PARIS LODRON UNIVERSITÄT SALZBURG

FH Salzburg

Applied Image and Signal Processing

Joint Master Programme

Technology
Health
Media

Master Programme

Univ. Prof. Dr. Andreas Uhl
Paris Lodron University of Salzburg

»In the highly research oriented courses, particularly chosen from the elective list, students are confronted with state-of-the-art research questions and cutting-edge problem solutions. Working in small groups enables first contacts to academic research and publications, the latter sometimes directly evolving from work done in the programs' courses.«

Image and signal processing affect our daily lives in an ever-increasing way. Participate in designing this fascinating technology and shape ITs future function in business and society.

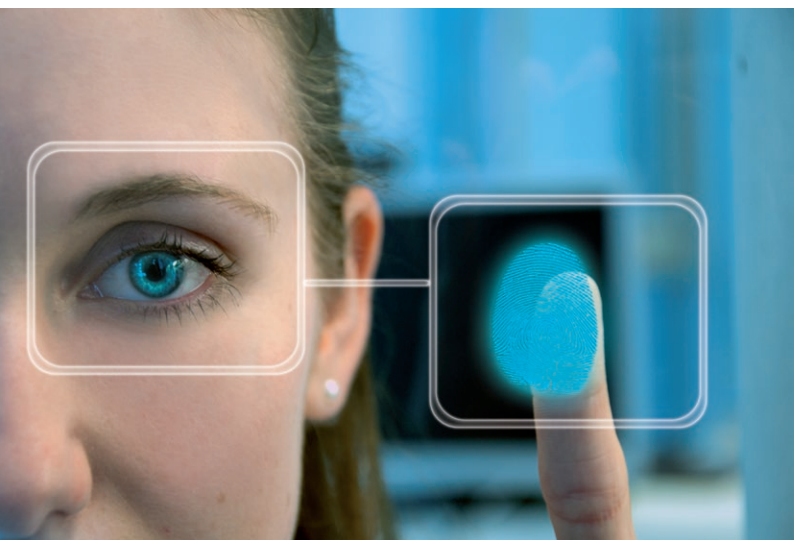
Today's networked devices for image and signal generation provide a historically unmatched volume of raw data for automated decision making and control systems. The demands are high: How can we design new tools and software in order to best distil useful information?

From Theory to Practice

The first semester is devoted to a concise study of the theoretical basis, the mathematical models and the algorithms used in image and signal processing. The second semester additionally focuses on geometric modelling, audio processing and digital media formats. Starting with the third semester, specific application scenarios are discussed and corresponding technologies are investigated in a number of elective courses.

Choose your Elective Courses

Choose one compulsory elective course from each university (see list and description on next page) and additionally define your free electives with a total sum of 6 ECTS. While it is recommended to take a third elective course as your free elective, any lecture held in English on any of the two universities qualifies as free elective.



Apply your Scientific Knowledge

In the third semester, you also start research on your master thesis and acquire profound IT-project management skills. The fourth semester is dedicated to the completion of the master thesis. An accompanying master seminar provides a forum for presenting and defending one's approach to a solution and the results obtained, i.e., for scientific discourse with faculty and peers.

Modules & Competences

This Master Programme is designed to provide you with an in-depth professional and scientific training. Based on appropriate prior bachelor studies, this programme offers a thorough technical training in conjunction with research-driven teaching. It will make the participants familiar with introductory and advanced-level topics in the fields of image and signal processing, their formal and methodical basics, and with diverse fields of application. The sound knowledge and skills acquired in this programme qualify the alumni for diverse practical challenges in their professional work and empower them to contribute to future innovations in image and signal processing.

Career and Study Abroad

A lot of interesting research and development projects in the private and the public sectors are calling for your expertise. Alternatively, this degree will open career tracks in universities and research labs to subsequent work in science and technology.

You have the opportunity to spend a semester abroad in one of our numerous partner universities in the fourth semester.

Elective Courses

Salzburg University of Applied Sciences

Medical Imaging
Image and signal processing applications in medicine are optimized with respect to the numerous modalities and sensors used. Images need to be segmented, co-registered and processed with respect to contextual knowledge. You get to know the most popular tools and libraries, and acquire competences in designing solutions for tomorrow‘s medical technology.

Platform Specific Signal Processing
Modern architectures for processing images and signals require tailored implementations of algorithmic concepts which exploit the functional framework of the hardware environment and achieve the best possible performance. You study concepts like fixed point formats, parallelization and hardware description languages and become experts in designing applications on dedicated hardware.

Data Science
You get to know technical and organizational challenges imposed by big data applications and understand methods and algorithms for data-intensive software development. You are aware of the interdisciplinary aspects of big data engineering and have a basic command of established frameworks. As to particular methodology, general linear and nonlinear regression models will be examined in more detail and we will develop your ability to independently apply those techniques and to appreciate the underlying mathematical concepts.

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Biometric Systems
Study biometric technologies and learn the most common modalities for the identification of individuals. Implications on security and privacy are discussed. Biometry is a generic topic in that various methods and concepts can be found in many other areas of image and signal processing as well, and in that the optimization of systems with respect to risk minimization is of a general nature.

Media Security
Concepts for encryption, authentification and robust labelling of multimedia data are presented and their application in media forensics is discussed. Since different modalities require highly specialized methods, you will become an expert in a range of such algorithms and will be able to design applications that achieve a good compromise between robustness, speed and usability.

Computational Geometry
Computational geometry is the study of the design and analysis of efficient algorithms for solving problems with a geometric flavor. The methodologies of computational geometry allow one to investigate solutions of numerous geometric problems that arise in application areas such as image processing, computer-aided design, manufacturing, geographic information systems, robotics and graphics. This course offers an introduction to computational geometry like geometric searching, convex hulls, Voronoi diagrams, straight skeletons, triangulations, and robustness issues.

Machine Learning
You study how to program computers to »learn« from available input data. In other words, it is the process of converting experience in the form of training data into expertise to solve a variety of different tasks. Fundamental concepts such as probably approximately correct (PAC) learning, Vapnik–Chervonenkis theory and applications there of are considered and applied in the analysis of popular learning algorithms such as boosting or support vector machines.

Curriculum

The detailed course outline can be found at:
www.aisp-salzburg.ac.at

	Courses	Semester			
Image and Signal Processing		1	2	3	4
1	Digital Signal Processing 1	6 (4)			
1	Signals and Systems 1	2 (2)			
2	Image Processing and Imaging	4 (3)			
1 2	Hardware oriented Signal Processing	3 (2)			
2	Geometric Modelling	5 (3)			
1	Digital Signal Processing 2		6 (4)		
1	Signals and Systems 2		2 (2)		
2	Audio Processing		5 (3)		
2	Media Data Formats		4 (3)		
2	Computer Vision			5 (3)	
Mathematic Modelling					
1	Selected Topics in Mathematics and Modelling	3 (2)			
2	Advanced Mathematics for Computer Science	7 (5)			
1	Applied Statistics		3 (2)		
2	Filterbanks and Wavelets		5 (3)		
Data Analysis and Knowledge Discovery					
1 2	Pattern Recognition			5 (4)	
1	Data Mining			2,5 (2)	
Free Electives					
1 2	Select from qualified SUAS and PLUS lectures		5 (*)	1 (*)	
Implementation and Application**					
1	Elective Course SUAS1 1: Medical Imaging			5 (3)	
1	Elective Course SUAS1 2: Platform Specific Signal Processing			5 (3)	
1	Elective Course SUAS1 3: Data Science			5 (3)	
2	Elective Course PLUS2 1: Biometric Systems			5 (3)	
2	Elective Course PLUS2 2: Media Security			5 (3)	
2	Elective Course PLUS2 3: Computational Geometry			5 (3)	
2	Elective Course PLUS2 4: Machine Learning			5 (3)	
Applied Sciences and Methods					
1	IT-Project Management and Softwareprojects			3,5 (2)	
1 2	Master Seminar 1			3 (2)	
1 2	Master Seminar 2				2 (1)
1 2	Master Thesis				28 (-)
	ECTS (CHW)	**30 (21)**	**30 (20)**	**30 (19)**	**30 (1)**

Study Locations

1 **(SUAS) Salzburg University of Applied Sciences**
Department of Information Technology & Systems Management
Urstein Süd 1, 5412 Puch / Salzburg, Austria

2 **(PLUS) Paris Lodron University of Salzburg**
Department of Computer Science
Jakob-Haringerstr. 2, 5020 Salzburg, Austria

* the contact hours per week/semester depends on the different courses
**minimum is one elective course from each University SUAS and PLUS

ECTS: European Credit Transfer and Accumulation System
CHW: contact hours per week per semester

The shown curriculum is an overview.

Studying in Salzburg

The Salzburg University of Applied Sciences (SUAS) and the Paris Lodron University of Salzburg (PLUS) have joined forces to offer this international joint master programme. This programme will allow you to get to know two different academic cultures, meet people with different backgrounds and learn to communicate professionally in an international working environment. We offer an up-to-date curriculum which we constantly adapt to the challenges of economy and society. An experienced and qualified faculty drawn from both academia and industry guarantee a cutting-edge education and provide impetus for scientific and academic content. Combined with state-of-the-art equipment in our auditoriums and labs, this stimulating environment creates the optimal breeding ground for growing your knowledge.

Campus Urstein

Techno-Z Campus

Get to know us better:

Both of our locations – Urstein Campus, where the SUAS is situated and the Techno-Z Campus of the PLUS – are situated in one of the most beautiful areas in the world. Whether you are an art and architecture buff, a music fan or a lover of the great outdoors, Salzburg combines historical heritage and modern lifestyle culture to offer something for everyone.

Urstein Campus: This campus is surrounded by greenery, next to the neighbouring medieval estate known as the »Meierei« (dairy). This modern building houses our central administrative offices and is where most of our degree programmes are taught. Trains from the S-Bahn station directly on campus will take you to Salzburg city centre in no time.

Techno-Z Campus: The modern Techno-Z Campus in Salzburg houses high-tech firms, institutes of higher education and a residence hall for students. Salzburg city centre is reachable within 10 minutes by bus, allowing students to explore the marvelous Old Town of Salzburg, which is a World Heritage Site. You can get to the main train and bus stations on foot or by bus within a few minutes.

The FH Salzburg Career Center supports students in planning their careers and entering the world of work. Students can benefit from exclusive free workshops on 'career planning' and a jobs and careers portal. www.fh-salzburg.ac.at/career-center

Sports & Nature: Our sports departments offer diverse programmes of courses and trainings. As a student you can use the facilities of the University and County Sports Centre Salzburg/Rif. Alternatively, you can simply explore nature outside your front door; the options are unlimited. Salzburg's mountains and lakes are available in closest proximity.

Living & studying: Students who would like to combine study with housing are welcome to check out the hall of residence of the Urstein Campus (www.studentenheim.at) or the Techno-Z Campus (www.techno-z.at). Information about grants, legal and practical issues is provided by www.oead.at.

Application & Admission

FH-Prof. Univ. Doz. Dr. Stefan Wegenkittl
Salzburg University of Applied Sciences

»State-of-the-art image and signal analysis defines the way in which machines can successfully interact with the real world. This joint master programme provides our students with a high degree of specialization, allowing them to take advantage of a lot of career options and interesting job offers. Our alumni will be able to design and implement the next generation of image-guided intelligent systems.«

Study mode: full-time
Length of study: 4 semesters
Degree awarded: Master of Science in Engineering (MSc)
Teaching language: English
Study places per year: 20
Location: Salzburg University of Applied Sciences and Paris Lodron University of Salzburg
Tuition and fees: at least 380 Euro / semester (EU students) up to double amount for other countries of origin

Requirements for enrollment
Admission to this programme requires an adequate academic background, as provided by relevant bachelor programmes in the fields of engineering, computer science or mathematics offered by recognized national or foreign post-secondary educational institutions, such as bachelor programmes in computer science, computer engineering, mathematics, mechatronics, mechanical engineering, electrical engineering, automation engineering, or digital media science.
In particular, the core subject fields computer science and mathematics need to be covered by semester-long courses with a minimum number of 18 and 12 ECTS credit points or 12 and 9 contact hours per week, respectively. Those numbers need to be shown in your transcripts on lecture level.

Application procedure
1. Check necessary documents and deadlines on www.aisp-salzburg.ac.at/faq/apply. International students: please consider the information given in the NON-EU citizen link.
2. Complete your online application following the link at www.aisp-salzburg.ac.at/faq/apply
   The application procedure is managed by the Salzburg University of Applied Sciences on behalf of both institutions.
3. After your documents and the entry requirements have been assessed, you will be invited for a personal interview.

Further information can be found on:
www.aisp-salzburg.ac.at
www.fh-salzburg.ac.at/ais

Contact
Fachhochschule Salzburg GmbH
Salzburg University of Applied Sciences
Urstein Süd 1, 5412 Puch / Salzburg, Austria
T +43 50 2211-1340
office.ais@fh-salzburg.ac.at
www.fh-salzburg.ac.at

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