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EMERALD International Summer School 2022 edition – brief overview

Assoc. Prof.dr.eng. Razvan Pacurar

Department of Manufacturing Engineering,

Faculty of Industrial Engineering, Robotics & Production Management,Technical University of Cluj-Napoca, Romania

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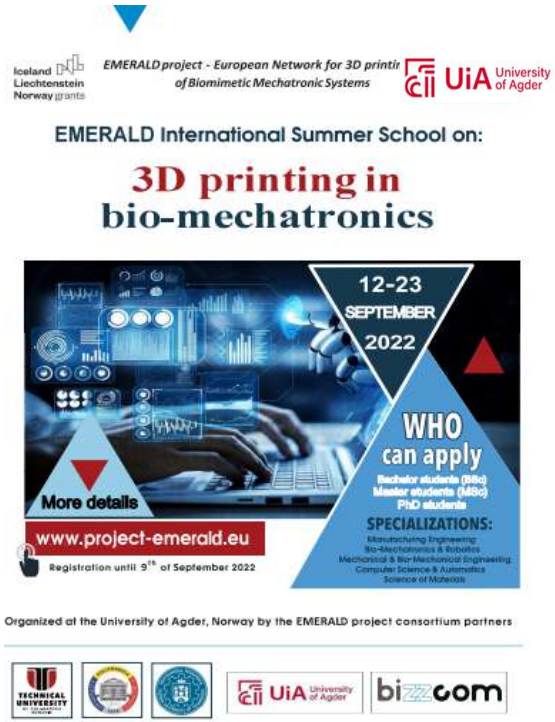

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EMERALD International Summer School on 3D Printing in Bio-mechatronics – 12-23 September 2022

h	Monday 12.09.2022	Tuesday 13.09.2022	Wednesday 14.09.2022	Thursday 15.09.2022	Friday 16.09.2022	Saturday 17.09.2022	Monday 19.09.2022	Tuesday 20.09.2022	Wednesday 21.09.2022	Thursday 22.09.2022	Friday 23.09.2022	h
10	Opening ceremony and project presentation	CAD - Lecture	CAE - Lecture	3D printing and Rapid Tooling for mechatronics	Applications of 3D printing in pre- and inter-operative surgery	Progress report (preparing of the interim report for Monday - working on smaller groups)	General progress of WI and objectives of W2	Intelligent (smart) materials	Metrology of mechatronic systems	Finalizing progress report, preparing final presentation	Presentations made by students for companies involved in the summer school - evaluation and feedback on behalf of the companies; defining of common ideas of future diploma projects	10
11	Participants' presentation and program guidelines for summer school	Workshop 3D / Launching of case studies	Workshop 3D CAE	Workshop 3D Printing	Enterprise dynamics (workshop)		Students' presentation (interim report – scientific presentations) Feedback on behalf of the EMERALD experts and guidelines for W2	Admittance vs impedance control	Case studies particularities and specific tests related to Bio-mechanics	Final test, final questionnaires and feedbacks		11
12	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	Lunch & free time	12
13	Introduction to Biomechatronics	Workshop 3D CAD	VR and AR programming applications presentation, case studies	Actuators: theory	Presentation on behalf of Leycom company and Admasys companies from Romania	Preparing of scientific presentations for Monday (working in smaller groups)	Self-study of documentation (robotic arm) – interaction with student assistants	Admittance vs impedance control (programming)	Assembly and testing control	Final student presentations; live demonstrations, test corrections	Closing and awarding ceremony, future perspectives of the EMERALD project	13
14	Visiting of MIL laboratories	Sensors: theory	Developing of VR /AR applications	Actuators: programming (robotic arm)	Presentation on behalf of OMNI 3D company from Poland		Bio-mechatronics: programming		Finalizing work on assembly, preparing final presentation			14
15	Visiting of 4Helse laboratories	Sensors: programming (robotic arm)		Progress report and summary	Presentation on behalf of Blackford company in Norway	Boat trip in Kristiansand region, visiting of fiords		Programming case studies			Free time, sightseeing	15
	WEEK 1					WEEK 2						

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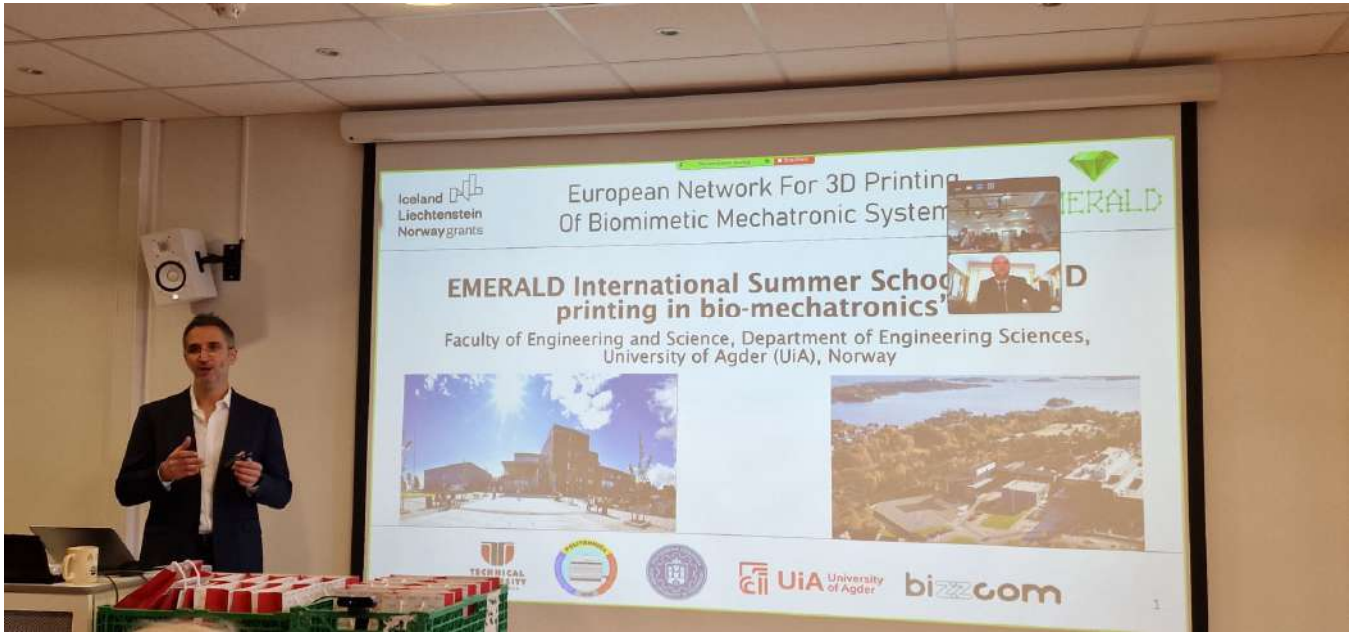
Opening ceremony and project presentation



Welcoming speech of Prof. Filippo Sanfilippo – University of Agder (Norway)

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Opening ceremony and project presentation

Welcoming words addressed by the Dean of the Faculty of Engineering and Science (University of Agder, Norway) Prof.dr.eng Michael Rygaard Hansen

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Opening ceremony and project presentation

Remotely (online) with the EMERALD summer school participants– Mr. Romanian Ambassador in Norway, Mr. Cristian Bădescu

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Opening ceremony and project presentation

Aims, actions and activities of the project – presented by Associate prof. dr.eng. Răzvan Păcurar (TUCN -Romania) – director of the EMERALD project

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Opening ceremony and project presentation

Official photo with the EMERALD consortium at the opening ceremony of the EMERALD International summer school

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Participants' presentation

University of Agder (Norway)

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Technical University of Cluj-Napoca (Romania) – leading partner of the EMERALD project

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Participants' presentation

University Politehnica of Bucharest (Romania)

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Participants' presentation

Poznan University of Technology (Poland)

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Participants' presentation

BIZZCOM s.r.o. company (Slovakia)

Participants' presentation

EMERALD International summer school – unique of life experience

Participants' presentation

EMERALD International summer school – unique scientific and cultural experience

Introduction to Bio-mechatronics

Prof. Filippo Sanfilippo – University of Agder (Norway)

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Visiting of the UiA laboratories

Visiting of the MIL laboratory (University of Agder, Norway)

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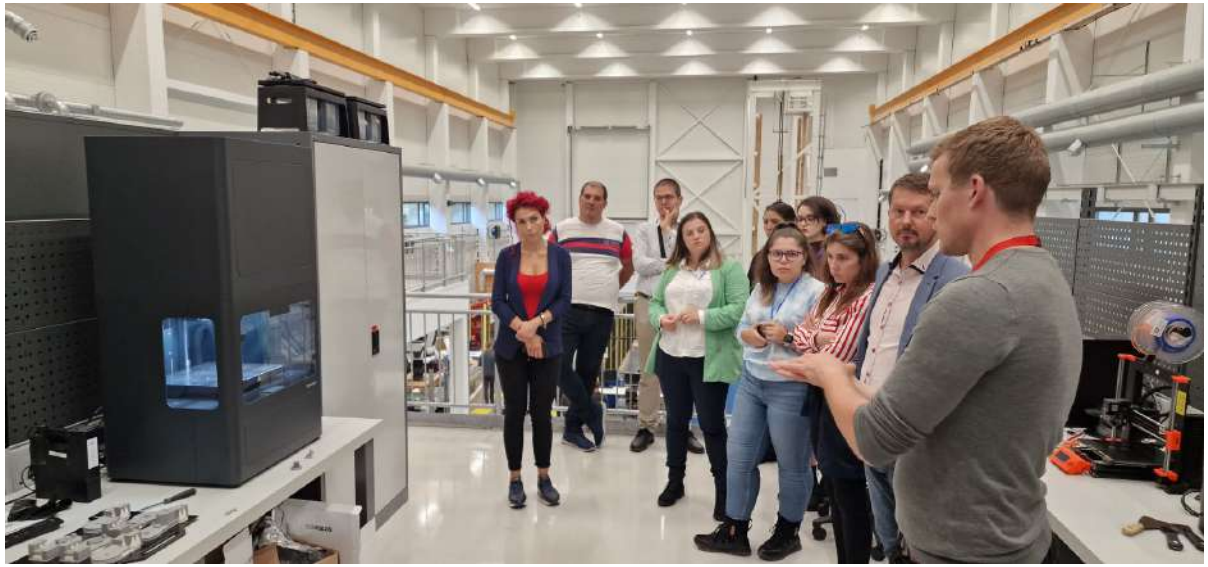
Visiting of the UiA laboratories



Visiting of the MIL laboratory (University of Agder, Norway)

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Visiting of the UiA laboratories

Visiting of the i4Helse laboratory (University of Agder, Norway)

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CAD lecture

CAD lecture held by Prof. Filip Gorski, Poznan University of Technology, Poland

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Launching of case studies and requirements

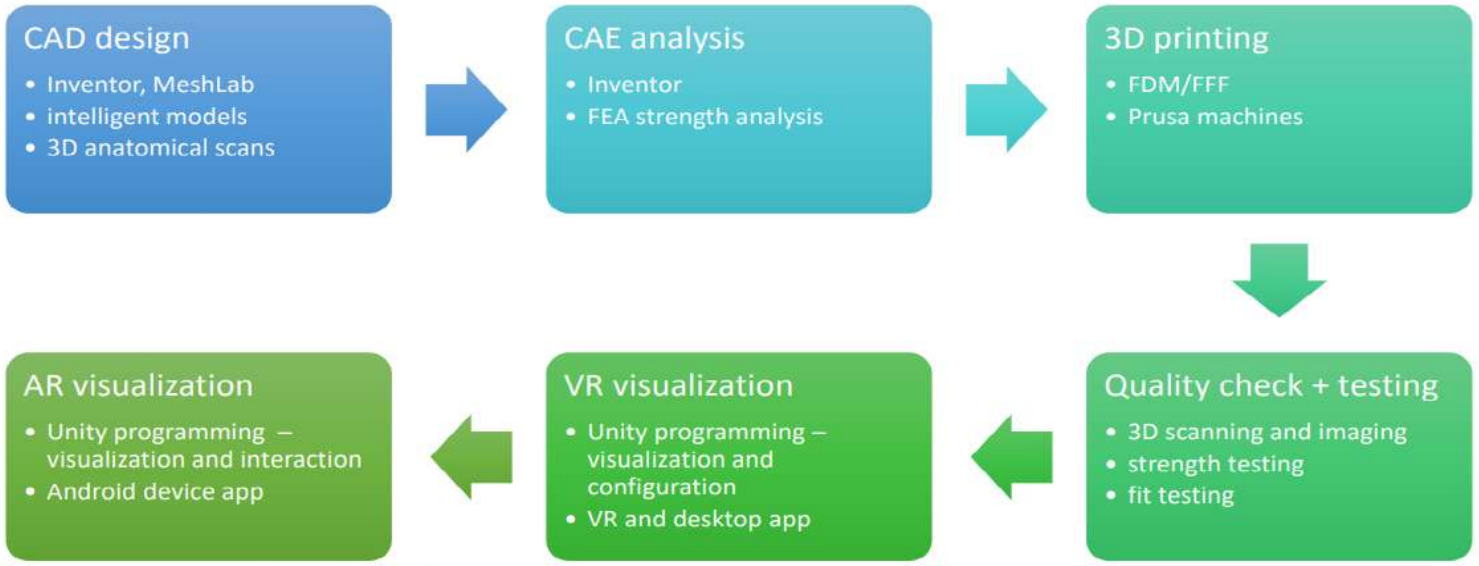
Case 1: bicycle prosthesis

Case 2: hand orthosis

Launching of case studies by Prof. Filip Gorski, Poznan University of Technology, Poland

Launching of case studies and requirements

COURSE OF WORK WITH THE CASES



Launching of case studies and requirements

COURSE OF WORK WITH THE CASES

- week 1 – CAD design of anatomical products; CAE analysis of selected aspects; 3D printing and testing
- week 2 – building PC VR application (configurator with interaction), building Android AR application (visualization with interactions)
- organizing: groups of maximum 5-6 people with a leader
- beginning of week 2 – summary of week 1 activities
- end of week 2 – final presentation and awards

Launching of case studies and requirements

FINAL REPORT & PRESENTATION

- final report & presentation must contain information about all the 6 stages of work (CAD, CAE, 3D printing, testing, VR, AR)
- presentation should be a live demo of obtained products + created applications + possibly videos
- necessary: proper fault-free design, usable parts, operational applications
- nice-to-have: large dose of creativity!

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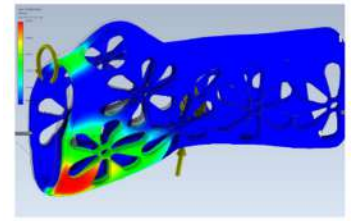
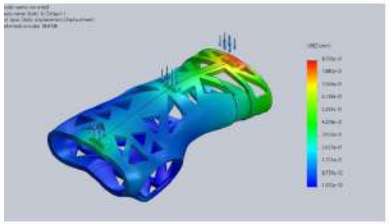
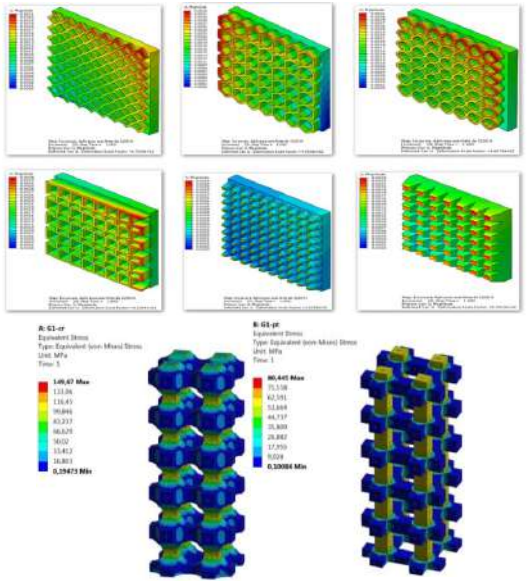
CAE lecture







CAE lecture held by Associate Prof. dr.eng. Răzvan Păcurar (TUCN -Romania)

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3D printing lecture

3D printing lecture held by Associate Prof. dr.eng. Răzvan Păcurar (TUCN -Romania)

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3D printing presentation

3D printing presentation held by Assistant dr.eng. Magdalena Zukowska (PUT Poznan, Poland)

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VR lecture

VR lecture held by Prof. Filip Gorski, Poznan University of Technology, Poland

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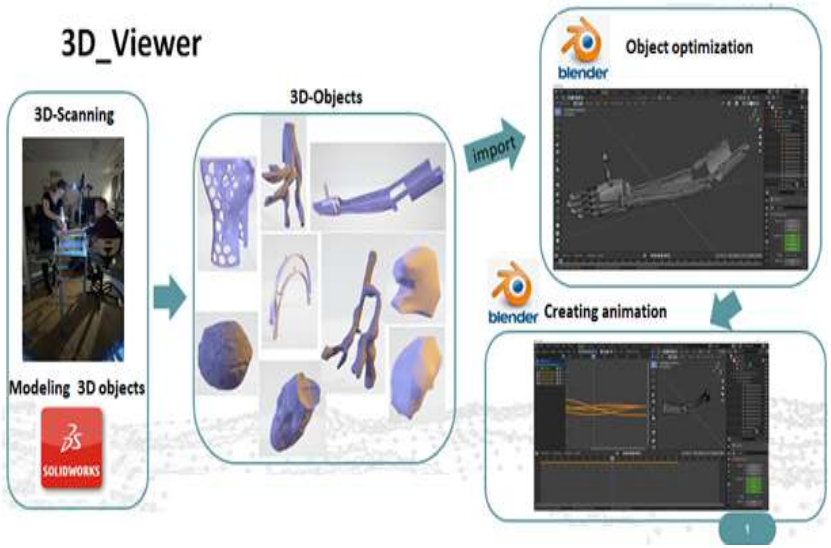
AR presentation



AR presentation held by Michal Gallia, programmer – BIZZCOM s.r.o, Slovakia

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Sensors and actuators lectures

Sensors and actuators lectures held by Prof. dr.eng. Morten Ottestad (University of Agder, Norway)

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Intelligent (smart) materials lecture

Intelligent (smart) materials lecture held by Associate prof.dr.eng. Diana Baila (University Politehnica Bucharest, Romania)

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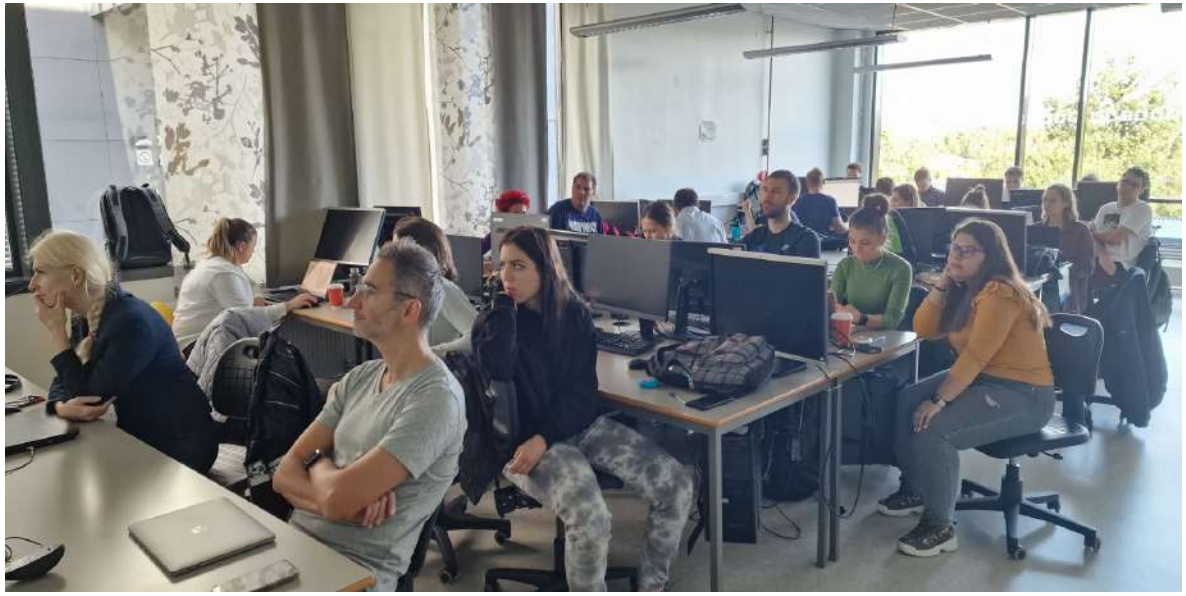
Metrology of mechatronic systems lecture



Metrology of mechatronic systems lecture held by prof.dr.eng. Nicolae Ionescu (University Politehnica Bucharest, Romania)

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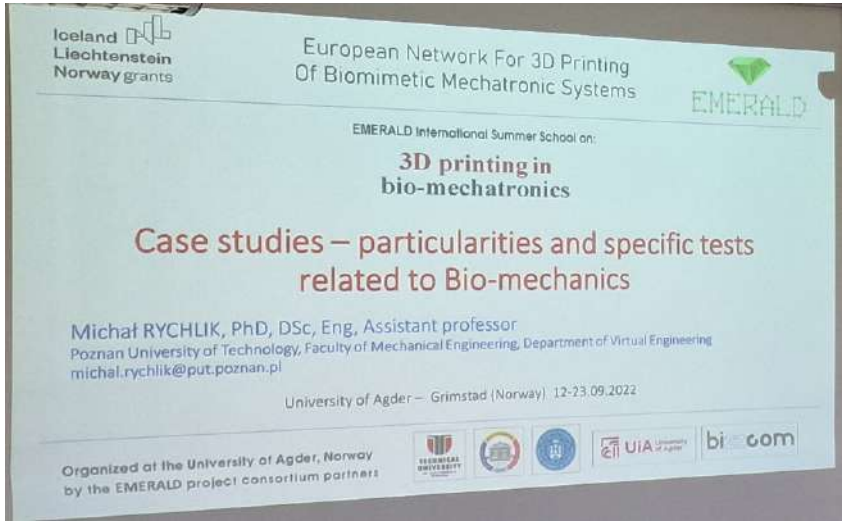
Case studies - particularities and specific tests related to Bio-mechanics presentation



Case studies - particularities and specific test related to Bio-mechanics presentation held by assistant prof. dr.eng. Michal Ryckhik (Poznan University of Technology, Poland)

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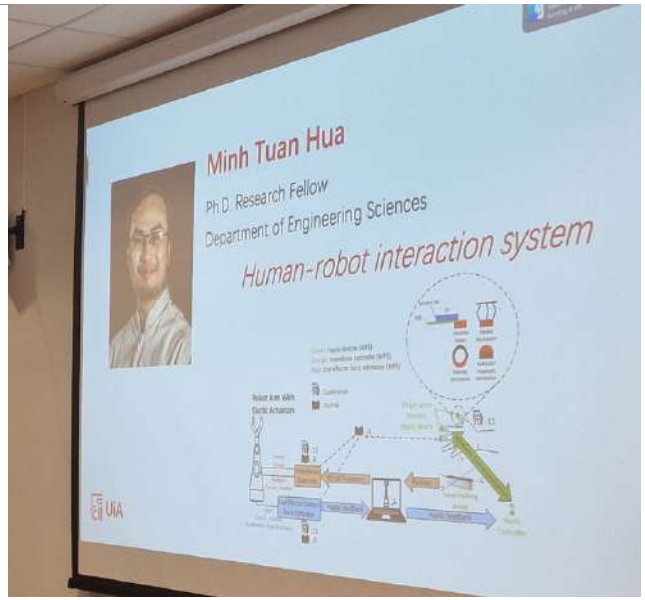
Admittance vs impedance control presentation



Admittance vs impedance control presentation held by PhD student Minh Tuan Hua (University of Agder, Norway)

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Working in groups with students

Working on CAD / CAE / 3D printing topics for the case studies launched by Prof. Filip Gorski

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Working on CAD / CAE / 3D printing topics for the case studies launched by Prof. Filip Gorski

constructive and nice interactions between students coming from different countries / universities

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Working in groups with students

Working on the mechatronic system developed by the students at the University of Agder, Norway

constructive and nice interactions between students coming from different countries / universities

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Invited professor

Invited professor Dr. Sven Maricic (University Juraj Dobrila, Croatia providing one lecture about 3D printing and VR methods in mechatronics

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Final test defended by the students

Final test defended by the EMERALD students

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Final presentations realized by the students

Final presentations realized by the EMERALD students

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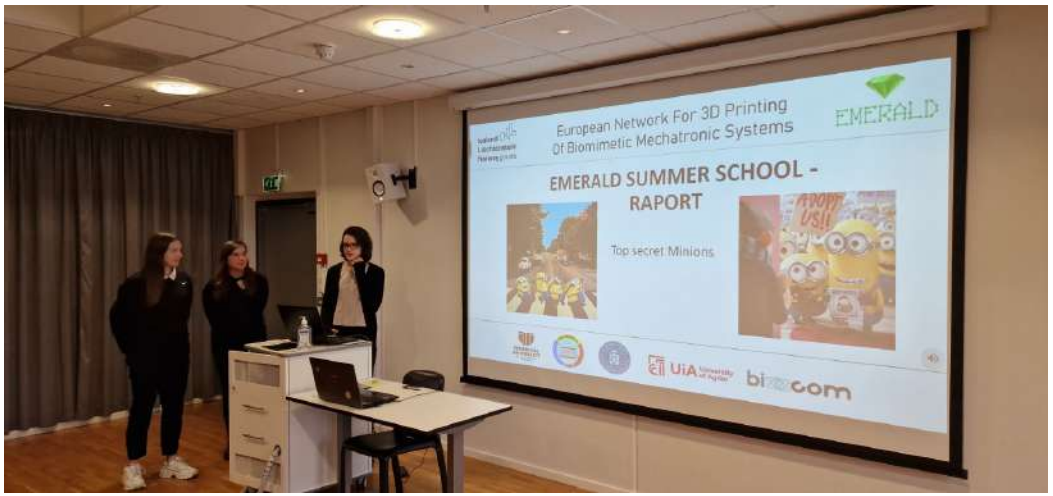

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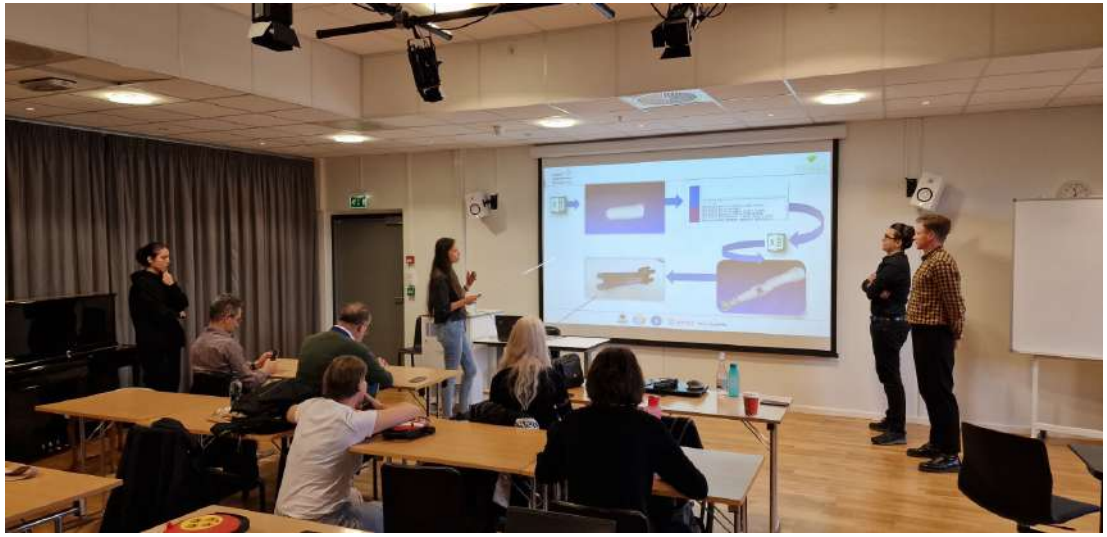

Final presentations realized by the EMERALD students

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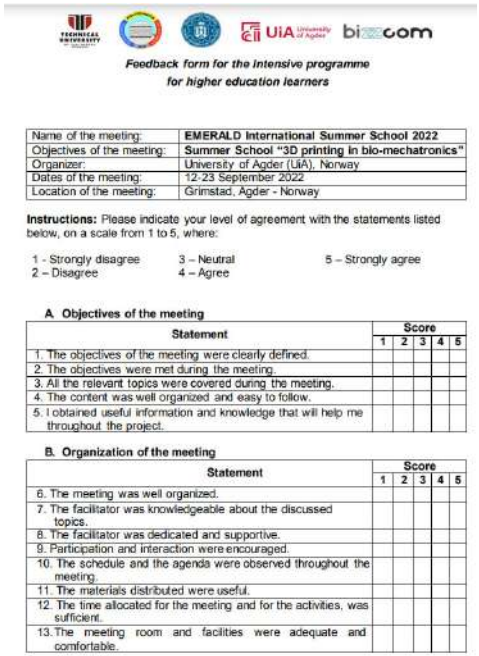

Feedback form for the intensive programme for higher education learners

Name of the meeting:	**EMERALD International Summer School 2022**
Objectives of the meeting:	**Summer School "3D printing in bio-mechatronics"**
Organizer:	University of Agder (UiA), Norway
Dates of the meeting:	12-23 September 2022
Location of the meeting:	Grimstad, Agder - Norway

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

1 - Strongly disagree 3 – Neutral 5 – Strongly agree
2 – Disagree 4 – Agree

A. Objectives of the meeting

Statement	Score 1	2	3	4	5
1. The objectives of the meeting were clearly defined.					
2. The objectives were met during the meeting.					
3. All the relevant topics were covered during the meeting.					
4. The content was well organized and easy to follow.					
5. I obtained useful information and knowledge that will help me throughout the project.					

B. Organization of the meeting

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

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CERTIFICATE OF ATTENDANCE

This is to certify that

Name and Surname

has attended the EMERALD International Summer School on:

3D Printing in Bio-Mechatronics

from 12.09.2022 to 23.09.2022

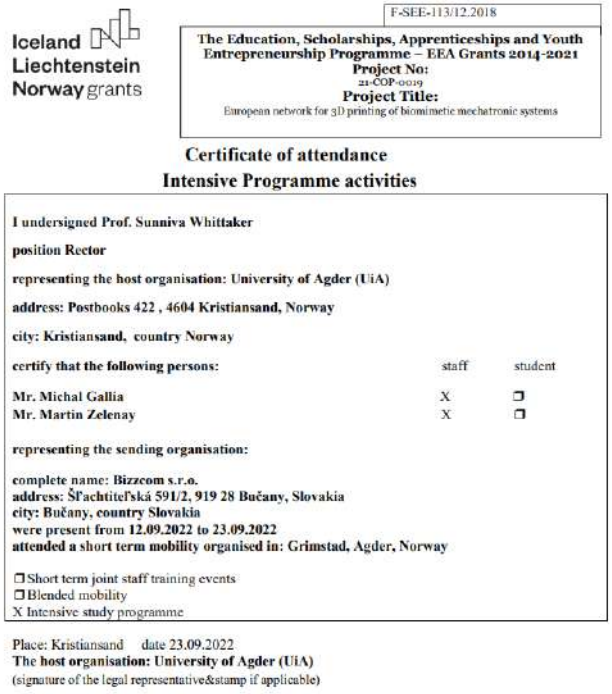
Organized at the University of Aeder, Norway by the EMERALD Project consortium partners

Prof.Dr.Eng. Filippo Sanfilippo,
Partner of EMERALD project

In cooperation with

bizzcom

EMERALD International Summer School on
3D Printing in Bio-Mechatronics
is organized at the University of Agder, Norway by the EMERALD Project consortium partners



Iceland Liechtenstein Norway grants

F-SEE-113/12.2018

The Education, Scholarships, Apprenticeships and Youth Entrepreneurship Programme – EEA Grants 2014-2021
Project No:
21-COP-0019
Project Title:
European network for 3D printing of biomimetic mechatronic systems

Certificate of attendance
Intensive Programme activities

I undersigned Prof. Sunniva Whittaker

position Rector

representing the host organisation: University of Agder (UiA)

address: Postbooks 422 , 4604 Kristiansand, Norway

city: Kristiansand, country Norway

certify that the following persons:	staff	student
Mr. Michal Gallia	X	❒
Mr. Martin Zelenay	X	❒

representing the sending organisation:

complete name: Bizzcom s.r.o.
address: Šľachtiteľská 591/2, 919 28 Bučany, Slovakia
city: Bučany, country Slovakia
were present from 12.09.2022 to 23.09.2022
attended a short term mobility organised in: Grimstad, Agder, Norway

❒ Short term joint staff training events
❒ Blended mobility
X Intensive study programme

Place: Kristiansand date 23.09.2022
The host organisation: University of Agder (UiA)
(signature of the legal representative&stamp if applicable)

Feedback forms and certificates provided to the EMERALD International summer school participants

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POLITEHNICA UNIVERSITATEA BUCUREȘTI 1818

POLITECHNIKA POZNAŃSKA POZNAN UNIVERSITY OF TECHNOLOGY

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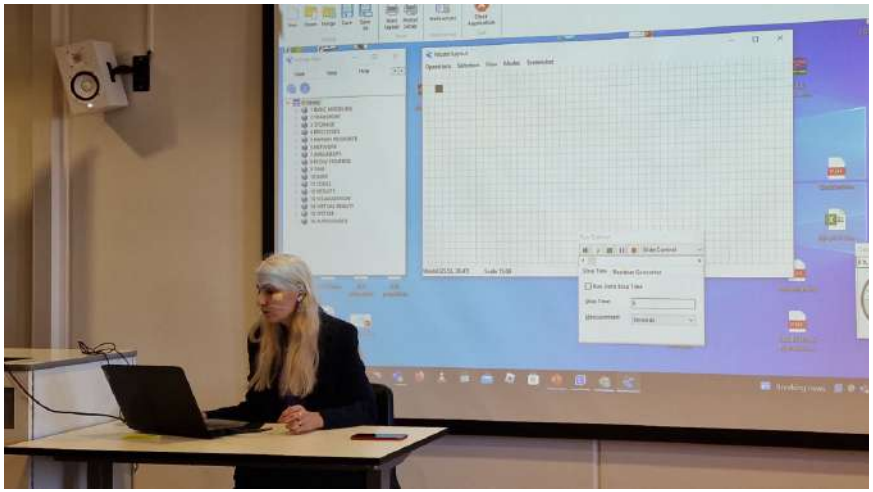
Companies presentations and feedbacks



Enterprise dynamics workshop + presentations of the Admasys and Leycom companies of Romania - provided by Associate prof.dr.eng. Diana Baila from University Politehnica Bucharest (Romania)

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Companies presentations and feedbacks

Blatchford ortopedi Norway company presentation - case studies revealed by Physiotherapist & Department leader of Blatchford Arendal - Bjarne Lindebø

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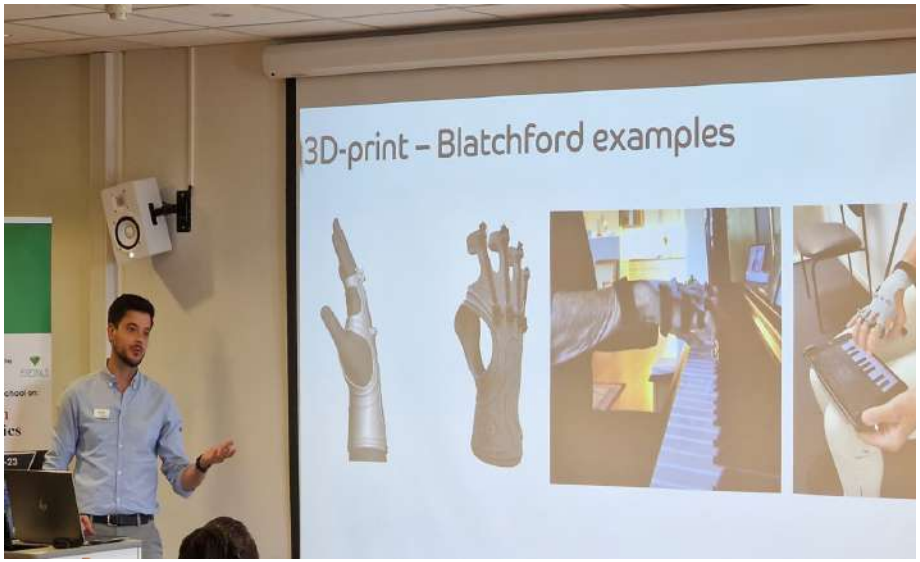

Blatchford ortopedi Norway company presentation – CPO – Head of development & 3D print in Blatchford Norway – Luis Rodrigues

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Ending of the first edition of the EMERALD International summer school

Ending up of a very intense , but consistent period of the EMERALD International summer school in Norway (2022 edition)

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EMERALD project - contact details

www.project-emerald.eu

CONTACT US

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