony Peyton
	Tampere University of Technology (DSP-TUT), Finland	Prof. Atanas Gotchev
	Karlstad University (KAU), Sweden	Prof. Andreas J. Kessler
	Ericsson Nikola Tesla Inc. (ENT), Croatia	Prof. Darko Huljениć
SRD3: Cooperative Renewable Energy Systems	University of Seville (USE), Spain	Prof. Eduardo F. Camacho
	Politecnico di Milano (PoliMI), Italy	Prof. Carlo L. Bottasso
	Institute of Communication and Computer Systems of the National Technical University of Athens (ICCS-NTUA), Greece	Prof. Nikos Hatzigiargyriou
	Polytechnic of Bari (Poliba), Italy	Prof. Marco Liserre
	KONČAR – Electrical Engineering Institute Inc. (KON-IET), Croatia	Dr. Mate Jelavić
SRD4: Cooperative Control Methods	Swiss Federal Institute of Technology Zürich, Automatic Control Laboratory (ETHZ), Switzerland	Prof. Manfred Morari
	Technische Universität München (TUM), Germany	Prof. Sandra Hirche
	Eindhoven University of Technology (TUE-CS), The Netherlands	Prof. Paul van den Bosch

The Steering Committee

EU experts	
Prof. Danica Kragić – SC Chair	KTH, Sweden
Prof. Markus Vincze	TUW, Austria
Prof. Manfred Morari	ETH, Switzerland
Prof. Sandra Hirche	TUM, Germany
Prof. Carlo L. Bottasso	PoliMi, Italy
Senior managers from Croatian industry	
Vjekoslav Majetić	Dok-Ing, Ltd., Owner and Chief Executive Officer
Siniša Marijan, Ph.D.	Končar Electrical Engineering Institute Inc., Head of the Managing Board
Darko Huljениć. Ph.D.	Ericsson Nikola Tesla, Inc., Manager for technology and science activities
Representatives of public authorities and funding agencies	
Emira Bečić, Ph.D.	Ministry of Science, Education and Sports, Directorate for Science and Technology
Ivo Friganović	HAMAG-BICRO - the Croatian Agency for SMEs and Investment
Marijan Maras, M.Sc.	Head of the Zagreb City Office for Energetics, Environment Protection and Sustainable Development
UNIZG-FER	
Prof. Nedjeljko Perić	Dean of Faculty of Electrical Engineering and Computing
Prof. Mislav Grgić	Vice Dean for Scientific Affairs at Faculty of Electrical Engineering and Computing

Selected Projects

Contact person	Project	Funding	Duration
Ivan Petrović	Advanced technologies in power plants and rail vehicles	ERDF	2014-2016
Maja Matijašević	Information and communication technology for generic and energy efficient communication solutions for e-/m-health	ERDF	2014-2016
Maja Matijašević	Human-centric Communications in Smart Networks	HRZZ	2014-2017
Zdenko Kovačić	Autism Diagnostic Observation with Robot Evaluator	HRZZ	2014-2017
Igor Kuzle	Flexible energy nodes in low carbon smart grid	HRZZ	2014-2017
Siniša Šegvić	Multi-class object detection for smart vehicles and safer roads	HRZZ	2014-2017
Mario Vašak	Control-based Hierarchical Consolidation of Large Consumers for Integration in Smart Grids	HRZZ	2014-2016
Ivan Petrović	A mathematical model for short-term forecasting of hourly consumption of electricity for distribution areas	Other	2014-2015
Stjepan Bogdan	Animal and robot Societies Self-organise and Integrate by Social Interaction (bees and fish)	FP7	2013-2018
Ivana Podnar Žarko	Open Source blueprint for large scale self-organizing cloud environments for IoT applications	FP7	2013-2014
Stjepan Bogdan	Human-in-the-loop Control of Multi-agent Aerial Systems Under Intermittent Communication	EOARD	2013-2015
Mato Baotić	Dynamic Management of Physically Coupled Systems of Systems	FP7	2013-2016
Mario Vašak	Enhancement of Research, Development and Technology Transfer Capacities in Energy Management Systems for Buildings	IPA	2013-2015
Mario Vašak	Centre of Excellence for Structural Health	IPA	2013-2015
Mario Vašak	Weather Intelligence for Wind Energy	IPA	2013-2015

Contact person	Project	Funding	Duration
Sven Lončarić	Computer Vision Innovations for Safe Traffic	IPA	2013-2015
Vedran Bilas	Sense Zagreb air	other	2013-2014
Mario Vašak	Intelligent Urban Water Management System	FP7	2012-2015
Mato Baotić	Optimization of renewable electricity generation systems connected in a microgrid	HRZZ	2012-2014
Vedran Bilas	Assisted living platform for fall detection	other	2012-2013
Ivan Petrović	Thermal Perception, Mapping and Exploration of Environments for Energy Efficiency	other	2012-2014
Zdenko Kovačić	Estimation and Control for Safe Wireless High Mobility Cooperative Industrial Systems	FP7	2011-2015
Maja Matijašević	IC0906: Wireless Networking for Moving Objects	other	2010-2014
Mario Vašak	Monitoring of Wind Turbine Generator Systems	FP7	2010-2012
Ivan Petrović	Thermal 3D Modeling of Indoor Environments for Saving Energy	FP7	2010-2012
Stjepan Bogdan	Electronic Differential for Small Electric City Car	HRZZ	2010-2012
Kristian Jambrošić	Acoustic Characteristics of Composite Elements in Civil Engineering	MZOS	2007-2013
Zdenko Kovačić	Integrated Control of Robotic Systems in Complex Environments	MZOS	2007-2013
Sven Lončarić	Intelligent Image Processing and Analysis Methods	MZOS	2007-2013
Vedran Bilas	Intelligent Systems for Measurement of Difficult-to-Measure Variables	MZOS	2007-2013
Maja Matijašević	Content Delivery and Mobility of Users and Services in New Generation Networks	MZOS	2007-2013
Nedjeljko Perić	Advanced Control and Estimation Strategies in Complex Systems	MZOS	2007-2013
Bojana Dalbelo-Bašić	Knowledge Extraction and Visualization of Textual Data	MZOS	2007-2013

Contact person	Project	Funding	Duration
Stjepan Bogdan	Task Planning and Scheduling in Robotic and Autonomous Systems	MZOS	2007-2013
Hrvoje Domitrović	Estimation, Monitoring and Noise Control	MZOS	2007-2013
Mladen Vučić	Design and Implementation of Efficient Methods for Digital Signal Processing	MZOS	2007-2013
Željko Ban	Control System of the Fuel Cells Energy Source With the Cogeneration	MZOS	2007-2013
Ivan Petrović	Control of Mobile Robots and Vehicles in Unknown and Dynamic Environments	MZOS	2007-2013
Fetah Kolonić	Control of Complex Electromechanical Systems for Manipulation in Transport	MZOS	2007-2013
Davor Škrlec	Planning and Operation of Active Distribution Networks and Microgrids	MZOS	2007-2013

Funding:

- ERDF – European Regional Development Fund
- HRZZ – Croatian Science Foundation
- FP7 – Seventh Framework Programme
- EOARD – European Office of Aerospace Research and Development
- IPA – Instrument for Pre-Accession Assistance
- MZOS – Ministry of Science, Education and Sport of the Republic of Croatia

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