



Modernization of Mechatronics and Robotics for bachelor's degree
in Uzbekistan through Innovative Ideas and Digital Technology
(MechaUz)

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MechaUz_D.3.2_Attend advanced Mechatronics trainings_V.1

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ABBREVIATIONS

Acronym	Definition
BS	Bachelor science
DoW	Description of Work
EC	European Commission
WP	Work Package
WPL	Work Package Leader
WP3	Work Package 3, Training
MechaUz	Modernization of Mechatronics and Robotics for Bachelor degree in Uzbekistan through Innovative Ideas and Digital Technology
IHU	International Hellenic University (Thessaloniki, Greece)
MHSSE	Ministry of Higher and Secondary Specialised Education System of Uzbekistan (Tashkent, Uzbekistan)
SEERC	The South-East European Research Centre (Thessaloniki, Greece)
VG TU	Vilnius Gediminas Technical University (Vilnius, Lithuania)
LiePU	Liepāja University (Liepāja, Latvia) Vidzeme University of Applied Sciences (Valmiera, Latvia)
IPVC	Polytechnic Institute of Viana do Castelo (Viana do Castelo, Portugal)
AndMI	Andijan machine-building institute (Andijan, Uzbekistan)
TTPU	Turin Polytechnic University in Tashkent (Tashkent, Uzbekistan)
FPI	Fergana Polytechnic Institute (Fergana, Uzbekistan)
TUIT	Tashkent University of Information Technology (Tashkent, Uzbekistan)
KEEI	Karshi Engineering-Economic Institute (Karshi, Uzbekistan)
TSTU	Tashkent State Technical University (Tashkent, Uzbekistan)
TTT	Training to trainers



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Overview

The main aim of the project is to develop an educational program in Mechatronics and Robotics. In addition, the project not only aims to develop a new program, but also will design several training courses in UZB on how to work effectively and efficiently. In order to solve the existing problems in UZB on this issue, it is needed to improve the state of training staff in the field of Mechatronics. Therefore, it becomes relevant in Uzbek universities to develop fully compatible BSc program with European standards.

For this reason, advanced trainings, training courses organized for professionals, regular workshops, and conferences to be held according to the needs of industry will strengthen the cooperation between university and industrial companies making the industry as another target group of the project in [WP3](#).

Project activities include the organization of advanced training based on the labs established or upgraded at the Universities in EU, training courses organized for teachers and trainers.

Tasks:

- Training and skills improvement for Uzbek teachers. Teachers from involved Uzbek HEIs will attend advanced Mechatronics trainings and seminars conducted regularly at partner HEIs in EU – 2 trainers from all partner HEIs in Uzbekistan must be trained at HEIs in EU.

Training courses for Uzbek teachers were carried out in different ways. Uzbek teachers attended advanced Mechatronics trainings and seminars, which were conducted at European partner HEIs. They were also followed and observed undergraduate and postgraduate courses conducted at EU partner institutions and take part in active teaching processes to be acquainted with the expertise of their European peers and practice learned teaching methodologies.

Advanced Mechatronics trainings were organized and held in VGTU, Lithuania and IPVC, Portugal.

1st Training

From May 30, 2022 till 3 June, 2022 at the Vilnius Gediminas Technical University (VGTU) the [first training seminar](#) of the project was organized. The main purpose of this training was to improve the skills of teachers on EU teaching methodologies and standards in Mechatronics at EU HEIs.

Program overview

Timetable

Date	Activities
Sun 29 May 2022	Partners' Arrival in Vilnius
Mon 30 May 2022	Day 1 – partners meeting
Tue 31 May 2022	Day 2 – partners meeting
Wed 1 June 2022	Workshop Day 1 – Introduction to Mechatronics and Robotics
Thu 2 June 2022	Workshop Day 2 – Introduction to University and Study System (Estimated visit to enterprise)
Fri 3 June 2022	Workshop Day 3 – Methodology of teaching (Lectures, Lab works; Practical exercises)
Sat 4 June 2022	Partners' Departure from Vilnius

Timetable for activities.

Time	Program	Duration	Contents	Number attendants
Wed 1 June 2022				
Workshop Day 1 – Introduction to Mechatronics and Robotics				
9.00am – 9.15am	Registration	15 min		All attendants
9.15 am – 10.45am	Review of University Study System	2 academic hours	Overview of the 3-stage study system in VILNIUSTECH	All attendants
10.45am – 11.00am	Break	15 min		All attendants
11.00am – 12.30pm	Study objectives, results and content	2 academic hours	Overview of study program outcomes in the sense of achievable	All attendants



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			knowledge, abilities, and skills	
12.30pm – 13.30pm	Lunch break	1 hour		All attendants
13.30pm – 15.00pm	Studying, study achievements and staff	2 academic hours	Overview of Study materials and resources. Study quality management and announcement	All attendants
15.00pm – 15.15pm	Break	15 min		All attendants
15.15pm – 16.45pm	The curriculum of a study program	2 academic hours	General studies, Parts of the subject of the study field. Parts of the subject specialization. Preparation, formalization, and defense of the final work (project)	All attendants
Total Workshop Day 1: 8 academic hours				
Thu 2 June 2022				
Workshop Day 2 – Introduction to University and Study System				
9.00am – 9.15am	Registration	15 min		All attendants
9.15 am – 10.45am	Introduction to Mechatronics; Practical work, visit to laboratory	2 academic hours	Overview of current development trends and ambitions	All attendants
10.45am – 11.00am	Break	15 min		All attendants
11.00am – 12.30pm	Introduction to Robotics. Practical work, visit to laboratory	2 academic hours	Robotics – typical and modern applications, an	All attendants

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			overview of real cases	
12.30pm – 13.30pm	Lunch break	1 hour		All attendants
13.30pm – 16.30pm	Visit to enterprise	4 academic works	Overview of robots operating in production, students' internship activities, possible topics of the final theses	All attendants
Total Workshop Day 2: 8 academic hours				
Fri 3 June 2022				
Workshop Day 3 – Methodology of teaching (Lectures, Lab works; Practical exercises)				
9.00am – 9.15am	Registration			All attendants
9.15am – 10.45am	Lectures	2 academic hours	Visits to the lectures, sharing the positive experience	All attendants
10.45am – 11.00am	Break	15 min		All attendants
11.00am – 12.30pm	Lab works	2 academic hours	The main laboratory works, methodology, equipment, etc.	All attendants
12.30pm – 13.30pm	Lunch break	1 hour		All attendants
13.30pm – 15.00pm	Practical exercises	2 academic hours	Practical classes overview of CAD/CAM software	All attendants
15.00pm – 15.15pm	Break	15 min		All attendants
15.15pm – 16.45pm	Questions, Feedback	2 academic hours		All attendants

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Total Workshop Day 3: 8 academic hours
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Total hours: 32 hours

Supervisor: Prof. Vytautas Bučinskas

Courses

1. Basics of Theory of mechanism and Machine

Course aim: To teach understanding the structure of mechanisms and machines, kinematic and dynamic processes in them, in preparing to studies of modern machinery and equipment.

Description: Concepts of machine and mechanism. Structure of linkage mechanisms, their metric synthesis, graphical and graphs analytical kinematics. Classification of cam mechanisms, dimension calculation, the profile synthesis. Gear mechanisms, gear, and their design. Machine dynamics. Flywheel design for the machine.

2. Basics of Sensors

Course aim: This course is designed to introduce participants to a range of different sensor technologies and their connection, installation, and configuration. The Sensor Fundamentals course will enable you to select the correct sensor for a given application.

Contents: Overview of sensor families and operating technology, Selecting the correct sensor, connecting sensors, installing a sensor, Troubleshooting a sensor.

3. Basics of Technology of Robotics

Course aim: Deliver general understanding of mechatronic and robotic systems and their place in general engineering. Transfer general knowledge about mentioned systems, reveal their structure, and analyze structural elements and their internal links within system. To bring knowledge about evaluation of general parameters of these systems and ways to recognize them in the integrated environment. Bring knowledge about control using general programming of devices, reveal possibilities and limitations.

Description: In this course participants are introduced to an understanding of and main definitions of mechatronics and robotics. There are revealed

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structure of mechatronic system, introduced with structural components. There are given description of operation of mechatronic and robotic systems, revealed various configuration. Main principles of programming and their implementation for system control are presented in the course.

4. Practical course. Basic and practice of Mechatronics and Robotics. Basic and practice of Element of machine. Basic and practice of Element of Mechatronics.

5. Methodological guidelines for preparation of final Thesis

Course aim: Formulation of the Final Work tasks and title. To learn to write the Project theoretical part, to make technical calculations, to correctly drawings, present and define them.

Participants

Partners	Number of participants
South East European Research Centre (SEERC), Greece	3
Liepaja University, Latvia	2
Instituto Politécnico de Viana do Castelo (Portugal)	2
Andijan Machine-Building Institute, Uzbekistan	6
Turin Polytechnic University in Tashkent, Uzbekistan	5
Tashkent University of Information Technologies (TUIT), Uzbekistan	5
Fergana Polytechnic Institute (FPI), Uzbekistan	4
Karshi Engineering-Economic Institute, Uzbekistan	4
Tashkent State Technical University named after Islam Karimov (TSTU), Uzbekistan	6
Ministry of Higher and Secondary Socialized Education of the Republic of Uzbekistan	2
Total number of participants	39

Students (class)		Trainers/Teachers		Researchers		Others	
Total	Female	Total	Female	Total	Female	Total	Female
0	0	36	3	3	0	0	0

On the third day of the 3rd meeting and the 1st training session of the MechaUz project at Vilnius Gediminas Technical University, participants visited the [Vilnius Baldai furniture factory](#). The main purpose of the visit is to study the integration of industry and education and get well informed, about modern industry requirements. [All project participants](#) were awarded certificates by Vilnius Gediminas Technical University.

2nd Training

From 21 July, 2022 till 22 July, 2022 at the Polytechnic Institute of Viana do Castelo (Portugal) the [second training seminar](#) of the project was organized. The main purpose of this training was to improve the skills of teachers on modern Robotics technologies.

Program overview

Timetable

Date	Activities
DAY 1 Monday, 18 July 2022	PPM Meeting
DAY 2 Tuesday 19 July 2022	Visit to CITIN - Industrial Technological Interface Centre
DAY 3 Wednesday, 20 July 2022	PPM Meeting
DAY 4 Thursday, 21 July 2022	1 st Day of training
DAY 5 Friday, 22 July	2 nd Day of training

Timetable for activities.

DAY 4 Thursday, 21 July 2022 1st Day TTT	
9:00-9:15	Meeting of the participants (Trainees) in ESTG – IPVC (2 trainees per each Uzbek HEI)
9:15-9:30	Training session opening Duarte Alves, IPVC, Portugal Introducing training teacher Prof. Júlio Pires (IPVC teacher)
9:30-12:30	Training: Operation and basic programming of ABB Robots (Total: 16h, 2 days) General view of the system; Movement of arms; Defining tools and working objects.
12:30-14:30	Lunch Break - Polytechnic canteen restaurant
14:30-17:30	Training: Operation and basic programming of ABB Robots (continuation) Introduction to programming; Inputs and outputs; RAPID language.
DAY 5 Friday, 22 July – 2nd Day TTT	
9:00-12:30	Training: Operation and basic programming of ABB Robots (continuation) Servicing the robots; Operation of robot arms.
12:30-14:30	Lunch Break - Polytechnic canteen restaurant
14:30-17:00	Training: Operation and basic programming of ABB Robots (Final practice) Operation of robot arms; Final practice.
17:00-17:30	Certificates ceremony Handing over of training certificates.
Total hours: 16 hours	

Supervisor: Prof. Duarte Alves

Courses

1. Operation and basic programming of ABB Robots

Course aim: To teach understanding the movement of arms, inputs and outputs and RAPID language, servicing the ABB robots and operation of robot arms.

Description: General view of the system. Movement of arms. Defining tools and working objects. Introduction to programming. Inputs and outputs. RAPID language. Servicing the robots. Operation of robot arms. Operation of robot arms.

Participants

Partners	Number of participants
South East European Research Centre (SEERC), Greece	1
Liepaja University, Latvia	3
Andijan Machine-Building Institute, Uzbekistan	3
Turin Polytechnic University in Tashkent, Uzbekistan	5
Tashkent University of Information Technologies (TUIT), Uzbekistan	5
Fergana Polytechnic Institute (FPI), Uzbekistan	5
Karshi Engineering-Economic Institute, Uzbekistan	2
Tashkent State Technical University named after Islam Karimov (TSTU), Uzbekistan	5
Ministry of Higher and Secondary Socialized Education of the Republic of Uzbekistan	1
Vidzeme University of Applied Sciences, Latvia	1
VILNIUS TECH, Lithuania	4
Total number of participants	35

Students (class)		Trainers/Teachers		Researchers		Others	
Total	Female	Total	Female	Total	Female	Total	Female
0	0	33	5	2	0	0	0

On July 19, 2022 the consortium of the MechaUz project had a productive time with visits to the [industrial and educational facilities](#). The main purpose of the visit is to study the integration of industry and education and get well informed about modern industry requirements. All project participants were awarded [certificates by IPVC](#).