Friedrich-Alexander-Universität
Medizinische Fakultät
Technische Fakultät

Nebenfach AIBE für den Bachelor und Master Informatik

Department Artifical Intelligence in Biomedical Engineering

Minor "Artificial Intelligence in Biomedical Engineering" (AIBE) for the Bachelor and Master in Computer Science					Contact: Marlene Reuschel: marlene.reuschel@fau.de or Thomas Seel: thomas.seel@fau.de				
Module for ...	Module-Title	Lecturer	Language	Type	WS / SS	SWS	ECTS	Exam-Details
HEX – Chair of Human-Centered Computing and Extended Reality								
Master	Advanced Topics in Human-Computer Interaction	Roth	English	Seminar	WS	4	5	Seminar performance, assessed
	Virtual and Augmented Reality	Roth	English	Lecture /Project	SS23+	8	10	Lecture, project work, part exam
	Virtual Reality in Neuroscience	Roth	English	Seminar	SS23+	4	5	Lecture, project work, part exam
	Exergames	Roth, Morschheuser	English	Lecture /Project	WS21/22	4	5	Lecture, project work, part exam
ISS – Chair of Intelligent Sensorimotor Systems								
Bachelor or Master	AI in Medical Robotics	Seel	English	Lecture	WS	4	5	written exam, 60min
	Introduction to Explainable Machine Learning	Seel	English	Lecture	SS	4	5	written exam, 60min
	Artificial Motor Learning	Seel	English	Lecture	SS	4	5	written exam, 60min
	Inertial Sensor Fusion	Seel	English	Lecture	WS	4	5	written exam, 60min
	Intelligent Sensorimotor Systems Lab	Seel	English	Project	WS+SS	8	10	project work, presentation
MaD – Chair of Machine Learning & Data Analytics								
Bachelor or Master	Bewegungsanalyse und biomechanische Grenzgebiete (BABG)	Koelewijn	German	Lecture	WS+SS	2	2,5	written exam, 60min
	The why and how of human gait simulations (HGS)	Koelewijn	English	Seminar	WS	2	2,5	seminar performance, assessed
	Legged Locomotion of Robots (LLR)	Koelewijn	English	Seminar	SS	2	2,5	seminar performance, assessed
	Legged Locomotion of Robots Deluxe (LLR+)	Koelewijn	English	Seminar +Project	SS	4	5	seminar + project performance, assessed
Master	Catching your eyes: AI-driven modeling and analysis of eyetracking data (ETS)	Zanca	English	Seminar	SS	2	2,5	seminar performance, assessed
	A look inside the human body - gait analysis and simulation (GAS)	Koelewijn	English	Lecture (+exercise)	WS	2 (+2)	2,5 (5)	written exam, 120min or oral exam, 30min
NeuroTech – Chair of Sensory Neuroengineering								
Bachelor or Master	Computational Neurotechnology	Reichenbach	English	Lecture +Exercises	SS	2+2	5	written exam, 60min
NSquared – Chair of Neuromuscular Physiology and Neural Interfacing								
Bachelor or Master	Interfacing the Neuromuscular System	Del Vecchio	English	Lecture	SS	3	5	oral exam, 30min
Master	Applied Neuroengineering	Del Vecchio	English	Seminar +Project	WS	4	10	seminar, lecture + project performance
	Movement Neuroscience	Del Vecchio	English	Lecture	WS	2+1	5	oral exam, 30min
MediRob – Chair of Medical Robotics								
Master	Human-Robot Co-Adaptation (HRC)	Castellini	English	Lectures +Exercises	WS	4	5	written exam, 60min
	Upper-Limb Prosthetics (ULP)	Castellini	English	Lectures +Exercises	WS	4	5	written exam, 60min
	Rehabilitation and Assistive Robotics (RAR)	Castellini	English	Lectures +Exercises	SS	4	5	written exam, 60min
	Intent Detection and Sensory Feedback (IDF)	Castellini	English	Lectures +Exercises	SS	4	5	written exam, 60min
	Seminar Learning and Interaction in Medical Robotics (IMR)	Sierotowicz	English	Seminar	WS+SS	4	5	report+ presentation
	Seminar Biosignals in Rehabilitation Robotics (BRR)	Egle	English	Seminar	WS+SS	4	5	report+ presentation
	Seminar Robotics for the Lower Limb (RLL)	Scheidl	English	Seminar	WS+SS	4	5	report+ presentation

AIBE – A new department at FAU


Bernhard Kainz, W3
Image Data Analysis


Bjoern Eskofier, W3
Machine Learning


Claudio Castellini, W3
Medical Robotics


Florian Knoll, W3
Biomedical Imaging


N N, W3
Medical Robotics


Thomas Seel, W3
Sensorimotor Systems


Tobias Reichenbach, W3
Sensory Neurotechnology


Aless. Del Vecchio, W1
Neuromusc. Physiology

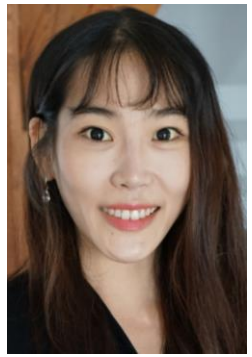

Andreas Kist, W1->W3
AI in Comm. Disorders


Anne Koelewijn, W1
Biomech. Simulation


Daniel Roth, W1
Extended Reality


D. Blumenthal, W1->W3
Network Science

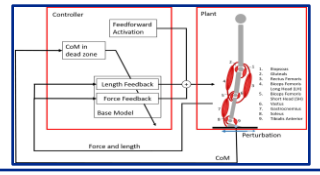

Katharina Breininger, W1
AI in Medical Imaging


Seunghee Yang, W1
Speech Processing

Associate Members: A. Maier, K. Franze, O. Amft , P. Dabrock, P. Beckerle, T. Ganslandt , T.M. Kinfe, F. Laun (tent.), A. Nagel (tent.), M. Zaiß (tent.),

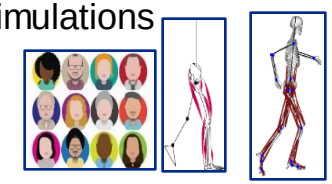
Chair of Biomechanical Motion Analysis and Creation

Controller identification



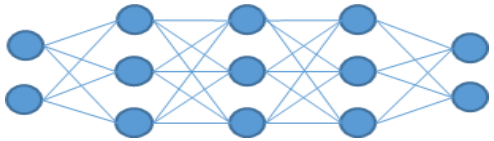
Device design

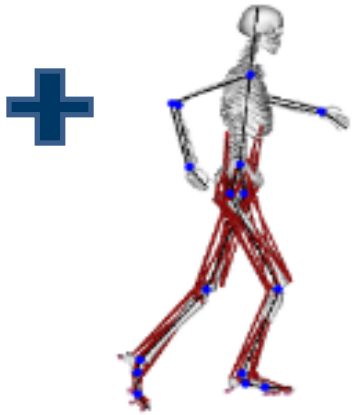
Personalized simulations



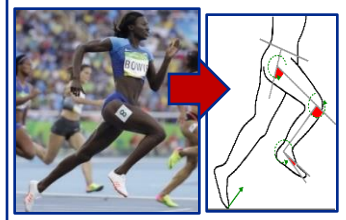
Understanding Human Movement

- Simulation of Gait
- State Estimation
- Design of Wearables

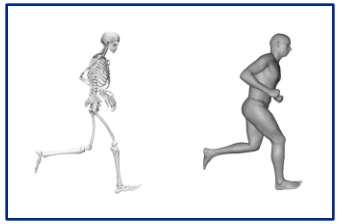




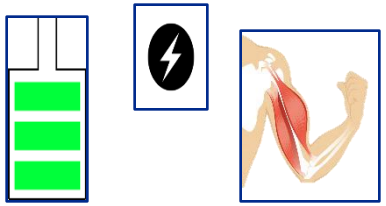
Measurements “in the wild”



Visualization



Muscle energetics

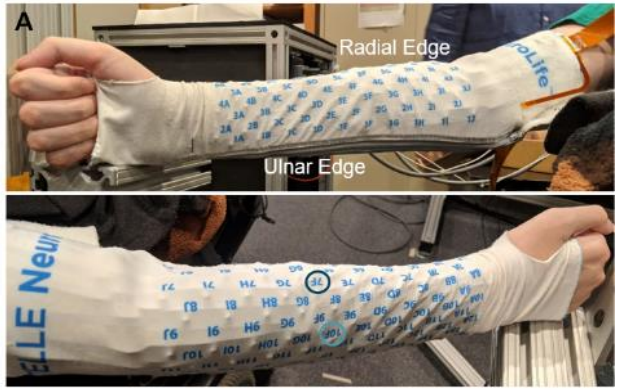


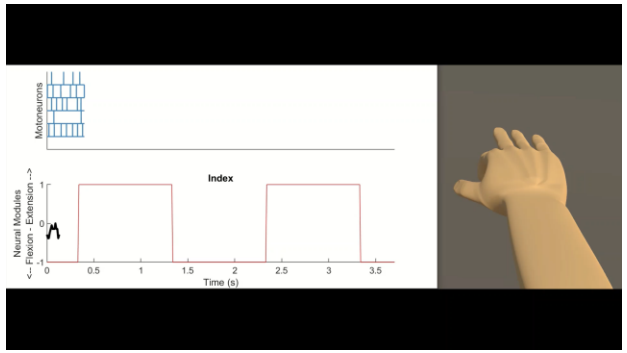
Prof. Anne Koelewijn

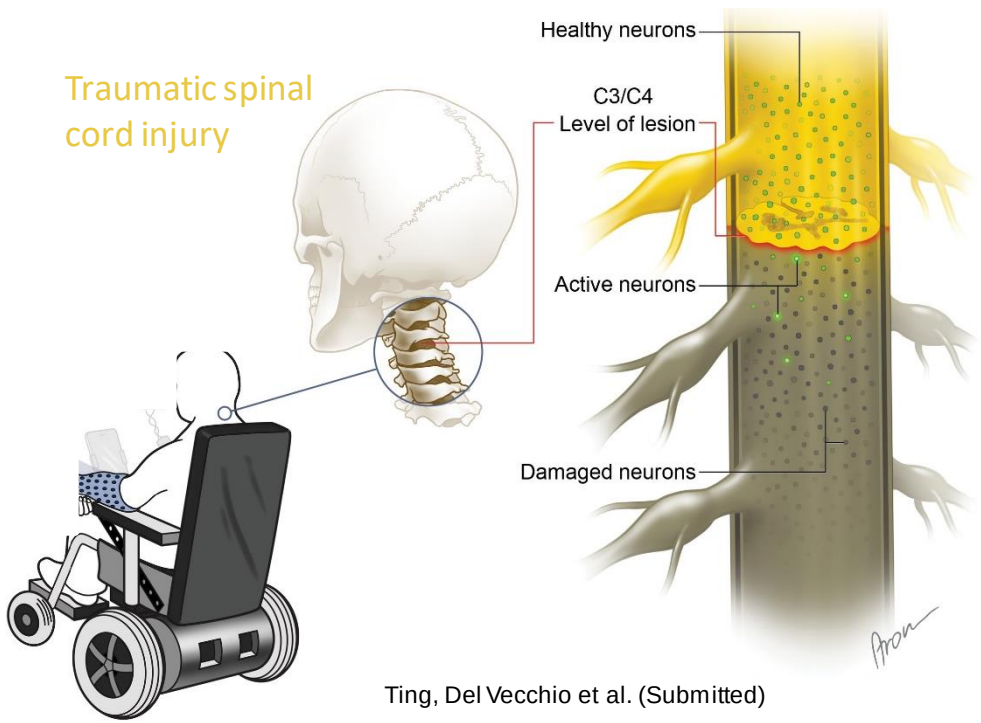
MaD – Chair of Machine Learning & Data Analytics									
	Bachelor or Master	Bewegungsanalyse und biomechanische Grenzgebiete (BABG)	Koelewijn	German	Lecture	WS+SS	2	2,5	written exam, 60min
		The why and how of human gait simulations (HGS)	Koelewijn	English	Seminar	WS	2	2,5	seminar performance, assessed
		Legged Locomotion of Robots (LLR)	Koelewijn	English	Seminar	SS	2	2,5	seminar performance, assessed
		Legged Locomotion of Robots Deluxe (LLR+)	Koelewijn	English	Seminar +Project	SS	4	5	seminar + project performance, assessed
	Master	Catching your eyes: AI-driven modeling and analysis of eyetracking data (ETS)	Zanca	English	Seminar	SS	2	2,5	seminar performance, assessed
		A look inside the human body - gait analysis and simulation (GAS)	Koelewijn	English	Lecture (+exercise)	WS	2 (+2)	2,5 (5)	written exam, 120min or oral exam, 30min

Chair of Neuromuscular and Neural Interfacing Laboratory

How your brain speaks with your muscles in traumatic injuries





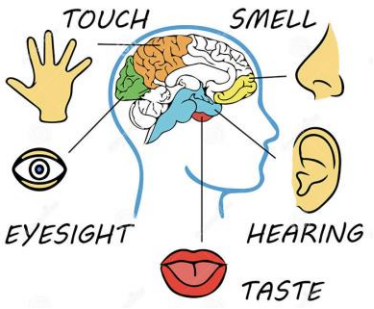


Ting, Del Vecchio et al. (Submitted)

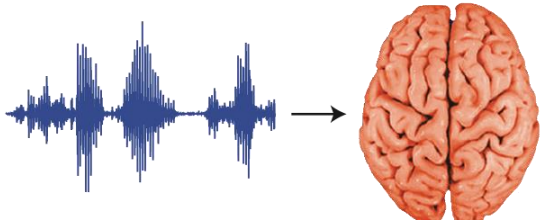
Prof. Alessandro Del Vecchio

Chair of Sensory Neuroengineering

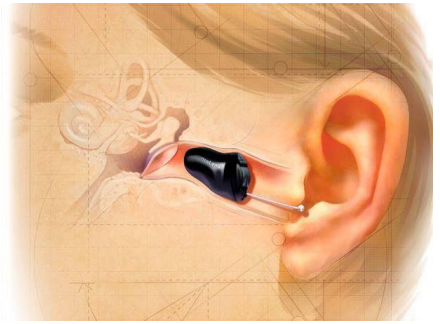
Prof. Tobias Reichenbach



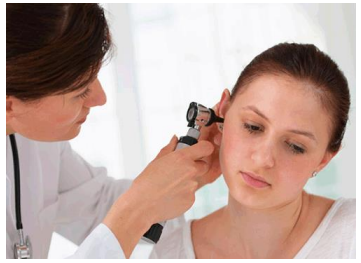
Grundlagen:
- z.B. Neuronale Mechanismen von Sprachverarbeitung
- Multisensorische Verarbeitung



Technologie / Industrie:
- kognitive Hörgeräte
- audiovisuelle Hörgeräte
- Oticon, Sivantos (Hörgeräte); Google (KI)



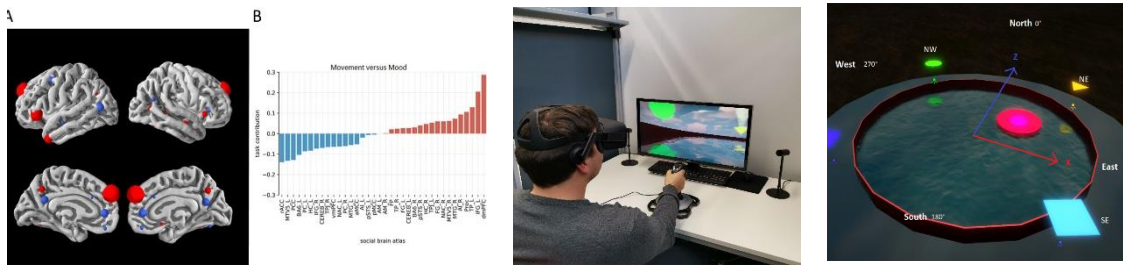
Klinische Links:
- Hörschäden, Cochlea-Implantate
- Aphasie nach Schlaganfall
- Traumatische Hirnverletzungen



Sensorische Neurotechnologie:
- Verstehen multisensorischer Wahrnehmung
- Diagnose von Störungen
- Technologien zur Behandlung

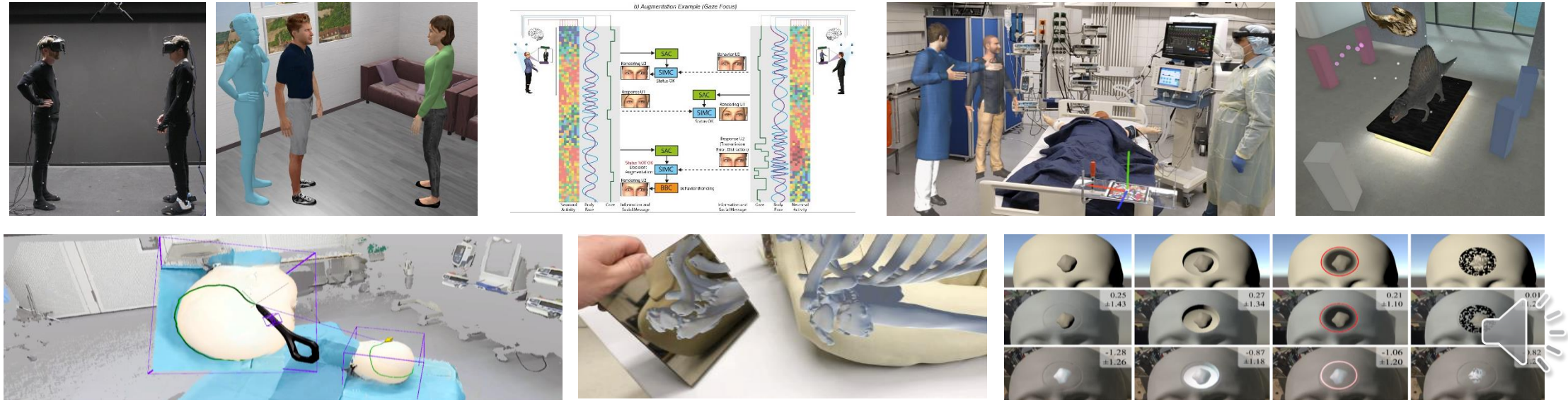
NeuroTech – Chair of Sensory Neuroengineering									
	Bachelor or Master	Computational Neurotechnology	Reichenbach	English	Lecture +Exercises	SS	2+2	5	written exam, 60min
NSquared – Chair of Neuromuscular Physiology and Neural Interfacing									
	Bachelor or Master	Interfacing the Neuromuscular System	Del Vecchio	English	Lecture	SS	3	5	oral exam, 30min
	Master	Applied Neuroengineering	Del Vecchio	English	Seminar +Project	WS	4	10	seminar, lecture + project performance
		Movement Neuroscience	Del Vecchio	English	Lecture	WS	2+1	5	oral exam, 30min

Human-Centered Computing and Extended Reality



Imagineering novel languages for the communication between humans (and machines).

Prof. Daniel Roth

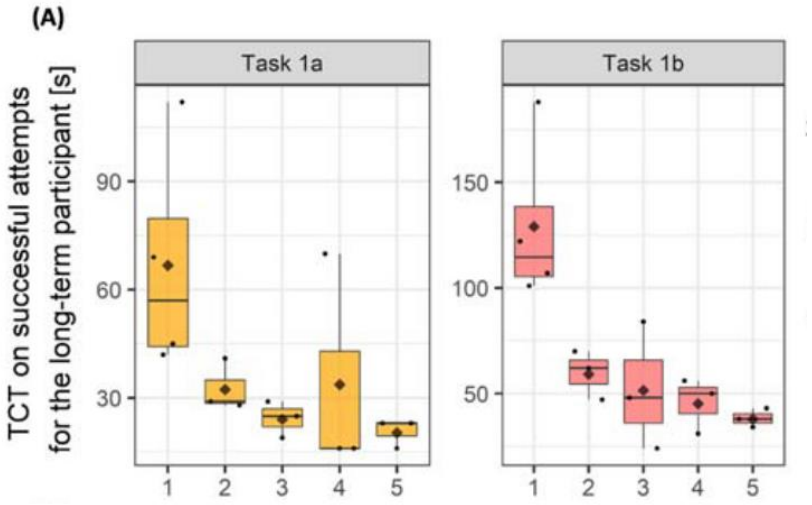


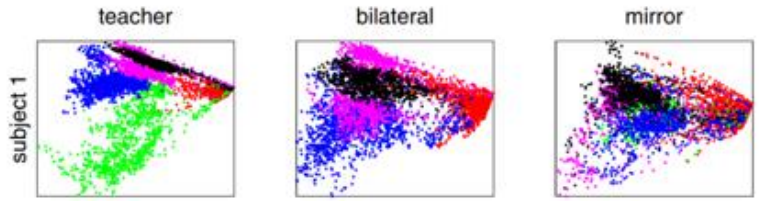
HEX – Chair of Human-Centered Computing and Extended Reality									
	Master	Advanced Topics in Human-Computer Interaction	Roth	English	Seminar	WS	4	5	Seminar performance, assessed
		Virtual and Augmented Reality	Roth	English	Lecture /Project	SS23+	8	10	Lecture, project work, part exam
		Virtual Reality in Neuroscience	Roth	English	Seminar	SS23+	4	5	Lecture, project work, part exam
		Exergames	Roth, Morschheuser	English	Lecture /Project	WS21/22	4	5	Lecture, project work, part exam

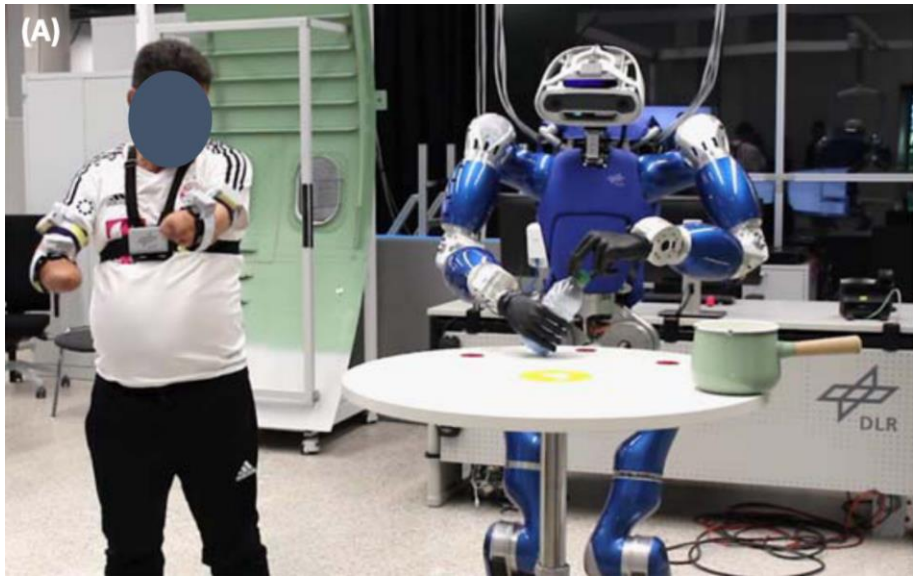
Intelligent Sensorimotor Systems

Rehabilitation and Assistive Robotics, including biocompatible sensing and stimulating techniques, adaptive human-machine interfaces, user-studies and clinical deployment.

Prof. Claudio Castellini





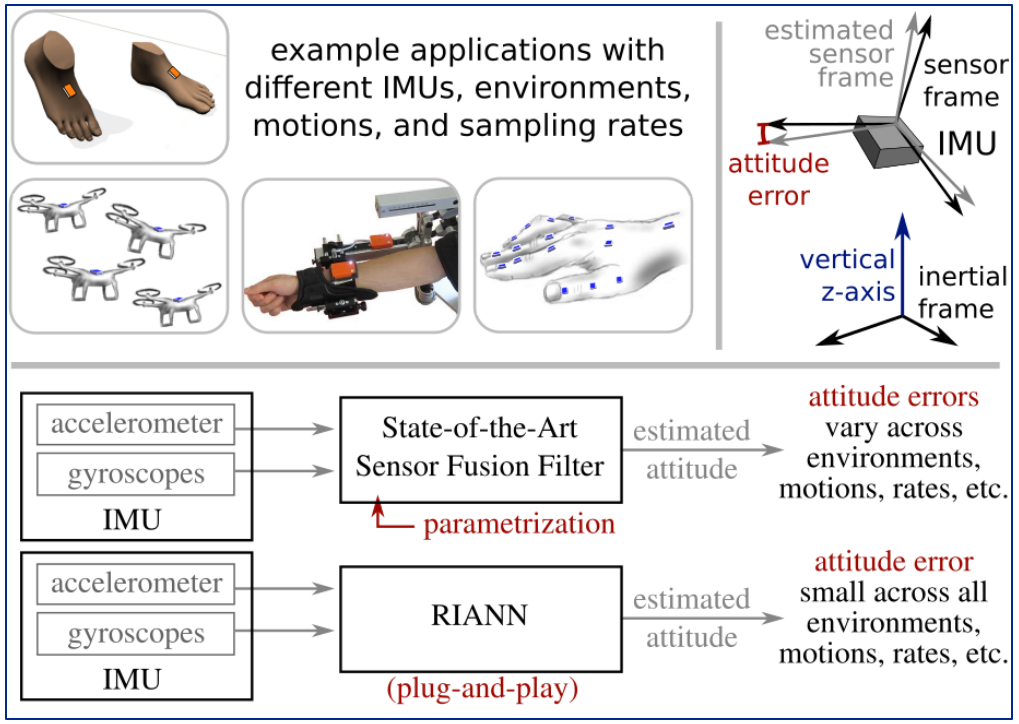


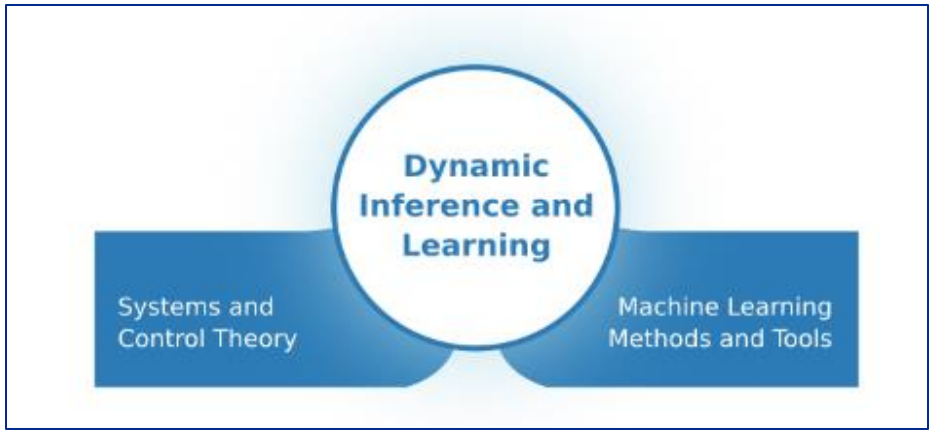
MediRob – Chair of Medical Robotics									
	Master	Human-Robot Co-Adaptation (HRC)	Castellini	English	Lectures +Exercises	WS	4	5	written exam, 60min
		Upper-Limb Prosthetics (ULP)	Castellini	English	Lectures +Exercises	WS	4	5	written exam, 60min
		Rehabilitation and Assistive Robotics (RAR)	Castellini	English	Lectures +Exercises	SS	4	5	written exam, 60min
		Intent Detection and Sensory Feedback (IDF)	Castellini	English	Lectures +Exercises	SS	4	5	written exam, 60min
		Seminar Learning and Interaction in Medical Robotics (IMR)	Sierotowicz	English	Seminar	WS+SS	4	5	report+ presentation
		Seminar Biosignals in Rehabilitation Robotics (BRR)	Egle	English	Seminar	WS+SS	4	5	report+ presentation
		Seminar Robotics for the Lower Limb (RLL)	Scheidl	English	Seminar	WS+SS	4	5	report+ presentation

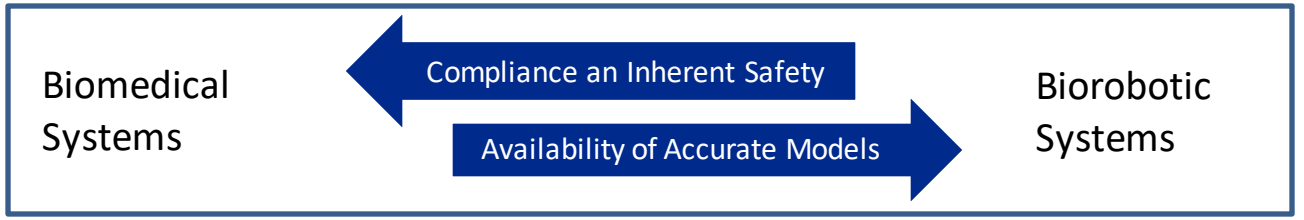
Intelligent Sensorimotor Systems

New methods and algorithms for dynamic inference and learning from non-restrictive prior and real-time data in applications that require online adaptation and dynamic interaction.

Prof. Thomas Seel







ISS – Chair of Intelligent Sensorimotor Systems									
	Bachelor or Master	AI in Medical Robotics	Seel	English	Lecture	WS	4	5	written exam, 60min
		Introduction to Explainable Machine Learning	Seel	English	Lecture	SS	4	5	written exam, 60min
		Artificial Motor Learning	Seel	English	Lecture	SS	4	5	written exam, 60min
		Inertial Sensor Fusion	Seel	English	Lecture	WS	4	5	written exam, 60min
		Intelligent Sensorimotor Systems Lab	Seel	English	Project	WS+SS	8	10	project work, presentation

Friedrich-Alexander-Universität
Medizinische Fakultät
Technische Fakultät

Thanks for your attention and see you in the courses if you like!

Minor "Artificial Intelligence in Biomedical Engineering" (AIBE) for the Bachelor and Master in Computer Science					Contact: Marlene Reuschel: marlene.reuschel@fau.de or Thomas Seel: thomas.seel@fau.de				
Module for ...	Module-Title	Lecturer	Language	Type	WS / SS	SWS	ECTS	Exam-Details
HEX – Chair of Human-Centered Computing and Extended Reality								
Master	Advanced Topics in Human-Computer Interaction	Roth	English	Seminar	WS	4	5	Seminar performance, assessed
	Virtual and Augmented Reality	Roth	English	Lecture /Project	SS23+	8	10	Lecture, project work, part exam
	Virtual Reality in Neuroscience	Roth	English	Seminar	SS23+	4	5	Lecture, project work, part exam
	Exergames	Roth, Morschheuser	English	Lecture /Project	WS21/22	4	5	Lecture, project work, part exam
ISS – Chair of Intelligent Sensorimotor Systems								
Bachelor or Master	AI in Medical Robotics	Seel	English	Lecture	WS	4	5	written exam, 60min
	Introduction to Explainable Machine Learning	Seel	English	Lecture	SS	4	5	written exam, 60min
	Artificial Motor Learning	Seel	English	Lecture	SS	4	5	written exam, 60min
	Inertial Sensor Fusion	Seel	English	Lecture	WS	4	5	written exam, 60min
	Intelligent Sensorimotor Systems Lab	Seel	English	Project	WS+SS	8	10	project work, presentation
MaD – Chair of Machine Learning & Data Analytics								
Bachelor or Master	Bewegungsanalyse und biomechanische Grenzgebiete (BABG)	Koelewijn	German	Lecture	WS+SS	2	2,5	written exam, 60min
	The why and how of human gait simulations (HGS)	Koelewijn	English	Seminar	WS	2	2,5	seminar performance, assessed
	Legged Locomotion of Robots (LLR)	Koelewijn	English	Seminar	SS	2	2,5	seminar performance, assessed
	Legged Locomotion of Robots Deluxe (LLR+)	Koelewijn	English	Seminar +Project	SS	4	5	seminar + project performance, assessed
Master	Catching your eyes: AI-driven modeling and analysis of eyetracking data (ETS)	Zanca	English	Seminar	SS	2	2,5	seminar performance, assessed
	A look inside the human body - gait analysis and simulation (GAS)	Koelewijn	English	Lecture (+exercise)	WS	2 (+2)	2,5 (5)	written exam, 120min or oral exam, 30min
NeuroTech – Chair of Sensory Neuroengineering								
Bachelor or Master	Computational Neurotechnology	Reichenbach	English	Lecture +Exercises	SS	2+2	5	written exam, 60min
NSquared – Chair of Neuromuscular Physiology and Neural Interfacing								
Bachelor or Master	Interfacing the Neuromuscular System	Del Vecchio	English	Lecture	SS	3	5	oral exam, 30min
Master	Applied Neuroengineering	Del Vecchio	English	Seminar +Project	WS	4	10	seminar, lecture + project performance
	Movement Neuroscience	Del Vecchio	English	Lecture	WS	2+1	5	oral exam, 30min
MediRob – Chair of Medical Robotics								
Master	Human-Robot Co-Adaptation (HRC)	Castellini	English	Lectures +Exercises	WS	4	5	written exam, 60min
	Upper-Limb Prosthetics (ULP)	Castellini	English	Lectures +Exercises	WS	4	5	written exam, 60min
	Rehabilitation and Assistive Robotics (RAR)	Castellini	English	Lectures +Exercises	SS	4	5	written exam, 60min
	Intent Detection and Sensory Feedback (IDF)	Castellini	English	Lectures +Exercises	SS	4	5	written exam, 60min
	Seminar Learning and Interaction in Medical Robotics (IMR)	Sierotowicz	English	Seminar	WS+SS	4	5	report+ presentation
	Seminar Biosignals in Rehabilitation Robotics (BRR)	Egle	English	Seminar	WS+SS	4	5	report+ presentation
	Seminar Robotics for the Lower Limb (RLL)	Scheidl	English	Seminar	WS+SS	4	5	report+ presentation