MSE | MASTER OF SCIENCE IN ENGINEERING

Title:	Real-Time Embedded Vision and Machine Learning
Short Code:	EVA_EVaML
ECTS Credits:	2
UAS:	ZHAW SoE
Organizer Details:	MRU ZHAW Institute of Embedded Systems
Evaluation:	pass/fail based on results of programming assignment
Decision Date:	15 March 2021
Start Date:	12 April 2021
End Date:	28 May 2021
Date Details:	Spring semester, ZHAW Institute of Embedded Systems (Winterthur)
Type:	Half day courses on 7 days in the semester plus individual work on assignment
Language(s):	English
Description (max. 300 characters):	The module targets the field of embedded real-time vision systems with AI support. Such systems are typically used for automotive, drones or industrial applications. The students get an introduction to state-of-the-art embedded camera and processing technologies. Each student gets an embedded vision kit based on a raspberry pi, which will be used for hands-on experiments. The full development chain from embedded Linux, camera driver integration, AI tools, neural network training, integration and a real-time application will be practiced.
Contents and Learning Objectives:	The course is setup as a 7 half-day workshop. Every student receives a raspberry-pi and a camera. The students will develop individual demos (e.g. industrial object recognitions, tour guides, collision alerts). All demos will be discussed and reflected during the workshops. The specific goals: • Training neural networks for small (mobile) devices in order to gain knowledge of the real time behavior of neural networks used for vision-based systems. • After investigating popular datasets such as MNIST, the students will elaborate specific use cases, e.g. detection of specific objects with a camera. • The full development and processing chain will be defined, such as data acquisition, labeling, training, testing and porting the neural network to the target.

	• The real time capabilities of the target system will be analyzed and tested. • The following tools will be used: Keras, Tensorflow, Python, and open source code generation applications for converting neural networks into C.
Admission:	ET, IT, ST
Literature:	
Conditions:	50% theory, 50% lab work
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Status:	:TODO:
Specialization:	Computer Science (CS) Data Science (DS) Electrical Engineering (EIE) Mechatronics & Automation (MA)