



EDLRIS

European Driving License
for Robots and Intelligent Systems



Interreg 
Austria-Hungary 2014-2020
European Union – European Regional Development Fund



EUROPEAN UNION

Enabling the Creation
of Intelligent Things



European Driving License for Robots and Intelligent Systems

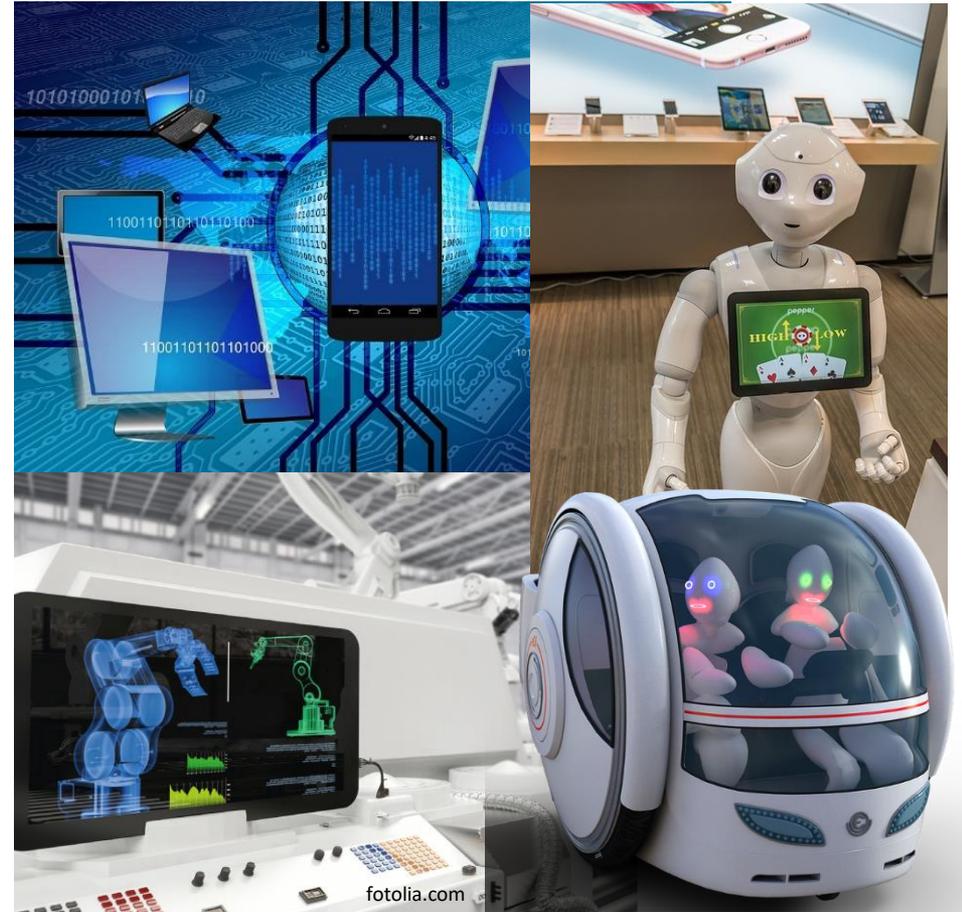


What is already a reality



Challenge

- **hardly any** systematic teaching exists
- concepts, fundamental principles
- careers, raising awareness – **opportunities, risks, threats**
- **informed** decision
- enabling an **economic and social participation**



<https://pixabay.com>

European Driving License for Robots and Intelligent Systems - EDLRIS

- sound knowledge in **Artificial Intelligence (AI)** and **Robotics** as a crucial factor for
 - future careers of young people
 - development of novel, innovative products
 - new jobs demand high level of education
- development of a **training and certification** system inspired by the ECDL
- **prepare** and **teach** topics in a well grounded way
- **proofing** skills acquired
- project 2017-2020 funded by the EU



Project Consortium

- Graz University of Technology; Austria
- OCG Austrian Computer Society; Austria
- University College of Teacher Education Burgenland, Onlinecampus Virtual PH; Austria
- Szechenyi University Győr; Hungary
- John von Neumann Computer Society; Hungary



Goals and target group

- implementing a professional, standardized **training- and certification-system** for Artificial Intelligence and Robotics
 - skills, competencies recognized and accepted by companies, educational institutions, public bodies
- target **audience**:



trainers

(teachers, mentors, ...)



trainees

(students, apprentices, young people, ...)



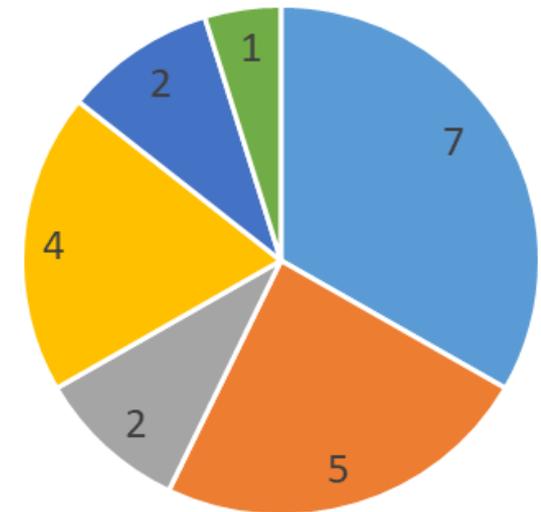
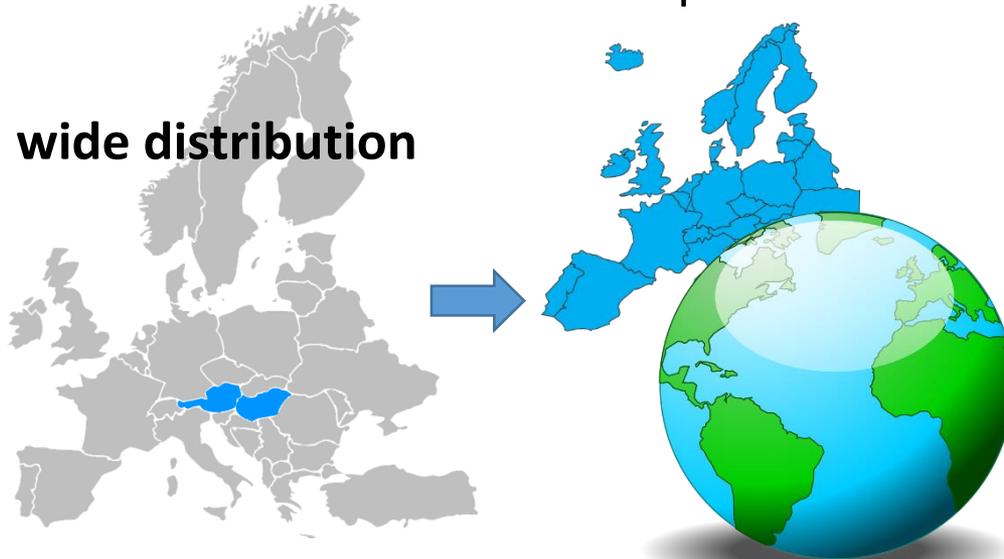
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Broad acceptance and dissemination

- **advisory board** ensuring **broad acceptance**:

- annual meetings/workshops
- continuous integration and feedback
- final stakeholder workshop

- **wide distribution**



- enterprises
- SMEs
- regional public authorities
- educational institutions
- ministry / government
- foundations

1st Advisory Board Workshop 2017

- 06.12.2017, Graz
- expectations
 - graduated trainer/trainees
 - program
- objectives and ‘hot topics’
 - Robotics
 - AI
- general considerations

=> prepared and considered in the process of curriculum development

2nd Advisory Board Workshop 2018

- 21.11.2018, Zamardi
- presentation and discussion of
 - lesson plans AI, Robotics
 - structure
 - topics
 - online/fact-to-face units
- general considerations
 - feedback and advice

=> considered in the final lesson plans and the first trainings in 2019

3rd Advisory Board Workshop - 06.12.2019

- 10.00h – 10.30h
 - welcome and introduction
 - EDLRIS project – recap, status, achievements
- 10.30h – 11.45h
 - hands-on EDLRIS
 - coffee break
- 11.45h – 12.50h
 - interactive discussion (1-2 groups): feedback, improvements, comments, ideas, follow-up
- 12.50 - 13.00h
 - wrap-up, outlook, farewell



2017

1.
Preparation

2018

2. Training-
and
Certification-
system Dev.

2019

3. Train-the-
Trainers

2020

4. Educating
the Trainees

Approach

- development of an extensive training and certification system
- development of teaching curricula and material
- sound technological and didactic preparation
- modules for AI and robotics (basic, advanced)

- training and certifying the trainers (e.g. teachers)
- conducted by researchers and educators
- well-balanced class-attendance, practical- and online-units

- training and certifying the trainees (e.g. students)
- conducted by certified trainers

Curricula (Stage 1,2)

Survey, Educational
Curricula, Advisory Board

Objectives, Core
Competencies

Topics, Contents,
Schedule

Age, Skill Level, Prior Knowledge, Educational
Curricula, Reference Textbooks

EDLRIS course structure

each module of AI and Robotics (Basic, Advanced) :

- 30-40h (3-5 days) of face-to-face units at partner institutions
- 20h-50h online units (guided online session)



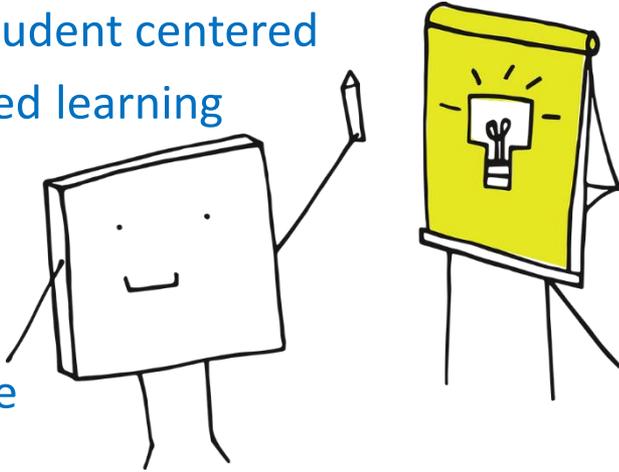
Characteristics

- providing learning **curricula** and **teaching material** to trainer:
 - ready-to-use teaching guides
 - scripts and tutorials, tools
 - exercises and solutions
 - presentation slides
- training and certification for trainers and trainees **for free**
- **non-commercial use of material**

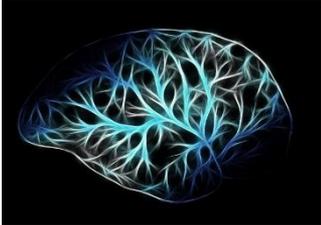


Methods and Tools

principles of **constructionism** – activity based

- **blended learning**
 - **flipped classroom**
 - competency-based, student centered
 - problem-/project-based learning
 - discovery learning
 - teamwork
 - active plenum
 - attentive micro lecture
 - whole brain teaching
- 
- **learning management system *Moodle***
 - **computer science unplugged**
 - **educational robotics**
 - simulators
 - logic puzzles
 - programming
 - station work
 - online exercises

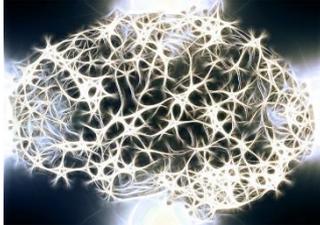
EDLRIS Modules



**AI
Basic**



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**AI
Advanced**



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**Robotics
Basic**



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**Robotics
Advanced**



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- each module can be done **independently of one another**

Modules - Focus



AI, Robotics Basic



No prior theoretical background is required.

Target group:

e.g. interested teachers,
secondary school students

- build awareness
- introduce concepts easily accessible way
- motivate people and enabling them to live with, *understand and use the technology properly*



AI, Robotics Advanced



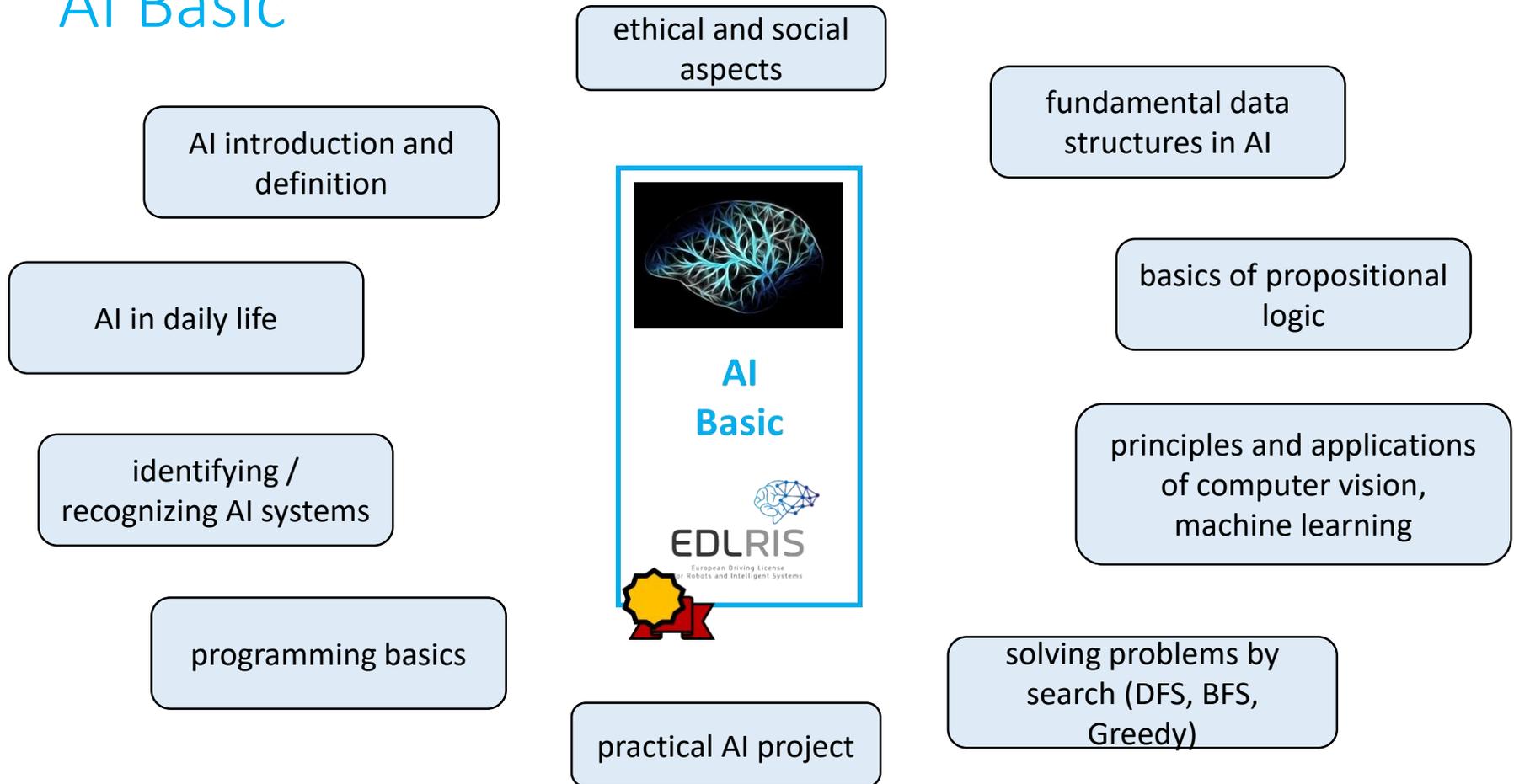
Background knowledge in CS and mathematics is required.

Target group:

e.g. teachers and secondary school students with background in the field

- cover more topics
- foster deeper understanding
- training on a high, elite level
- enabling people to *understand technology and to implement applications*

AI Basic



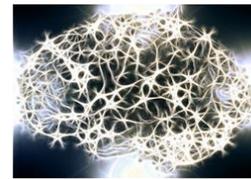
AI Advanced

ethical and social aspects

AI definitions, applications and history of AI

modeling and analyzing problems

working with common AI frameworks and tools



**AI
Advanced**

principles of knowledge based systems, natural language processing, CSP, machine learning

fundamental mathematical concepts in AI

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Robots and Intelligent Systems



properties of problem representations

practical AI project

solving problems by fundamental AI concepts: search, declarative, data driven

Robotics Basic

ethical and social aspects

Robotics history and terminology

use cases and robotics applications in our everyday life

modeling of robotics systems (flowchart)

building and programming mobile robots

robotics components (actuator, sensor, controller)



Robotics Basic



principles of robotics and intelligent systems (sense-plan-act)

practical robotics project

Robotics Advanced

ethical and social
aspects

overview robotics
systems

sensor fusion and
state estimation (e.g.
Kalman filter)

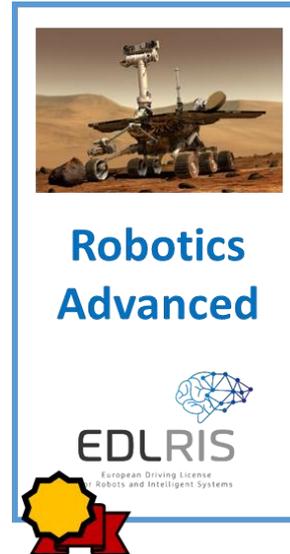
principles of robot
manipulators and
mobile robots

systematic
engineering approach

linear algebra, CS,
physics

geometrical and
kinematical models of
robot manipulators and
mobile robots

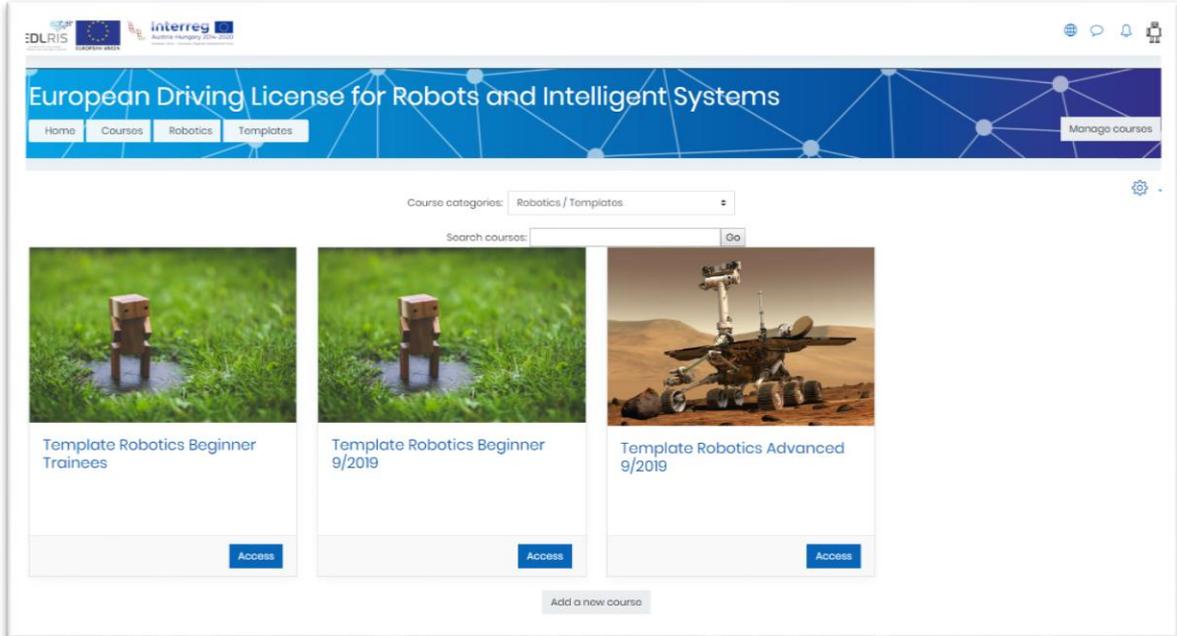
practical robotics project



Unified Learning Management System

<http://onlinecampus-server.at/edlris/>

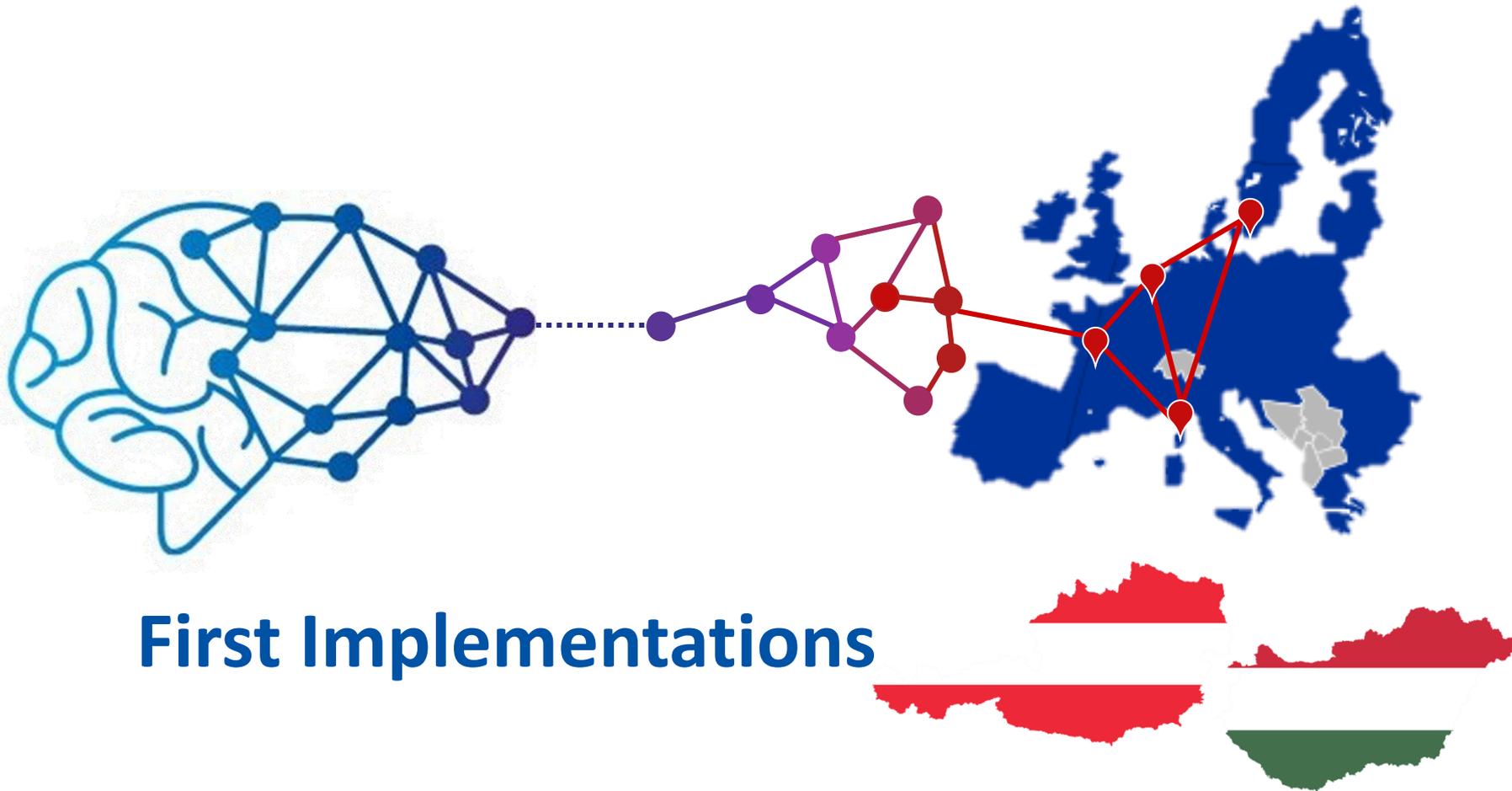
- course and teaching material
- presentation slides
- guided online sessions
- didactical and pedagogical information for trainer
- certification system



The screenshot shows the EDLRIS online learning management system interface. At the top, there are logos for EDLRIS, the European Union, and Interreg Austria-Hungary 2014-2020. The main header is blue with the text "European Driving License for Robots and Intelligent Systems" and navigation tabs for "Home", "Courses", "Robotics", and "Templates". A "Manage courses" button is visible on the right. Below the header, there is a search bar with "Course categories: Robotics / Templates" and a "Search courses:" field. Three course cards are displayed, each with a thumbnail image and an "Access" button:

- Template Robotics Beginner Trainees (Thumbnail: a small wooden robot on a green field)
- Template Robotics Beginner 9/2019 (Thumbnail: a small wooden robot on a green field)
- Template Robotics Advanced 9/2019 (Thumbnail: a Mars rover on a red planet surface)

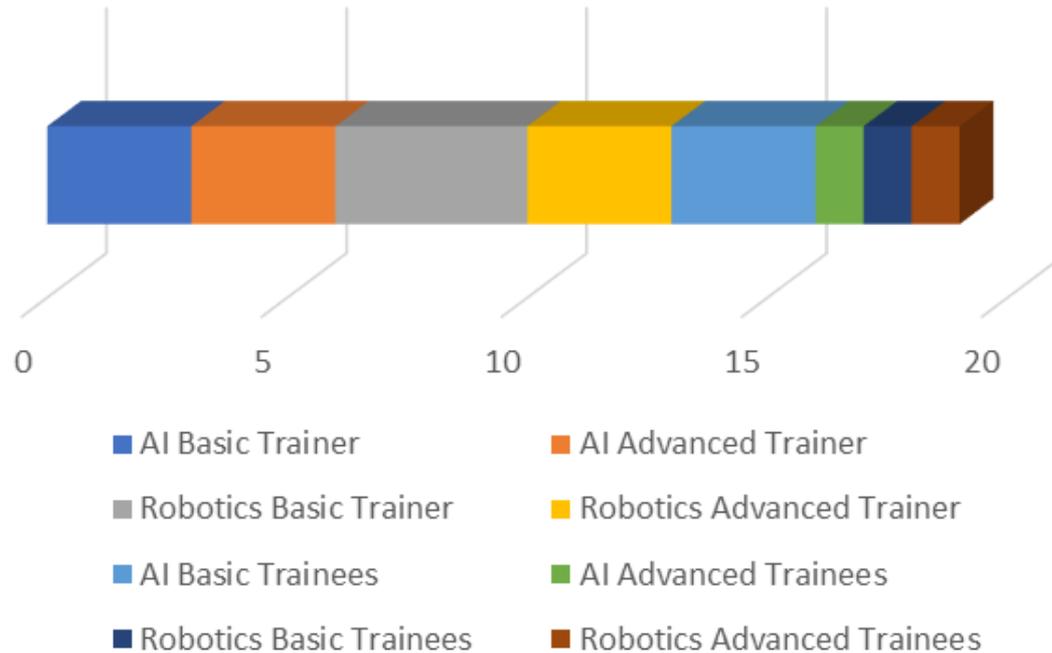
An "Add a new course" button is located at the bottom of the course list.



First Implementations

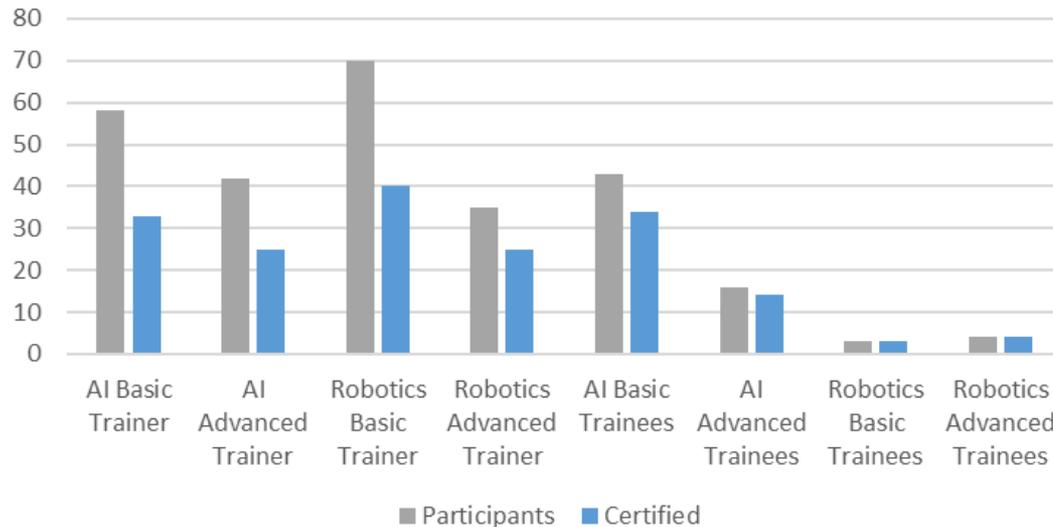
EDLRIS Implementations – Spring/Fall 2019

Conducted Courses in 2019

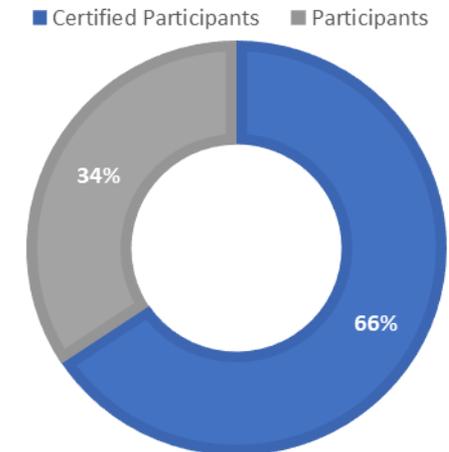


EDLRIS Implementations – Spring/Fall 2019

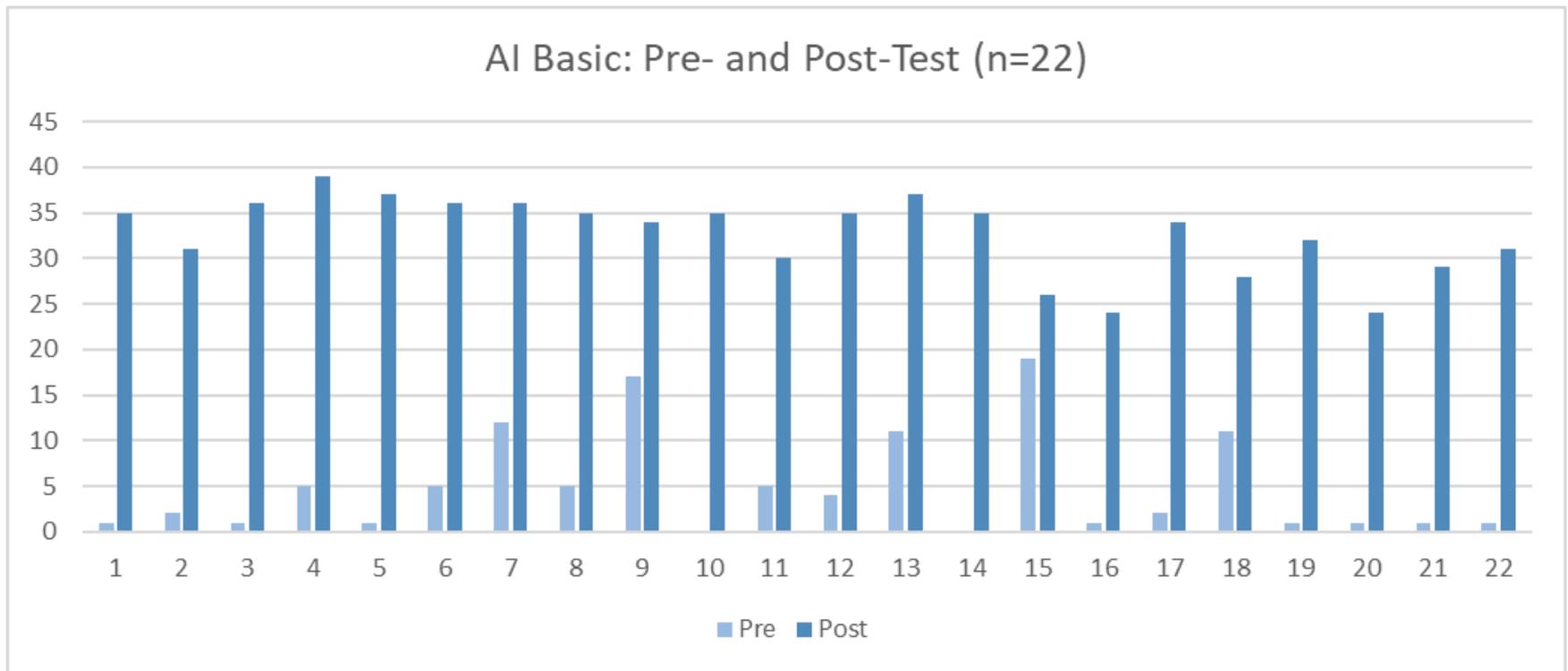
Participants, Certifications



Overall Participants in 2019 (n=271)



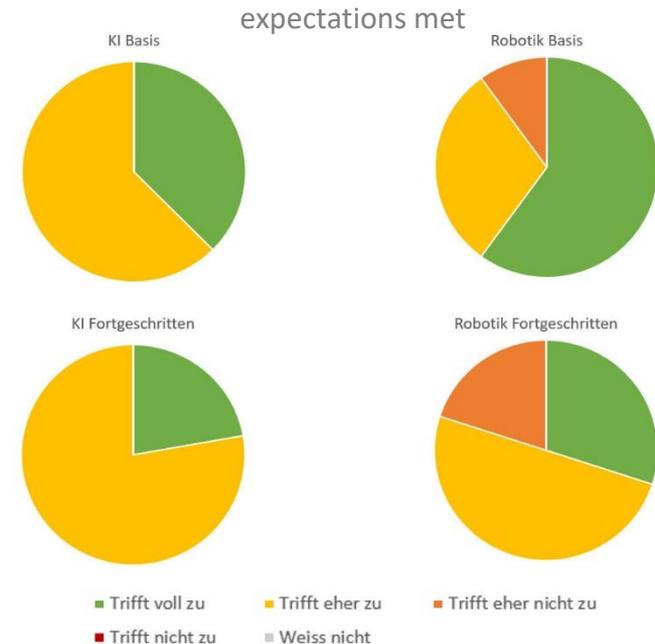
Pre- and Post evaluation (preliminary)



Qualitative Evaluation – Participants' Survey (preliminary)

prior and **after** trainer courses (5 Likert scale, 1 open ended question)

- overall positive feedback regarding content, material, implementation, expectations
- suggestions for structural improvements:
 - less face-to-face units in Basic modules (<5)
 - transfer contents to online units => learning pace, participants with different prior knowledge
 - more time between F2F and online units
- some typos and textual errors,
- intuitively (online units)

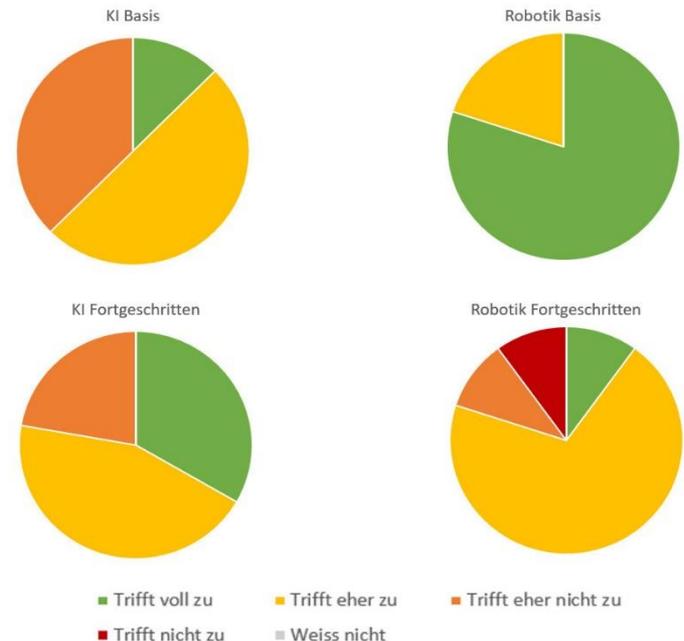


Qualitative Evaluation – Participants’ Survey (preliminary)

- blended learning concept overall positively accepted
- overall Basic contents for trainees appropriate
- nevertheless: some topics in Basic courses still too complex for trainees without any prior knowledge (esp. Python programming)
- gap between Basic and Advanced courses too big

“the complexity and contents of the advanced module are too high for doing this course with my pupils in school”

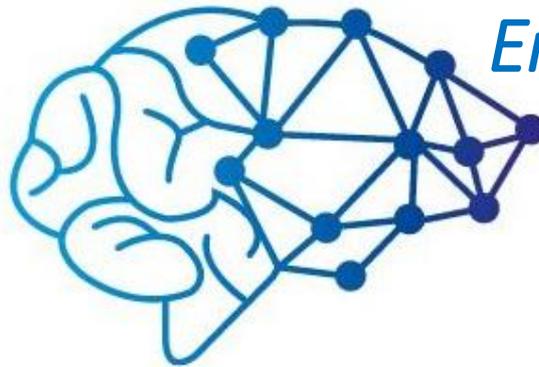
coherent picture of F2F + online





Outlook 2020 +

- **RoboCupJunior** Austrian Open **24.-25.4.2020** in Eisenstadt
- further **trainer courses** in AT&HU
- further **trainee courses** by certified trainers in schools in AT&HU
- quantitative and qualitative **evaluation** of Robotics and AI modules
- final Stakeholder Workshop (advisory board, project team, trainers+trainees) in **April/May 2020** in Graz
- project completion May 30 - 2020
- **follow-up project**



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Thank you.

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