1ˢᵗ transnational project meeting minutes

Kick off meeting

Integrating virtual and AUGMENTED reality with WEARable technology into engineering EDUcation (AugmentedWearEdu)

Project number 2020-1-NO01-KA203-076540

NOTE: because of the COVID-19 pandemic, this physical meeting was postponed from the originally planned date

Date: 10 October, 2021

Venue: University of Agder (UiA), Faculty of Engineering and Science, Department of Engineering Sciences, Jon Lilletuns vei 9, NO-4879, Grimstad, NORWAY

Participating partners:

- UNIVERSITA DEGLI STUDI DI SIENA, Italy
- UNIVERSIDADE DO MINHO, Portugal
- UNIVERSITATEA POLITEHNICA TIMISOARA, Romania
- KAUNO TECHNOLOGIJOS UNIVERSITETAS, Lithuania

Head of meeting: Filippo, Sanfilippo, Professor

Minute taker: Filippo, Sanfilippo, Professor

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1. Agenda

1st transnational project meeting

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Work programme

10 October, 2021		
16:00	16:15	Introduction
16:15	16:30	Round table presentation
16:30	17:00	Integrating VR/AR with Haptics into STEM Education
17:00	17:30	A Multi-Modal Auditory-Visual-Tactile e-Learning Framework
17:30	18:00	Possible synergies with the Erasmus+ project titled "Robotics at Schools Online with Augmented Reality" (eROBSON)
18:00	19:00	Summary and future actions regarding IOs
20:00	22:00	Dinner

2. Minutes

A short welcoming introduction and summary of the project is given by the project manager.
Then, a round table presentation with all the participants is given.
Successively, the following works are presented:

- Integrating VR/AR with Haptics into STEM Education. About 80% of the world's students are not in school as a result of many countries shutting educational institutions in response to the COVID-19 pandemic in 2020. To address this challenge, schools and universities are stepping up their efforts to leverage educational resources and offer remote learning opportunities. Many educational applications, platforms, and tools are available to facilitate student learning during periods of school closure. While these approaches provide critical support to society, they are mostly focused on the transfer of theoretical content. There is a lack of support for hands-on laboratory work and practical experience. This is especially relevant for science, technology, engineering, and mathematics (STEM) departments, which must constantly improve their labs and pedagogical resources to offer meaningful study plans. In this paper, we present a novel perspective for a sustainable integration of virtual and augmented reality (VR/AR) with haptic wearables into STEM education to achieve multi-sensory learning. We highlight a unique viewpoint on existing pedagogical concepts and discuss the implications. We seek to stimulate global efforts towards the achievement of fully-immersive, open, and distance laboratory learning.

- A Multi-Modal Auditory-Visual-Tactile e-Learning Framework. With a high number of countries closing learning institutions due to the restrictions in response to the COVID-19 pandemic, over 80% of the world's students was not attending school. As a response to this challenge, many educational institutions are increasing their efforts to utilise various educational technologies to provide remote learning opportunities. One of the biggest drawbacks of the majority of these existing solutions is limited support for hands-on laboratory work and practical experiences. This is especially relevant to science, technology, engineering, and mathematics (STEM) departments, which must continuously develop their laboratories and pedagogical tools to provide their students with effective study plans. To enable a safe, digital access to laboratories, a novel haptic-enabled framework for hands-on e-Learning is introduced in this work. The framework enables a fully-immersive tactile, auditory, and visual experience. This is achieved by combining virtual reality (VR) tools, with a novel wearable haptic device, which is designed by augmenting a low-cost commercial off-the-shelf (COTS) controller with vibrotactile actuators. For this purpose, the Unity game engine and the Valve Knuckles EV3 controllers are adopted. To demonstrate the potential of the proposed framework, a human subject study is presented. Results suggest that the proposed haptic-enabled framework improves the student engagement and illusion of presence.

Both works are discussed in detail by all contributors and participants.
Successively, possible synergies with the Erasmus+ project titled "Robotics at Schools Online with Augmented Reality" (eROBSON) are discussed.
Finally, a summary and future actions regarding Intellectual Outputs (IOs) are considered.

3. Decisions

No.	Decisions / Tasks	Deadline	Responsible person, institution
1.	Implementing the following actions regarding IO1: • Assessment tool for educators' competencies evaluation on using VR/AR including wearable haptic technologies	February 2022	Tomas Blažauskas, KAUNO TECHNOLOGIJOS UNIVERSITETAS, Lithuania
2.	Implementing the following actions regarding IO1: • Learning Theories	February 2022	Isabel Ramos, UNIVERSIDADE DO MINHO, Portugal
3.	• Contributing to IO1, IO2, IO3 • Developing concepts for mixed reality applied to learning	February 2022	Silviu Vert, UNIVERSITATEA POLITEHNICA TIMISOARA, Romania
4.	Implementing the following actions regarding IO3: • Producing first wearable prototypes to be shared among the partners • Start implementation of Open source library of VR, AR and wearable haptics to be used for re-designed study modules and engineering laboratories	March 2022	Gionata Salvietti, UNIVERSITA DEGLI STUDI DI SIENA, Italy
5.	• Dissemination plan • Updated plan for multiplier and translational events • Contributing to IO1 and IO3 • Developing first methodology and tools related to Training program for educators on haptics, VR and AR competences development (IO2)	March 2022	Filippo Sanfilippo, University of Agder (UiA), Norway
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8.			
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4. List of participants

Kick off meeting
The purpose of the activity: participation in 1ˢᵗ transnational project meeting
Dates: 10 October, 2021
Venue: University of Agder (UiA), Faculty of Engineering and Science, Department of Engineering Sciences, Jon Lilletuns vei 9, NO-4879, Grimstad, NORWAY

No.	Name [1]	Surname	E-mail	Position, Organization	Address of sending organization	Physical (P) or Remote (R) attendance	Signature
1.	Filippo	Sanfilippo	filippo.sanfilippo@uia.no	Professor, University of Agder (UiA), Norway	Dept. of Engineering Sciences, Jon Lilletuns vei 9, NO-4879, Grimstad, Norway	P	*(signature)*
2.	Isabel	Ramos	isabramos@gmail.com	Associate Professor, UNIVERSIDADE DO MINHO, Portugal	Dept. of Information Systems, University of Minho, R. da Universidade, 4710-057 Braga, Portugal	P	
3.	Jaziar	Radianti	jaziar.radianti@uia.no	Associate Professor, University of Agder (UiA), Norway	Jon Lilletuns vei 9, NO-4879, Grimstad, Norway	P	
4.	Tomas	Blažauskas	tomas.blazauskas@ktu.lt	Associate Professor, Kaunas University of Technology, Lithuania	Faculty of Informatics, Studentu str. 50, LT-51368 Kaunas, Lithuania	P	
5.	Gionata	Salvietti	salviettigio@diism.unisi.it	Associate Professor, University of Siena, Italy	Dept. of Information Engineering, 53100, Siena, Italy	R	

6.	Silviu	Vert	silviu.vert@upt.ro	Associate Professor, Politehnica University Timisoara, Romania	Multimedia Research Centre, Timisoara, Romania	R	
7.	Tim A.	Majchrzak	timam@uia.no	Professor, University of Agder (UiA), Norway	Jon Lilletuns vei 9, NO-4879, Grimstad, Norway	R	
8.	Martynas	Girdžiūna		Research Assistant, Kaunas University of Technology, Lithuania	Faculty of Informatics, Studentu str. 50, LT-51368 Kaunas, Lithuania	P	
9.	Airidas	Janonis		Research Assistant, Kaunas University of Technology, Lithuania	Faculty of Informatics, Studentu str. 50, LT-51368 Kaunas, Lithuania	P	
10.	Eligijus	Kiudys		Research Assistant, Kaunas University of Technology, Lithuania	Faculty of Informatics, Studentu str. 50, LT-51368 Kaunas, Lithuania	P	

Representative from the receiving organisation: Filippo, Sanfilippo, Professor

Signature

5. Pictures