TALENTJOURNEY

Testing / piloting trans-national CDS vocational curricula and testing/delivering lifelong trainings

August/September 2021

Co-funded by the
Erasmus+ Programme
of the European Union

Piloting plan for ROBOTICS

The Robotics module is normally taught according to the annual clock 2 times a year after the autumn and winter holidays and Life Long Learning 4 times a year.

The scope of the joint curricula is about 200 hours, in the pilot it can be tested in the range of 50-100 hours, which means the scope of 5 creditpoints

In the autumn of 2021, piloting must be done immediately after the holidays. Each partner pilots the modules belonging to it according to their own holiday schedule.

The pilot plan must be completed during April 2021.

The table outlines how piloting is carried out in Sataedu.

Piloting plan

Module **Robotics** https://www.ade.fi/en/front-page/front-page

Piloting group or part of group USA19		The robotics module could be the locally offered part of the degree included in the student's personal learning development plan electrical automation, the discussion should be successful

						Evaluation of curricula usability		Evaluation of learned outcomes	
Part of Robotics module which under piloting	Knowledge and skills to be learned	An exercise used to study a part of module	Studying environment	Teacher	Object of evaluation of the robotics module part	Evaluation criteria (for piloting/how module works)	Learning analysis	**Evaluation criteria from curricula**	Time (hrs)
IIoT Holistic view	IIoT in general, sensors and actuators, security risks, advantages and disadvantages, various applications	IIoT Holistic view point 4, explore the topic based on the material and define a good application that includes sensors, connections, data to be transferred and its use	A place where internet connection available	Teachers of electrical automation and ICT. Niemelä, Matintalo, Mäkitalo	Written output	Usability, benefits, and ease of deployment of a defined application. Depth of familiarity with the topic.	Has the student learned the skills defined in the criteria and knowledge and skills by doing this exercise. In what time has the intended learning taken place. Is the level of exercise too difficult, appropriate or too easy. The evaluation is carried out by a group that also includes a company representative (external expert).	criterias from curriculum	5
Entry level test	Electronic quantities, basics of automation technology, basics of digital and telecommunication technology and basics of measurement	Based on previously learned, verified by interview and measurement exercises.	Sataedu classroom	Teachers of electrical automation and ICT. Niemelä, Matintalo, Mäkitalo	Competence is demonstrated on a screen similar to the interview, which also includes the use of measuring equipment	The result must be more than 50% approved in order to continue the actual study of the module	Has the student learned the skills defined in the criteria and knowledge and skills by doing this exercise. In what time has the intended learning taken place. Is the level of exercise too difficult, appropriate or too easy. The evaluation is carried out by a group that also includes a company representative (external expert).	criterias from curriculum	4
Prepare for the installation of robotics and computer network equipent	Different mechanical structures and types of robots. Details of electronic motion control. Equipment and tools related to control, management and operation. Different sensors. Safety of robot operation. Interpretation of device operation based on documents. Computer network structure and protocols. Work performance planning. Economic and ecological use of materials.	Basics of Robotics self-study material (SAMK), VR presentation on cell function and safety issues. Basics of Computer Networks and Computer Network Equipment Course (Sataedu)	Sataedu classroom and Classrooms and the Yaskawa Robot Cell Environment	Atte Pirttijärvi, Niemelä, Matintalo	Basics of robotics, Cell security and TCP / IP, firewall and VPN	Data management is demonstrated on a screen-like basis by an interview	Has the student learned the skills defined in the criteria and knowledge and skills by doing this exercise. In what time has the intended learning taken place. Is the level of exercise too difficult, appropriate or too easy. The evaluation is carried out by a group that also includes a company representative (external expert).	criterias from curriculum	15
Make the installation and commissioning of the robot and IIOT computer network equipment	Wiring diagrams, sensors, cables, mechanical structures, mechanical fastenings, logic program stop and start, encrypted mobile network connection construction and cell security. Computer network settings.	An end / space sensor is installed on the robot and connected to the Siemens LOGO PLC, from where the data is transmitted via a switch / router / mobile network to the upper system. VR presentation on cable stripping, connection, etc. VR-factory containing safety factor, wireing, changing the sensor virtually.	Yaskawa robot cell, VR-factory	Matintalo, Mäkitalo, Pirttijärvi ja Niemelä	Determining the control panel wiring from the wiring diagrams, sensor selection, sensor mechanical installation, cable selections, wiring and logic wiring. Router configuration. Work safety.	Correctness of installation (electrical safety and standards) and cleanliness of installation and environment. Economic use of materials and proper sorting and disposal of waste. Ensuring operational safety. Proper installation and adjustment of sensors, actuators and network settings.	Has the student learned the skills defined in the criteria and knowledge and skills by doing this exercise. In what time has the intended learning taken place. Is the level of exercise too difficult, appropriate or too easy. The evaluation is carried out by a group that also includes a company representative (external expert).	criterias from curriculum	30
Use the robot and robot shell	Cell security. Using a robot. Influencing the economy of operations.	Stops and restarts the robot safely. Uses the robot with an existing program to test the operation of a new sensor and safety devices. Can stop the robot quickly in an emergency. Possible to reprogram the robot or make a program change if necessary. Understand the economic significance of a production outage.	Yaskawa robot cell	Pirttijärvi	Test run of the robot after the change. Operation of safety devices. Understanding the significance of downtime.	Safety. Detecting improvement in performance after change. Understanding downtime by interviewing.	Has the student learned the skills defined in the criteria and knowledge and skills by doing this exercise. In what time has the intended learning taken place. Is the level of exercise too difficult, appropriate or too easy. The evaluation is carried out by a group that also includes a company representative (external expert).	criterias from curriculum	10
Perform robot maintenance, service and documents the installation of computer network equipment	Documentation of drawings. Measurement. Computer network documentation.	Performs check measurements, verifies annotations of new connections, and documents changes to connection drawings. Makes the necessary adjustments.	Yaskawa robot cell	Matintalo, Pirttijärvi, Mäkitalo, Niemelä	Corrections to drawings after changes. Measurement protocols and documentation of changes to computer network equipment.	Correctness and legibility of drawings and other documents.	Has the student learned the skills defined in the criteria and knowledge and skills by doing this exercise. In what time has the intended learning taken place. Is the level of exercise too difficult, appropriate or too easy. The evaluation is carried out by a group that also includes a company representative (external expert).	criterias from curriculum	5

Piloting plan for AI and CS

Professional field	**Competence and time frame**	**Professional skills (integrate meta & green skills)**	**Learning outcomes**	**Microcredentials**	**Date of implementation (month and day planing)**	**Responsible teacher**	**Learning and teaching method, way of cooperation with companies or external experts**	**Learning environment**	**Which companies or external experts participate**	**Evaluation of gained competences (in what way you are going to measure?)**
AI & CS	CS • basic cesurity concepts • web based risks mitigation AI • recognize user needs and find intersection between user needs ad AI strenghts •collection and evaluation of the required data Time frame:30 hours	CS • Lists basic security elements • Identify features of common web server architecture. • Identify web server and application vulnerabilities. • Describe web server and web application attacks. AI • identifies which users problems is AI positioned to solve; • asses automation vs. augmentation; • queries data from multiple sources like relational databases, IOT devices, social networks, data warehouses	CS • Defines and describes principles of information security. • Identyfies and Explains most common vulnerabilities in modern web servers. • explains web application securuty flaw (OWASP) AI • describes the fields where AI is used (computer vison, speech recognition, natural language processing, social network filtering, games, mobile advertising,...) • finds the examples where AI is probably better and where rule or heuristic based solution will work • defines user needs, possible solutions and assess whether AI can solve the problem in unique way	YES	27.09.2021	Marko Marcetić, Aljaž Gec	•AI & cyber company experts will give learners insights about trends, skills needed, job opportunities. •Some theoretical bases will be provided by the teachers. • The learning goals and outcomes will be discussed with the learners and offered real life challenges to solve, by companies. • get acquainted with the challenges	online,	Marken, Geni	still to be defined
					28.09.2021	Marko Marcetić, Aljaž Gec	• a more detailed discussion of the challenges that students/learners will address • establishment of international teams •International learners' teams will work on challenges, supported through mentorship by teachers and company experts	online, communication tools (e.g. airmeet)		still to be defined
					29.09.2021	Marko Marcetić, Aljaž Gec	• The company visit will be organized by each partner country, to to talk to experts about the matters needed to solve their challenges (hint for challenge solution).	company visit	Kolektor, Yaskava, Domel, H	still to be defined
					30.09.2021	Marko Marcetić, Aljaž Gec	• working again in teams on challenges and also preparing presentation •International learners' teams will work on challenges, supported through mentorship by teachers and company experts	online (e.g. airmeet)		still to be defined
					1.10.2021	Marko Marcetić, Aljaž Gec	•finalizing presentations •Learners' ideas/solutions will be presented to company experts and teachers. The learners will be awarded microcredentials for gained skills.	online (e.g. airmeet)	Marken, Geni	still to be defined

Piloting plan for Holistic IIoT

Professional field	Competence and time frame	Professional skills (integrate meta & green skills)	Learning outcomes	Microcredentials	Date of implementation (month and day planing)	Responsible teacher	Learning and teaching method, way of cooperation with companies or external experts	Learning environment	Which companies or external experts participate	Evaluation of gained competences (in what way you are going to measure?)
Holistic IIoT	• Gets familiar with IIOT and History • How IIOT works and available applications •Challenges, advantages, disadvantages in IIOT 4 hours	Gets owerviev of IIoT	Student: •understand basics of IIoT •recognises the challenges •knows IIOT applications	?	20.09.2021	ales.kozjek@sckr.si	Virtual lecture (16 students/partner)	at the school , in the laboratory with internet access	/	still to be discussed
Holistic IIoT	IIOT practical application exercise 6 hours	•Gets acquainted with IIOT application and analyses the structure of the application •Explores the hardware & software •Defines the best methods in applications	Student: • is able to define a good IIOT application. •understands the structure of IIOT environment (sensors, connections, data, analysing)	?	21.09.2021	Luka.colaric@sckr.si	Virtual workshop (16 students/partner)	at the school , in the for electronics and technology with internet access	/	still to be discussed

Piloting plan for Data Science

Professional field	**Competence and time frame**	**Professional skills (integrate meta & green skills)**	**Learning outcomes**	**Microcredentials**	**Date of implementation (month and day planing)**	**Responsible teacher**	**Learning and teaching method, way of cooperation with companies or external experts**	**Learning environment**	**Which companies or external experts participate**	**Evaluation of gained competences (in what way you are going to measure?)**
Data Science	Owerview of the Data Science field 4 hours	• Understanding the importance of data • Overview of different types of data	Student: • gains an understanding of the potential power and usefulness of data.	?	11.10.2021	Luka.colaric@sckr.si	University of Maribor Faculty of Organizational Sciences: lecture and workshop on "data usability"	at the school , in the laboratory, where we will previously conduct a holistic lecture on IIOT.	University of Maribor Faculty of Organizational Sciences Kidričeva cesta 55a SI-4000 Kranj Associate Professor PhD Mirjana Kljajić Borštnar Assistant Professor PhD Marieta Marolt	still to be discussed
Data Science	Example of Data Science in use 2 hours	• Extracting usability from data	Student: • understands the approach to exploiting data usability. • gets insight into the actual work of a data scientist.	?		Luka.colaric@sckr.si	Elektro Gorenjska presents a 2 hour presentation of "real use of data for economic purposes"	at the school , in the laboratory, where we will previously conduct a holistic lecture on IIOT.	company Elektro Gorenjska Blaž Dobravec	still to be discussed

Piloting plan for Production Process Development

Professional field	Competence and time frame	Professional skills (integrate meta & green skills)	Learning outcomes	Microcredentials	Date of implementation (month and day planing)	Responsible teacher	Learning and teaching method, way of cooperation with companies or external experts	Learning environment	Which companies or external experts participate	Evaluation of gained competences (in what way you are going to measure?)
Production Process Development	Getting familliar with product life-cycle 1 hour	• A comprehensive view of the product life cycle (how to get from idea to product). • Determining the product manufacturing schedule (schedule).	Student: • Gains an overall view of the product life cycle • learns about the time course and method of conducting the workshop	?	4.10.2021	ales.kozjek@sckr.si	Presentation of the module and industry partner (POLYCOM d.o.o.), videoconference	at school - classroom with internet access (Microsoft Word tool)	Polycom, Development Engineer, Production Manager	still to be discussed
Production Process Development	Basic product design 5 hours	• Preparation of a rough prototype plan (sketch, list of materials, type of machining procedures ...) • 3D product design • Preparation of technical documentation	Student: • prepare a rough plan for making a prototype • creates a prototype plan in a software environment for 3D modeling (SolidWorks, Creo, etc.) • prepares technical documentation	?		ales.kozjek@sckr.si	workshop, virtual for partnerschools	at school -classroom with internet access, Microsoft Word tool, 3D planning software		still to be discussed
Production Process Development	Production of mechanical components with a 3D printer and advanced CNC technology 3 hours	• Convert 3D models to STL format • Getting to know the software tools for 3D printing (Cura, Prusa slicer). • Basic and advanced use of the 3D printer. • 3D printing with support material. • 3D printing of complex objects. • Getting to know advanced CNC technologies	Student: • Converts 3D models to STL format • Learns 3D printing tools • makes a product using a 3D printer • learns about advanced CNC technologies that are current in the industryji	?	5. 10. 2021	matic.rzek@sckr.si ales.kozjek@sckr.si	workshop, virtual for partnerschools	at school - classroom with internet access, Tools 3D design software 3D printing software		still to be discussed
Production Process Development	Enchance knowledge concerning the electronic components and devices (Arduino, low cost senzors and actuators) 3 hours	• Production of electronic circuit • Connection of electronic sensors and microcontrollers (arduino, rasbery pi) • Basics of measurement and data acquisition AD, DA	Student: • binds electronic components • programs microcontrollers • performs basic measurements and data acquisition AD, DA	?		matic.rzek@sckr.si andrej.arh@sckr.si	workshop, virtual for partnerschools	at school - classroom with internet access (Adruino IDE tool)		still to be discussed
Production Process Development	IOT 4 hours	Conduction of protocols: • MQTT data protocols, • Websocket communication protocols http • programming of server (C #, pyton), • testing with "web client", • sending test data to the server and reviewing the entered data.	Student: • performs protocols and tests of the components planned for the instalation	?	6.10.2021	matic.rzek@sckr.si andrej.arh@sckr.si	workshop, virtual for partnerschools	at school - classroom with internet access (Adruino IDE tool, Visual Studio .NET / C #)		still to be discussed
Production Process Development	Production of the final project/product 3 hours	• Prototyping: assembly of all components into the final product. • Programming of the prototype	Student: • performs the final assembly of the prototype • programs the prototype according to the previously set automation criteria	?		matic.rzek@sckr.si andrej.arh@sckr.si ales.kozjek@sckr.si	workshop, virtual for partnerschools	at school, classroom for electronics and technology		still to be discussed
Production Process Development	Testing and evaluation of the final product 5 hours	Product testing and evaluation as required.	Student: • checks the mechanical operation of the prototype • checks the electronic operation of the prototype • checks the software operation of the prototype • evaluates the operation of the prototype, according to the previously set criteria	?	7.10.2021	matic.rzek@sckr.si andrej.arh@sckr.si ales.kozjek@sckr.si	workshop, virtual for partnerschools	at school, classroom for electronics and technology		still to be discussed
Production Process Development	Example of good practice - a visit to the company 5 hours	Demonstration of real product development in industry	Student is acquainted with a case of real production process developmnet	?	8.10.2021	ales.kozjek@sckr.si	visit to company	Company Plycom (a visit to company in local environment: demonstation of real product development in industry	Polycom, Development Engineer, Production Manager	still to be discussed

Piloting plan for AR

Professional field	**Competence and time frame**	**Professional skills (integrate meta & green skills)**	**Learning outcomes**	**Microcredentials**	**Date of implementation (month and day planning)**	**Responsible teacher**	**Learning and teaching method, way of cooperation with companies or external experts**	**Learning environment**	**Which companies or external experts participate**	**Evaluation of gained competences (in what way you are going to measure?)**
AR	Competence: Gets acquainted how to use the VR and AR technologies Time frame: 3 hours	In this part we will learn how to use AR and VR equipment	The student knows how to use AR and VR development tools	No	October 2. week		examples: hands on projects, webinars, virtual tour of companies, work in digital platform, company visit, mini hackathons, online mentoring by company experts etc.	examples: at school, in the laboratory-UIL, in company, virtual, (note: describe exactly which virtual environment will be used), VR	Polycom, Electro Goren ska,... Note: specify companies and persons	example: written output, application of the gained competencies in some practical case (problem-solving approach)
					11.10.2021	Kaupo Nõlvak	Hands on project	At school, UIL	TalTech, Andres Ääremaa	Gain competencies how to solve problems in new environment and with the new approach

Co-funded by the
Erasmus+ Programme
of the European Union