Dieses Wahlpflichtmodul ist ein Angebot der:

**Fachhochschule
Dortmund**
University of Applied Sciences and Arts

**Masterstudiengang
Informationstechnik**

Radar Systems

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Radar Systems					
Kennnummer	**Workload**	**Credits**	**Studiensemester**	**Häufigkeit**	**Dauer**
RSY 10420	180 h	6	2.-3. Semester	Wintersemester	1 Semester

1	**Lehrveranstaltungen**		**Kontaktzeit**	**Selbststudium**	**Gruppengröße**
	Radar Systems		4 SV / 60 h	120 h	25 Studierende

2	**Lernergebnisse (learning outcomes) / Kompetenzen**
	In conjunction with LiDAR and cameras, radars sensors are a key technology for automated driving. This module introduces students into radars sensors with an emphasis on signal processing. Several case studies are discussed based on Matlab-Code and usage of demonstration boards of vendors like Texas Instruments.
	Knowledge - Knows relevant basics of wave propagation and antenna theory - Knows basic elements of radar sensors including modulation - Knows major blocks of radar signal processing including state estimation - Knows current trends in radar signal processing
	Skills - Can implement basic algorithms like target detection, angle finding and sub-bin range estimation - Can implement basics tracking algorithms
	Competence - attitude - Can discuss requirements and features in the area of automotive radar - Understands limitations and translates between different domains - Can lead cross domain usage of radar sensors
	Skills trained in this course: theoretical, practical and methodological skills

3	**Inhalte**
	- Wave propagation and antennas - Block diagram - Modulation - Spectral analysis - State Estimation and Tracking - Current trends in radar signal processing - Applications

4	**Lehrformen**
	- Lectures, Labs (with Matlab/Simulink) - Access to tools and tool tutorials - Access to recent research papers - Access to demonstration boards - Block week - Guest talk by industry experts

5	**Teilnahmevoraussetzungen**
	Formal: keine
	Inhaltlich: Höhere Mathematik, Signal- und Systemtheorie, Kenntnisse in Matlab und/oder Python

6	**Prüfungsformen**
	Modulprüfung Radar Systems: Written Exam (60 min) at the end of the course (50%) and homework (50%) with demonstration/presentation. Homework deals with aspects of signal processing for use cases in automotive or robotics. Homework is teamwork and can be based upon demonstration boards and/or Matlab/Python and public dataset. Homework can be based upon block week.
7	**Voraussetzungen für die Vergabe von Kreditpunkten**
	Modulprüfung muss bestanden sein.
8	**Verwendung des Moduls** (in anderen Studiengängen)
	Masterstudiengänge Informationstechnik, Embedded Systems Engineering und gemäß Katalog der Ruhr Master School
9	**Stellenwert der Note für die Endnote**
	6/90 x 60 % (gemäß § 33 Abs. 2 Studiengangsprüfungsordnung (StgPO) für den Masterstudiengang Biomedizinische Informationstechnik)
10	**Modulbeauftragte/r und hauptamtlich Lehrende/r**
	Modulbeauftragte/r: Prof. Dr. Andreas Becker hauptamtlich Lehrende/r: Prof. Dr. Andreas Becker, Prof. Dr. Jörg Thiem
11	**Literatur**
	[1] Stergiopoulos, Advanced Signal Processing, CRC Press, 2009 [2] Kay, S.; Fundamentals of Statistical Signal Processing, Vol. I: Estimation Theory, Prentice Hall,1993 [3] Mahafza, Radar Signal Analysis and Processing using Matlab, CRC Press, 2016 [4] Winner, Handbuch Fahrerassistenzsysteme, Springer, 2015 [5] IEEEexplore: Several papers will be used throughout lecture