



Erasmus+ strategic partnership for Higher Education  
**DEVELOPMENT OF MECHATRONICS SKILLS AND INNOVATIVE  
LEARNING METHODS FOR INDUSTRY 4.0**

## C1 REPORT

<b>Project Title</b>	<b>Development of mechatronics skills and innovative learning methods for Industry 4.0</b> <b>2019-1-RO01-KA203-063153</b>
<b>Output</b>	<b>C1 – Short term joint staff training event</b>
<b>Date of Delivery</b>	<b>August 2021</b>
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<b>Version</b>	<b>V3, 30.08.2021</b>

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## 1. Description of MIND Project

EU founded Erasmus+ project MIND (Development of mechatronics skills and innovative learning methods for Industry 4.0, Project Reference: 2019-1-RO01-KA203-063153) is getting closer to its end after close to two years and after facing the current pandemic times.

MIND project has following main objectives:

1. Determine the most frequent mechatronics skills necessary for Industry 4.0 in the partner nations' regions.
2. Raise students' employability, relevant knowledge, and competencies by taking into account the demands of firms implementing Industry 4.0 principles.
3. Construction of an online e-learning platform that will support courses and learning materials on cutting-edge industrial issues will improve the learning experience of teaching staff and students.
4. Enhance and build cross-sector synergies through collaboration between higher education institutions and private sector representatives with the goal of closing the gap between company needs and real capabilities acquired through higher education curriculum.

The MIND project's outcomes were determined by the relevant skills and current technologies used by Industry 4.0, as well as the path that students and teaching staff can take to achieve state-of-the-art knowledge and competences by using the educational MIND platform and taking online video courses.

## 2. Summary of the short-term joint staff training event

The short-term joint staff training event (C1) organised by the Serbian partner UNI was held from 25<sup>th</sup> to 28<sup>th</sup> August 2021 at Faculty of Mechanical Engineering University of Niš. At this training event, 15 teachers from 3 MIND University partners were involved (UTCN, PUT, UNI). MIND University partner from Slovakia, STU was unable to send teachers to this event due to COVID 19 restrictions for travelling abroad.

The main objective of C1 short-term joint staff training event was to put in action and test 2 learning modules, one per each day and how to apply new modules lessons to the classes. In addition, UNI teachers from Department of Mechatronics and Control of Faculty of Mechanical Engineering have presented new accredited modules related to acquiring Industry 4.0 in Mechatronics. This process of introducing new modules related to Industry 4.0 in UNI Mechatronics M.Sc. and B.Sc. programs, is one of the most important results of MIND project.

During three days of training, two learning modules of curricula have been presented to the teachers. Throughout the training, professors were able to provide feedback on the modules and to add content based on previously acquired experiences.

In order to provide relevant feedback related to lab exercises for selected modules, lab demonstration of module's exercises have been shown.

In addition, visit to science technological park in Nis and conversation with its management and tenants, allow providing the direct feedback of practical benefits of created modules from end users.

The participants as teachers dealing with Mechatronics subjects were able to test and validate after this training the new proposals of the curricula.





At the end of this training, results of learning sessions have consisted of acquiring skills, knowledge, specific abilities for Industry 4.0 in mechatronics.

All the participants were aware of the actual needs and requirements of innovative learning that will attract more and more students willing to participate and proactively be involved in this type of learning.

Finally, the evaluation of the whole event and quality of the trainer's methodology has been done by participants.

The first presented and elaborated module to the participants of the training event was Module 6 - Implementation of new manufacturing technologies and systems for Industry 4.0. Training encircled key issues of new manufacturing technologies and systems to be used in Industry 4.0. The special focus was on improving the understanding related to the concept of rapid prototyping. General and specific objectives of this module have been elaborated. In that sense, laboratory demonstration and realized research and commercial projects related to 3D printing have been presented from UNI teachers.

The second training day presented and elaborated module to the participants of the training event was Module 1 – PLC based project on Mechatronics systems for Industry 4.0. The training encircled key issues to address the challenge of reinventing and reconfiguring PLCs as best option for industrial automation to fulfil requirements of Industry 4.0. Special focus was on PLC based projects on mechatronics systems for Industry 4.0. In that sense, some practical examples have been shown by UNI teachers from Department of automatics Faculty of Electrical Engineering.

In order to provide qualitative feedback of prepared modules during the project realization, the following additional activities have been realized in C1 short-term joint training event:

- Discussion about content of modules (with special focus on practical examples important for providing relevant mechatronics skills) with PhD students from UNI Faculty of Mechanical Engineering.
- Visit to Science Technological Park (NTP) and discussion about project content and acquired mechatronics skills with management of the NTP and its tenants (companies from the field of Mechatronics and IT – COMING, Veries and Sentronis).
- Joint discussion of all participants of the C1 joint staff short-term training event about needed improvements

In addition, during the 3<sup>rd</sup> day of the event, UNI FME representatives have presented all novel accredited subjects on Mechatronics and Control M.Sc study program and on Mechanical Engineering – module Mechatronic and Control B.Sc. study program. Also, completely new module on Engineering Management M.Sc. study program named Management in Industry 4.0 have been elaborated. The curriculum of the following specific subjects has been presented:

- Industry 4.0 with applications (I semester M.Sc. Engineering Management in Industry 4.0)
- Artificial neural networks (II semester M.Sc. Engineering Management in Industry 4.0)
- ICT in Mechatronics (II semester M.Sc. Mechatronics and Control)
- Mechatronics (V semester B.Sc. Mechatronics and Control study program)
- Internet of Things (VII semester B.Sc. Mechatronics and Control study program)

These modules and study programs have been accredited at the beginning of this year and will start to be active from school year 2021/2022. In that sense, modernization of these modules, new subjects related to Industry 4.0 and accreditation of the one completely new module can be considered as achievements of the MIND project.

The schedule of the C1 event is presented in the following table:

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<b>25<sup>th</sup> August</b>	<b>1<sup>st</sup> day of the C1 event</b>
09:00-09:15	Registration of the participants
09:15-10:00	Presentation of main content of C1 meeting (Ass. Prof. Milos Simonovic)
10:00-12:00	Training of the Module 6 – Part 1 (Ass. Prof. Milan Banic)
12:00-12:15	Coffee break
12:15-13:00	Training of the Module 6 – Part 2 (Ass. Prof. Nikola Vitkovic)
13:00-14:00	Laboratory demonstration of the Module 6 and discussion with PhD students
14:00-15:00	Lunch
15:00-16:00	Discussion and elaboration of the 1 <sup>st</sup> day of the C1 event
16:00-16:15	Feedback for the 1 <sup>st</sup> day of the C1 event – distribution of questionnaires
16:15-16:30	Joint conclusions of the 1 <sup>st</sup> day
16:30-17:00	Discussion
<b>26<sup>th</sup> August</b>	<b>2<sup>nd</sup> day of the C1 event</b>
09:00-11:00	Training of the Module 1 – Part 1 (Ass. Prof. Milos Simonovic)
11:00-11:45	Laboratory demonstration of the Module 1 (LUPS laboratory, Ass. Emina Petrovic)
11:45-12:00	Coffee break
12:00-13:00	Training of the Module 2 – Part 2 (Ass. Prof. Marko Milojkovic)
13:00-14:00	Laboratory demonstration of the Module 1 and discussion with PhD students (Ass. Prof. Stanisa Peric)
14:00-15:00	Lunch
15:00-16:00	Discussion and elaboration of the 2 <sup>nd</sup> day of the C1 event
16:00-16:15	Feedback for the 2 <sup>nd</sup> day of the C1 event – distribution of questionnaires
16:15-16:30	Joint conclusions of the 2 <sup>nd</sup> day
16:30-17:00	Discussion
<b>27<sup>th</sup> August</b>	<b>3<sup>rd</sup> day of the C1 event</b>
09:00-11:00	Introduction of new accredited modules and specific subjects at UNI FME related to Industry 4.0 in Mechatronics and in line with MIND objectives (Ass. Prof. Milos Simonovic)
11:00-11:45	Discussion about accredited subjects
11:45-12:00	Coffee break
12:00-14:00	Visit to NTP and discussion with NTP management and tenants (SMEs)
14:00-15:00	Lunch
15:00-16:30	Discussion and concluded remarks about presented modules in line with feedback provided by teachers, PhD students and SMEs
16:00-16:15	End of C1 short-term joint staff training event

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TECHNICAL  
UNIVERSITY  
OF CLUJ-NAPOCA  
ROMANIA

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### 3. Attendance

As it stated above, the short-term joint staff training event (C1) organised by the Serbian partner UNI was held from 25<sup>th</sup> to 28<sup>th</sup> August 2021 at Faculty of Mechanical Engineering University of Niš. At this training event, 18 teachers from 3 MIND University partners were involved (UTCN, PUT, UNI). MIND University partner from Slovakia, STU was unable to send teachers to this event due to COVID 19 restrictions for travelling abroad. The list of the teachers participated in C1 short-term joint staff training event is presented below.

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**Erasmus+**  
Erasmus+ Programme – Strategic Partnership  
Project Nr: 2019-1-RO01-KA203-063153  
Name and number short term joint staff training event: C1  
Event host organization: University of Nis  
Date and Place: 25-27.08.2021

**PARTICIPANTS LIST**  
Short term joint staff training event

Nr.	Name	Organization	Organization's address	City of the organization	Country of the organization	Signature
1.	DAN STAN	TU CLUJ-NAPOCA	Bulevardul Muncii	CLUJ-NAPOCA	ROMANIA	[Signature]
2.	MIRIA OTAVESCU	TU CLUJ-NAPOCA	Bulevardul Muncii	CLUJ-NAPOCA	ROMANIA	[Signature]
3.	PERIS MIRUNA	TU CLUJ-NAPOCA	Bulevardul Muncii	CLUJ-NAPOCA	ROMANIA	[Signature]
4.	STOICARU CARMEN	UP TIMISOARA	Piața Victoriei 2	TIMISOARA	ROMANIA	[Signature]
5.	CRIVETIU CORINA	UP TIMISOARA	Piața Victoriei 2	TIMISOARA	ROMANIA	[Signature]
6.	Lovasa Ervica-Cristina	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
7.	MILAN BANIĆ	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
8.	Mirca Simona	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
9.	Milena Rasic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
10.	Danijel Rangelov	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
11.	Mario Ponic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
12.	Vlastimir Mirkovic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
13.	MARCO MILICEVIC	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
14.	Spanisa Pasic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]

Host organization: University of Nis  
Name of the legal representative: Prof. Dragan Antic  
Signature of the legal representative: [Signature]

**Erasmus+**  
Erasmus+ Programme – Strategic Partnership  
Project Nr: 2019-1-RO01-KA203-063153  
Name and number short term joint staff training event: C1  
Event host organization: University of Nis  
Date and Place: 25-27.08.2021

**PARTICIPANTS LIST**  
Short term joint staff training event

Nr.	Name	Organization	Organization's address	City of the organization	Country of the organization	Signature
15.	Miroslav Stokich	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
16.	Edina Petrovic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
17.	Nikola Vukovic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
18.	Alexandra Veljovic	UNI FME	A. Medvedev 14	NIS	SERBIA	[Signature]
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Host organization: University of Nis  
Name of the legal representative: Prof. Dragan Antic  
Signature of the legal representative: [Signature]

### 3. Questionnaire/Inquiry data and results

The participants were kindly asked to complete anonymously the following questionnaire. In this questionnaire were included questions about the organizational part of the event, about the materials that were presented and the overall impressions about attending the C1 short-term joint staff training event. The questionnaire has been delivered for each of the day separately and for the 3<sup>rd</sup> day two questionnaires have been fulfilled (one for that day and one for the whole event). Shorted questionnaires consist of first 5 questions from complete questionnaire. In that sense, there

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are comparative answers for first 5 questions by each day.

**Instructions:** Please indicate your level of agreement with the statements listed below, on a scale from 1 to 5, where:

1 - Strongly disagree  
2 - Disagree

3 – Neutral  
4 – Agree

5 – Strongly agree

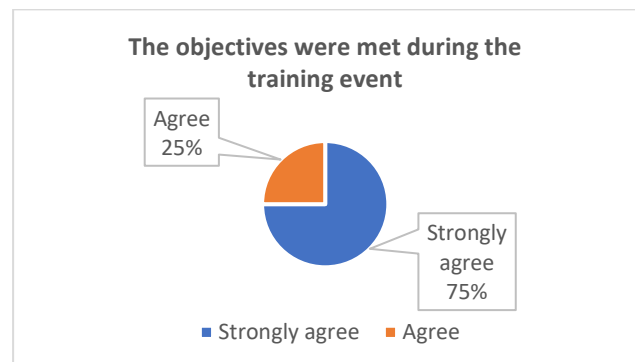
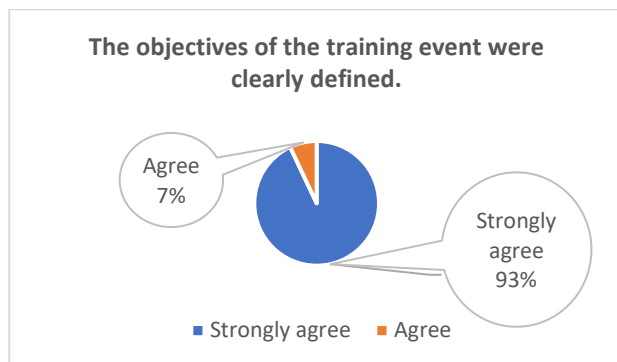
**A. Objectives of the training event**

Statement	Score				
	1	2	3	4	5
1. The objectives of the training event were clearly defined.					
2. The objectives were met during the training event.					
3. All the relevant topics were covered during the training event.					
4. The content was well organized and easy to follow.					
5. I obtained useful information and knowledge that will help me in my activity at work.					

**B. Organization of the training event**

Statement	Score				
	1	2	3	4	5
6. The meeting was well organized.					
7. The facilitators were knowledgeable about the discussed topics.					
8. The facilitators were dedicated and supportive.					
9. Participation and interaction were encouraged.					
10. The schedule and the agenda were observed throughout the event.					
11. The materials distributed were useful.					
12. The time allocated for the event and for the activities, was sufficient.					
13. The event room and facilities were adequate and comfortable.					

A total of 18 participants completed the feedback questionnaires and the result for the whole training event is presented in the following graphs:



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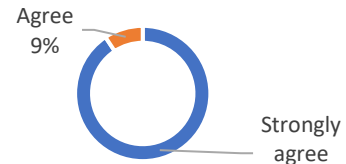


All the relevant topics were covered during the training event



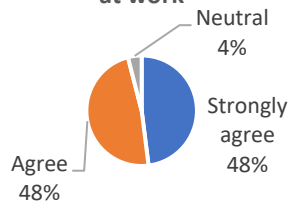
Strongly agree Agree

The content was well organized and easy to follow



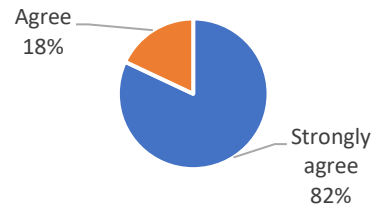
Strongly agree Agree

I obtained useful information and knowledge that will help me in my activity at work



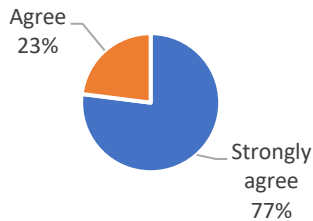
Strongly agree Agree Neutral

The training event was well organized



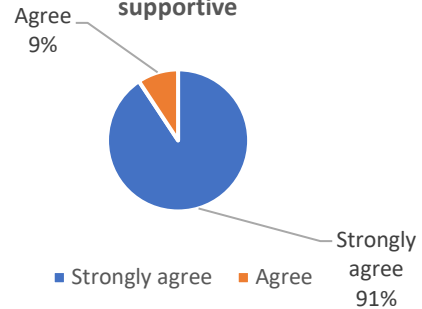
Strongly agree Agree

The facilitators were knowledgeable about the discussed topics



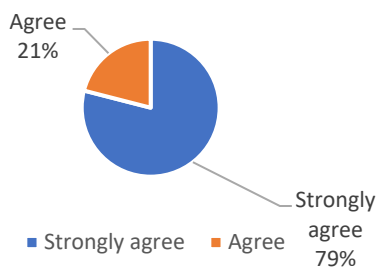
Strongly agree Agree

The facilitators were dedicated and supportive



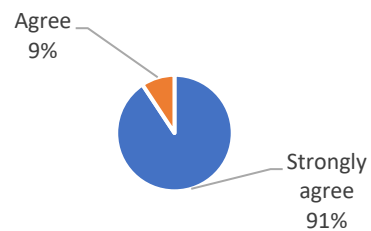
Strongly agree Agree

Participation and interaction were encouraged



Strongly agree Agree

Scedule and agenda were observed troughout the training event



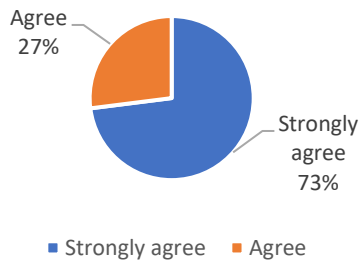
Strongly agree Agree

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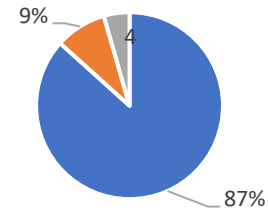




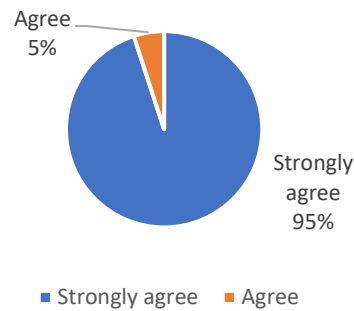
#### The materials distributed were useful



#### The time allocated for the training event and for the activities, was sufficient



#### The event room and the facilities were adequate and comfortable



#### 4. Conclusion

The results of the questionnaire show that participants were mostly satisfied with the organization part of the event (the place and time), the objectives of the C1 meeting were clearly presented and achieved at the end of the event (according to the answers of the question 2).

The participants were quite motivated teachers ready to introduce new modules and modernize old ones in order to achieve modern mechatronic skill required by Industry 4.0 .

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