Tactile feedback enriched interaction through virtual reality and beyond

WP8 – Dissemination, exploitation & communication

D8.5 Reports on stakeholder workshops and demonstrator presentations 2

Dissemination level: Public

GRANT NUMBER 856718

REVISION HISTORY

Modification Description	Author	Date
Document template creation	E. Hernández (TEC)	18/10/2021
Information and pictures of the booth	J. Castet (IMM)	26/10/2021
Information regarding the forest scenario	M. Strbac (TECSR)	26/10/2021
Final review	T. Keller (TEC)	03/11/2021

ACRONYMS

IMM: IMMERSION
MR: Mixed Reality
TEC: FUNDACION TECNALIA RESEARCH & INNOVATION
TECSR: TECNALIA SERBIA DOO BEOGRAD
VR: Virtual Reality
XR: Extended Reality

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EXECUTIVE SUMMARY

Background	Aim
During the second year of the project, the Beta demonstrator has been developed. This demonstrator is intended to be used for research activities but also for demonstrations to stakeholders to obtain feedback of such a system.	This document describes the two different demonstrators developed based on the Beta prototype and the presentation done at the Laval Virtual exhibition.
Approach In order to bring as much audience as possible to the presentation of the TACTILITY Beta demonstrator given the restrictions related to Covid-19 pandemic, it was decided that should be organized at the Laval Virtual exhibition. Two different demonstrators were prepared using the latest Beta physical components, one related to the automotive use case providing active touch on fingertip contact and a second one providing passive touch on the whole hand to simulate the effect of raindrops falling on the hand.	
Findings and results The TACTILITY system has been shown to stakeholders, in general with positive feedback and raising interest on the system. The technical feedback is mainly focused on two important aspects that are already being and will continue being addressed by the consortium: the calibration and the haptic effects.	
Impact This presentation helped the dissemination and demonstration activities to be done in WP8. 148 people visited the TACTILITY space and 56 tested the system.	**Planned dissemination and/or exploitation** Dissemination level of this deliverable 8.5 is public.

1 INTRODUCTION

After making some initial demonstrations and a workshop with the Alpha prototype reported in D8.4, D1.3 and D1.4, the technical development towards the Beta demonstrator has been progressing during the second year of the project, with the double objective of using the demonstrator for the research activities but also for workshops and presentations. Nevertheless, the consortium has struggled with two opposite limitations, on one hand the nature of the TACTILITY system requires that it is tested in person by users to understand its actual and potential capabilities, while at the same time the restrictions caused by the COVID-19 pandemic have imposed several difficulties for the organisation of presential events.

This deliverable reports the presentation of a first prototype of the TACTILITY's Beta demonstrator on the Laval Virtual fair.

2 PRESENTATION AT LAVAL VIRTUAL

2.1 Beta demonstrator

The development of the Beta demonstrator was started after the integration of the Alpha demonstrator with the development of the main components that would be part of this demonstrator and later the integration of those along different steps of the project. First all the hardware related components were designed and tested, and then the software components integrated.

By the time of the organisation of this presentation (July 2021) the final version of the Beta demonstrator was not yet finalised, but at least all the HW components were ready (Beta stimulator, ES glove and kinematic glove). As reported in D1.4 (figure below) a dual glove solution, including an inner glove with the transferred electrodes connected to the stimulator and an outer glove with the kinematic sensors, was used for this demonstrator.

Figure 1 - Physical set-up of the Beta demonstrator

Additionally, an effort was done to finish for that event the implementation of a couple of VR scenarios where a basic functionality of the system could be showcased. These two demonstrators are summarized below.

2.2 Industrial scenario

This is the first demonstrator prepared for the event. It is the same scenario than the one that was chosen to be used related to the Industrial Use Case that was defined for the project. The VR scenario

shows a car and a workbench with some tools. The interactions implemented for this event were only related to the car, i.e.: opening and closing doors or the engine hood and touching different components of the car. It was designed to simulate and showcase active touch, using the Manus glove to detect collisions and the ES glove to provide touch related electrotactile feedback on the fingertips. More details about this scenario will be provided in oncoming deliverables.

Figure 2 - Screenshot of the automotive scenario for active touch showcasing

2.3 Forest scenario

This second demonstrator was prepared to show and test the potential functionalities related to the full hand stimulation and the capability of providing stimulation and its precise localization all over the palm. The VR environment is a forest where it is raining, and the user can see its hand. When the user places the palm looking upwards, the rain sound starts and the raindrops falling over the hand effect is simulated with electrical stimulation. User can also control the intensity of the rain (from light to heavy rain) by moving its fingers, and the electrical stimulation intensity and frequency will vary accordingly.

Figure 3 - Screenshot of the forest scenario for passive touch full-hand stimulation of raindrops

2.4 Booth at Laval Virtual

While some restrictions related to people travelling and keeping social distancing in presential events were still in force during spring and summer 2021, the consortium agreed that in order to be able to attract more people, a presentation should be organized along with a bigger event.

Laval Virtual[1] is one of the top exhibitions in Europe in the VR/XR field and in 2021 was planning to have along with the virtual fair some physical exhibition space. It was agreed that attending Laval Virtual was going to be the best opportunity to have a first demonstration of the system after the pandemic.

The Laval Virtual 2021 figures were:

- 3 days
- 300 exhibitors from the VR/AR industry
- 18 000 visitors
- 9 000 m² exhibition space
- 150 lecturers from 50 countries

Immersion organised a booth of 68m² with Barco, HP, Varjo, Noitom and HTC, were amongst others TACTILITY Beta demonstrator was shown. A team of TECSR was also present during the event to make the set-up and support during the testing of the forest scenario.

During the event 148 people visited the TACTILITY space and 56 people tested the demonstrators.

[1] https://www.laval-virtual.com/ Last access 29/10/2021

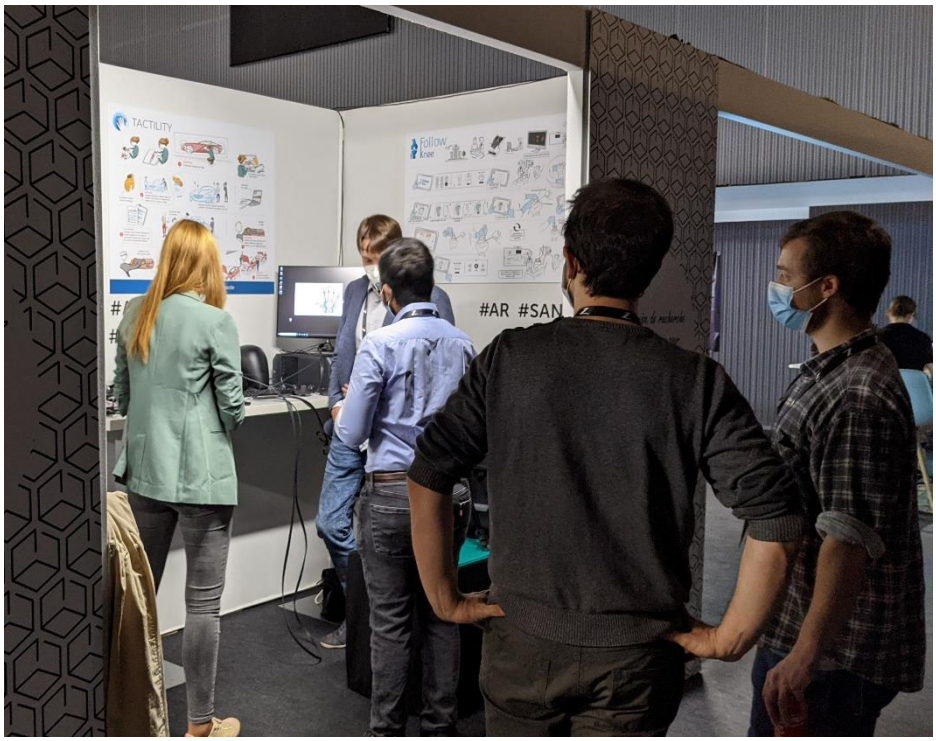

Figure 4 – TACTILITY space on Laval Virtual exhibition

Figure 5 – Testing of the industrial/automotive scenario

Figure 6 – Testing of the forest scenario

3 CONCLUSIONS

The consortium has dealt with the restrictions and limitations related to the Covid-19 pandemic and has been able to organize a demonstration of a preliminary version of the Beta demonstrator on a booth in the Laval Virtual exhibition.

General concept of the TACTILTY project, technology we are developing and our vision of the use cases of interest was presented to a relatively high number (~150) of Laval Virtual participants. Feedback we received is very positive, as most participant we spoked to agreed that incorporation of haptic feedback in VR is the next big challenge for the industry, they expressed high interest in electrostimulation technology considering current solutions are based on mechanical actuators and they agreed that the automotive use case we outlined would be a very good penetration point for this technology. Due to the time limitations demos were tested by a smaller group of participants (~50), all of them sharing enthusiasm for the future of TACTILITY and the use of this system in VR. Feedback we received can be sorted in 3 categories:

- Participants amazed by potential and would like to obtain TACTILITY in the current state (about 30% of testers)
- Participants that foresee there are technological steps in calibration and haptic effects that are required before TACTILITY glove can reach the required TRL (about 50% of testers)
- Participants who are doubtful that even after providing simplified calibration procedures electrical stimulation system can in a short time reach usability level that is required for VR everyday use (about 20% of testers)

While a more refined version of the Beta demonstrator has been integrated after Laval Virtual and now ready, other presentations and a workshop with the stakeholders' board and other stakeholders are planned to be organized. As for the Laval Virtual exhibition, the consortium is currently analysing the big VR presential events that will be held during the following months to organize the presentations and workshop along with one of those events.