Visionair Newsletter #4 September 2013

VISIONAIR's Trans National Access (TNA) Activities are full speed ahead!

VISIONAIR Newsletter Editor's note

Dear readers,

As we are all back from the summer vacations, this fourth issue of our VISIONAIR Newsletter continues its predecessor in reporting our diverse Trans National Access (TNA) activities. As envisioned by the Project designers, TNA has already become one of the most distinct highlights of the VISIONAIR Project.

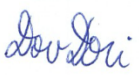
In this issue, we describe several TNA activities that were carried out in recent months at several VISIONAIR laboratories and centers of excellence. You can read exciting stories on projects that have been completed.

Through these reports we demonstrate what a transnational access project is. This should help you consider how you can apply for such projects. Every researcher from Europe or one of the associated countries is eligible to submit a project proposal for being supported by VISIONAIR. Any discipline from the natural sciences through engineering to art is welcome. Whenever high level of visualization and interaction elements are proposed, VISIONAIR will try to support your project.

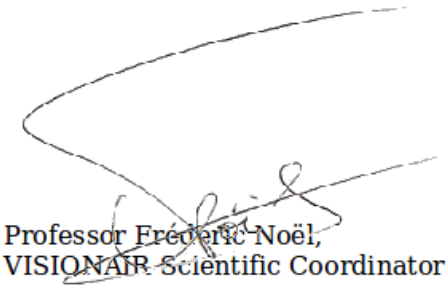
A project can take from a few days up to four weeks of research and utilization of our high level infrastructure, including technologies such as CAVE, haptic devices, holography, and ultra-high definition resolutions. Just go to our website, http://www.infra-visionair.eu/propose-new-project.html, and access a simple form to describe your project and needs. We will then help you refine the research question and emphasize its visualization content.

More than 60 projects have already been supported by VISIONAIR, creating a great success story. You are welcome to propose topics that extend the wide variety of project topics already carried out. Not only do we help you; we also learn a lot from your research, so it is a great win-win opportunity.

Enjoy reading, and we look forward to hearing from you!



Professor Dov Dori, VISIONAIR Newsletter Editor



Professor Frédéric Noël,
VISIONAIR Scientific Coordinator

VISIONAIR Social network

If you expect following us and exchanging with us, we have now a LinkedIn group. Just follow the link and submit to enter the group. Forums and Open questions will be possible very soon within this social network.

LinkedIn http://www.linkedin.com/groups?gid=5087645&trk=myg_ugrp_ovr

For more direct contact about a TNA project you can also contact us by email : contact@infra-visionair.eu

How and where to meet us?

VISIONAIR will have a presentation booth in the following conferences in the next month: you are welcome to join us and open discussions on these booths or VISIONAIR special tracks.

- Booth at NEM summit in Nantes – October 28th-30th 2013: http://nem-summit.eu/about/
- Booth and demonstrations at ICT Conference in Vilnius – November 6th-8th 2013: http://ec.europa.eu/digital-agenda/en/ict-2013
- Special track at JVRC in Paris – December 11th-13th, 2013: http://jvrc2013.sciencesconf.org/
- CogInfoCom in Budapest – December 2nd-5th, 2013: http://www.coginfocom.hu/conference/CogInfoCom13/

We are also actively preparing for our **Third General Assembly** which will take place in Poznan, Poland, Tuesday, February 4 to Friday, February 7, 2014. **An open-forum will be organized on February 5th and 6th which is open to everybody and will feature presentation of VISIONAIR results and an opportunity to find out more about what we can offer.** You are warmly welcome during these two days hosted by PSNC.

VISIOANIR has been represented with posters and presentations during the last month in the following events:

- PLM 2013 in Nantes : http://www.plm-conference.org/
- SGP 2012 in Genova : http://sgp.ge.imati.cnr.it/

We are open to present VISIONAIR in your community to support your colleagues to understand the opportunities offered by VISIONAIR

Permanent VISIONAIR Call for projects

VISIONAIR is a European funded infrastructure that grants researchers access to high level visualization facilities and resources. Both physical access and virtual services are offered by the infrastructure, free of charge, based on the excellence of the project submitted. In addition to technical aspects, you take advantage of skills and knowledge of our experienced teams operating the platforms. The access to a facility will include:

- Training on each specific facility
- Access to the scientific environment supporting the platform

- Access to networking environments
- Scientific and engineering support for specific tasks development
- Accommodation and logistic support

The current Call for Project leaves the topics open for you to decide based on your needs. Hosting and travel costs are covered by VISIONAIR for eligible applicants. For further information about the Call, please go to: http://www.infra-visionair.eu/propose-new-project.html

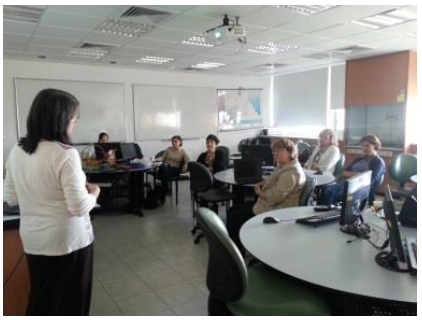
Technion: Using Visualization Analysis for Evaluating Students' Virtual Science Fairs Outcomes

Proposer : Dr. Gabriela Jonas-Ahrend , faculty of physics education at the Technische Universitaet Dortmund

Visited laboratory: Enterpise Systems Modeling Laboratory (ESML), Haifa, Israel

Visit Dates: 11 November to 15 November, 2012

The project director of "Virtual Science Fair – Germany", Dr. Gabriela Jonas-Ahrend from the Faculty of Physics Education at the Technische Universitaet Dortmund, was hosted by Prof. Dov Dori, Prof. Judy Dori, and their research teams. She visited the Technion's Science Teaching Visualization Laboratory and the Enterprise Systems Modeling Laboratory (ESML) at the Technion, Israel Institute of Technology between 11 and 15 November 2012.



The purposes of this visit was to study how to analyse visual expressions which students use in virtual science fair projects, to learn how to model the e-mentoring and the virtual science fairs' processes using OPM – a conceptual modelling methodology, and to explore additional ways to foster students' scientific literacy and motivation.

During the visit Dr. Jonas-Ahrend presented the Virtual Science Fair project as well as examples of students' visual outcomes. Following the presentation, the visitor, the hosts and the research team began conducting in-depth analysis of the visual students' outcomes and the science literacy that is reflected through those outcomes.

Additionally, we constructed an OPM model that represents the science fair project's system. The visit ended with a promise to continue the joint research activities.

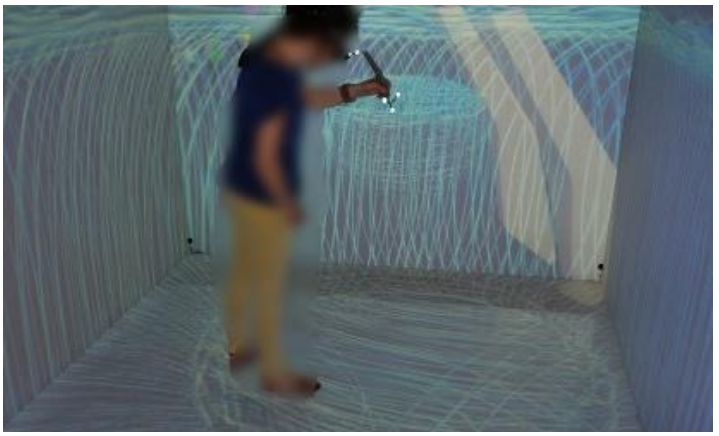
At the end of the visit Dr. Jonas-Ahrend wrote "My stay was a unique and great experience. I feel honored to be hosted by VISIONAIR. I feel truly thankful for that great cooperation and the special collaboration with great people of the team. I am also very thankful for the warm welcome and nice talks."

Fraunhofer IPK: Mastering Digital Materiality in Immersive Modelling

Proposer: Laurence Mauderli, Laurent Greslin, and students from the ESAD de Reims, Reims, France

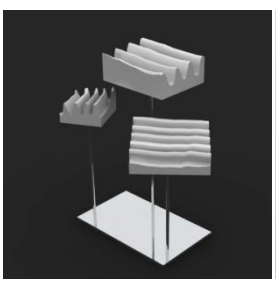
Visited laboratory: Virtual Reality Solution Centre of the Fraunhofer IPK, Berlin

Visit Dates : July, 2012



In July 2012, a Trans National Access project was conducted by Laurence Mauderli, Laurent Greslin, and students from **the École Supérieure d'Art et de Design de Reims**, ESAD de Reims, a college of art and design in Reims, France. The visit was with the Virtual Reality Solution Centre of the Fraunhofer IPK in Berlin. The aim of the project was to search for bridges which allow designers to use the potential of immersive modelling even though no materiality (i.e., no touchable material) is present in virtual environments. During the two-week project, four approaches of mastering digital materiality emerged from the work of the participants with the IPK's immersive modelling system. The figure on the right shows Participant sketching in the virtual environment.

All four approaches imply different means of substituting the missing material constraints. The results of this project suggest that designers can find individual ways to handle digital material in immersive environments which may satisfy their professional expectations and standards. They may possibly be able to develop a professional level of manipulative skills within virtual environments that are comparable to their work with physical material. It can be expected that more approaches to immersive modelling appear as the technology advances and designers become engaged with it. Further information can be found at http://dx.doi.org/10.1145/2487381.2487388



The figure on the left shows objects created using immersive modelling tools (renderings): bookshelves (left) and fruit bowls (right).

MTA SZTAKI: visualization of grasping and manipulation of virtual objects

Csaba Antonya (Transilvania University of Brasov, Romania) has done research in the field of Virtual Environments with special focus on virtual mechanical systems and virtual manipulation. The topic of this TNA project (21.01.2013-01.02.2013) is the visualization of grasping and manipulation of virtual objects.

Grasping and manipulation of virtual objects can be done with or without force feedback. When no haptic feedback is applied, the position of the fingers may not be the same as when having true feedback. In order to reconstruct and analyze the virtual grasping process, it is to study the movement of the hand and the fingers during real actions. The tracking of hand motion can be achieved by vision-based techniques or using wearable motion capture devices.

The motion of the upper arm, the lower arm, and the hand with all five fingers were tracked with a high-fidelity capture system (Measure and ShapeWrap) available at MTA SZTAKI (see figure).

In the course of the project, the arm and hand motion were recorded in several grasping situations with different target objects (square boxes, coffee cups, bottles, cylindrical objects) to build a database for further investigation. The collected motion data foster the quantitative motion analysis and enables the development of feedback methods for virtual manipulation enhancing the quality of the existing implementations.

Encouraged by the valuable results, a long-term cooperation agreement has been signed between MTA SZTAKI - 3DICC Laboratory and the Laboratory of Virtual Informatics and Robotics, Transylvania University of Brasov.

Grenoble-INP: Data visualization for the complexity of human resource planning in home health care

Proposer: Lanzarone Ettore, Consiglio Nazionale delle Ricerche (CNR), Istituto di Matematica

Visited laboratory: Grenoble-INP

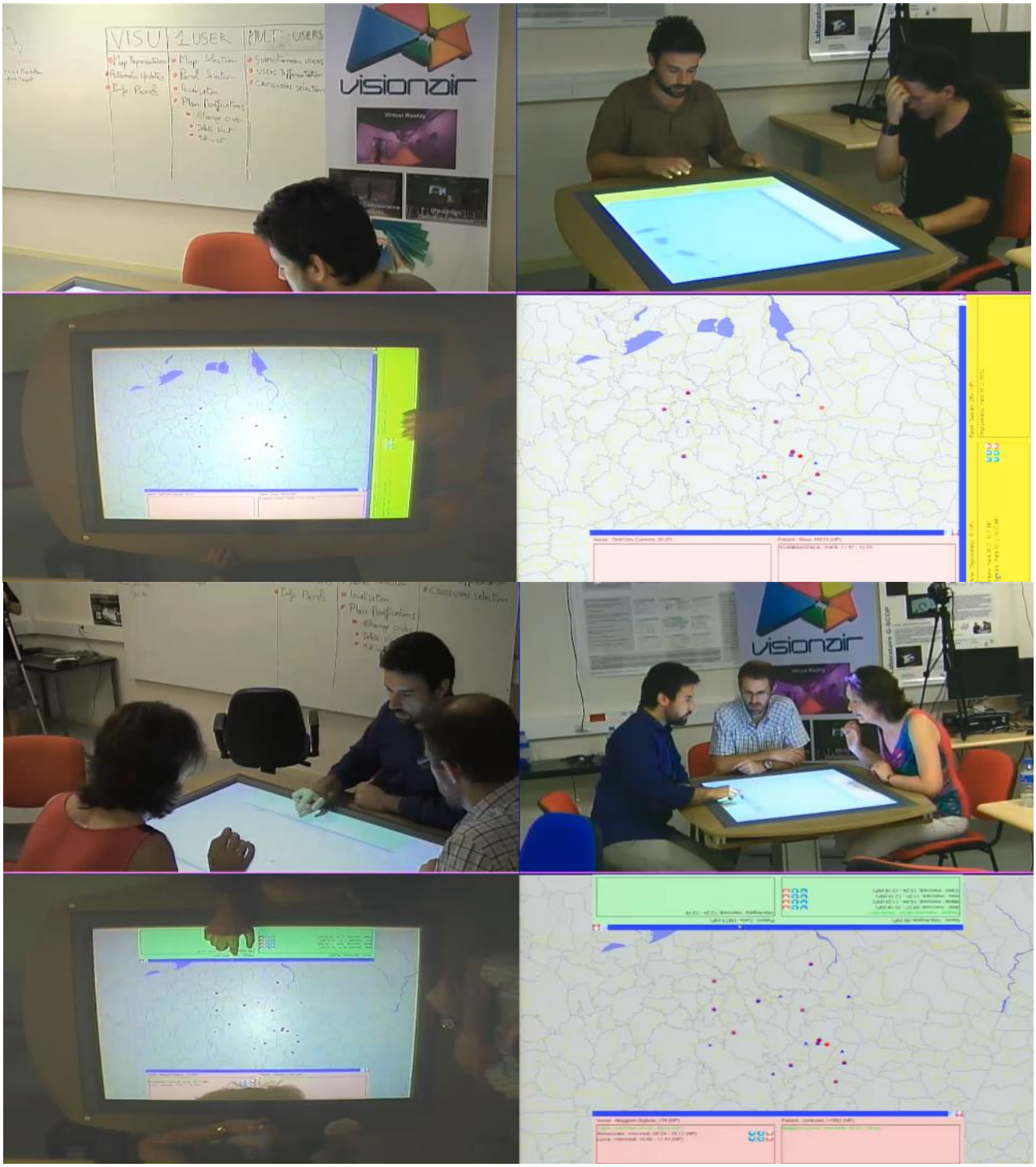
Visit Dates : 07/28/2013 - 08/04/2013

Objectives : The objectives of the project are the definition, the development and the functional validation of a tool to manage the daily schedule of nurses in charge to a home care provider. The tool consists of a multi user touch table (DiamondTouch, CircleTwelve Inc.) on which the map of the territory covered by the home care provider. In addition, the tool includes functionalities for managing and modifting the schedule of nurses.

Summary of achievements : A propototype of the tool is successfully implemented. Moreover, the functional validation of the prototypal tool is conducted. Two categories of tests are considered: visualisation and interactions. In the following the defined requirements that are tested are reported. Visualisation :

- user is able to visualise the geographic area he is managing • user is able to manipulate the map to adapt the visualisation area (pan, zoom)
- user is able to visually distinguish the status of patients, i.e., with visits to be still received in the day (covered/uncovered) or with no visits
- user is able to visually distinguish the status of nurses, i.e., in car, at a patient's home, at office
- user is able to visually associate the iconic metaphores of patients and nurses to the textual information displayed in the private areas
- user can visualize nurse's remaining route for the current day
- each user has access to a private area where information related to patient and nurses can be displayed; in particular it is required for nurse to have the daily schedule and for patients to have the list of the visits planned in the day
- the user can visualize on the map the issues in the initial planning Interactions :
- multiple users (up to 4) are able to make the actions described above
- user is able to change the order of the visits that are included in the nurse's list user can erase a visit from a nurse's list
- user can add a visit to a nurse's list
- user can glide across the time in the simulation (e.g. to anticipate events in the future by displaying the potential state of the system in the day) The basic tasks that could involved this functions are :
- a patient is cancelling his visit
- a patient asks for modifying his visit schedule
- a nurse asks to cancel a visit because of too much delay
- the planner want to check the availability of a nurse Finally, the validation tests are recorded and a video is provided to be shown in real home care providers. On one side, this allows to disseminate the outcome of the project for a possible real application in the management of

nurse workforce; on the other, this permits to obtain feedbacks and suggestion for further evolution of the propotypal tool.



HLRS: Evaluating a nested high-resolution weather model, Harmonie

Proposer: Delaney Sean, ICHEC

Visited laboratory: HLRS

Visit Dates : 05/14/2012 - 05/25/2012

Summary : The scientific challenges are to convert the multiple datasets from the models and observations, which are on different non-cartesian grids, etc. to a common reference frame and then compare them. We know that weather models need 'scale-selective damping' at the grid scale to prevent energy buildup at sub-grid scale levels. These need to be examined. Previous efforts of using Harmonie at these scales have led to convective events being "too symmetrical" and "unrealistic". Hence we need to explore convective events in both the datasets from LIDAR and models. For the ocean model testing, we need to visualise the 3-D wind and ocean currents simultaneously, and compare with the observation sets from radar of the (2-D) surface wave and current fields.

RWTH: Visually augmented analysis of information evolution in design

Proposer: Tino Stankovic

Visited laboratory: RWTH

Visit Dates : 11/19/2012 - 11/29/2012

Summary : Visual representation and analysis of information evolution is a method by which the technology can augment human capabilities in order to meet the challenges of management of complex information structures.
The research in cognitive psychology established that it is much easier to process complex structures if visually displayed than to rely on the limited capacities of working memories (Ware 2004).
Augmenting natural ability to deal with large complex digital repositories of information objects is achieved when suitable visualisation technique is applied to foster interpretation of their content and context. Building on these human-centred characteristics, modern computer based visualisation tools offer environments for effective complex information dependency analysis. User friendly graphical interfaces backed with underlining algorithms through which information context and content evolution can be visualised as spatially organized and interactive will improve both the information understanding for retrieval and reuse process. In order to provide a more effective understanding of

both the content and context of the information evolution and its traceability for the engineering design and development application domains, a TRENIN project (TRaceability of ENgineering INformation – TRENIN framework (www.trenin.org) funded by EUREKA program, resulted with development of semantic traceability records as a network of traceability elements and objects interconnected by semantic links of different types and strengths.

The idea of the semantic traceability records is to identify, represent and capture the physical and abstract concepts from the system design domain relevant for description of the information object content and context evolution. Among the other results, the project also yield in a Java based TRENIN Visualisation Toolkit which was developed within the Processing visualisation environment (www.processing.org).

The purpose of the TRENIN Visualisation Toolkit is to visually describe recorded evolution of information content and context thereby utilizing both the semantic network of the information objects and predefined traceability elements instantiated based upon predefined ontology. The visualisation was realized upon an organic information visualisation paradigm which employs simulated organic properties in an interactive, visually refined environment to collect qualitative facts from large bodies of quantitative data generated by information evolution dynamics.

Additional application of various layout algorithms and semantic filters to display complex structure of traceability record in 2D helped out in identification and analysis of information evolution patterns. To complement semantic graph view mode a 2D/3D matrix based visual interpretation of information evolution is being provided for dependency analysis in design of complex systems.

To continue further the development we propose generalisation of the TRENIN Visualisation Toolkit in order to become a generic tool for complex structures of information evolution. To accomplish that, the following objectives should be met: Real-time large information network layout evolution applying various graph drawing techniques, i.e. force-directed approach for general graphs or hierarchical approach for acyclic digraphs, to convey the relevant meaning by displaying appropriate network layouts. On-the-fly evolution of the properties of a large information network (degree, centrality, diameter, modularity, clustering etc.) augmented with appropriate computer graphics based effects performed on network's entities to emphasize property in-time change.

To perform search on large-scale information networks and to record and observe the evolution of emerging processes and effects taking place on networks such as reaching the information network's transition points at respective evolution steps, or formations of giant clusters and modules. To test out the extension of a 2D evolution visualisation of complex information structures into 3D which would bring more clarity in the visualisation allowing (i.e. no edges/links crossings). Furthermore the 3D representations allow space navigation against planar only in 2D, which should enable the user to more efficiently focus on clustered network portions.

Scientific Challenges: Scientific challenges can be summarized by the following: An opportunity to visualise and analyse the behaviour of large scale complex information networks evolution. To test out the limits, the applicability and advantages of available advanced visualisation technology when augmenting human capabilities in large scale networks analysis. To explore the possibilities for prediction of complex information network's behaviour based on the recorded data organized as bi-partite/n-partite graphs (i.e. preference networks and recommender systems). To test out the performance of parallel CPU Cluster or GPU based algorithms for visualisation and analysis when run on the VisionAir's computational resources.

Inria Rennes: Data visualization for the complexity of human resource planning in home health care

Proposer: Alexandra Covaci – "Transilvania" University of Brasov, Romania
Franck Multon – MimeTIC, University Rennes2, France

Visited laboratory: Inria Rennes

Visit Dates : 15/04/2013 - 26/04/2013

Figure 1: picture of the experiment with one subject experimenting the First-person view protocol.

Our aim is the implementation of a free-throw simulator that would provide not only a user-friendly interface, but also a modular program that could be expanded into more than a game towards a learning platform for people. The proposed simulator can be considered as an excellent tool to increase the quality and speed of learning and developing motor skills, offering a wide range of aesthetics and performance features compared to the classic training systems.

Preliminary results

We are currently processing the data but preliminary results are availabe yet.

Firstly, we analyzed the success ratio in each situation (see Figure 2). At this stage we did not notice any significant differences between the groups. It seems that the performance in real and in virtual are similar. Moreover using first or third person of view seems to have no effect on this parameter.

Because of large standard deviations, it is difficult to conclude and further analysis of the data will be useful, such as comparing the results of each subject separately to eliminate inter-individual variations.

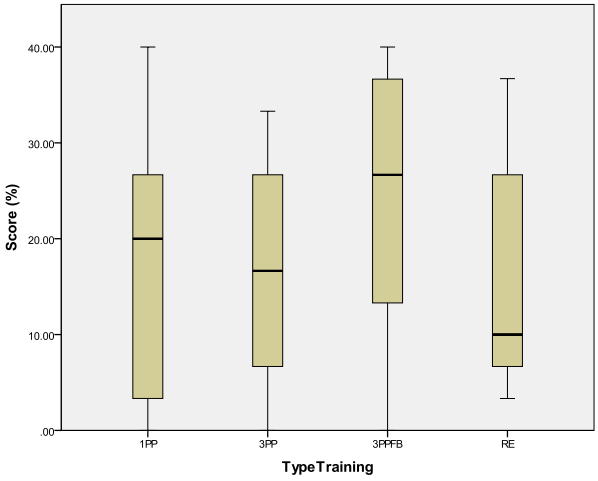


Figure 2: success ratio depending on the situation (real RE, first person view 1PP, 3rd person view 3PP, and 3rd person view with accelerator 3PPFB).

Secondly, we analyzed the average distance between the final ball position and the middle of the ring (see Figure 3). Again it seems that there was no significant difference between real and virtual. In the same way, there was no significant difference between first and third person view. One can notice a smaller standard deviation and a slighly smaller distance to the basketball ring when using the accelerator.

Again these results should be confirmed in further analyses.

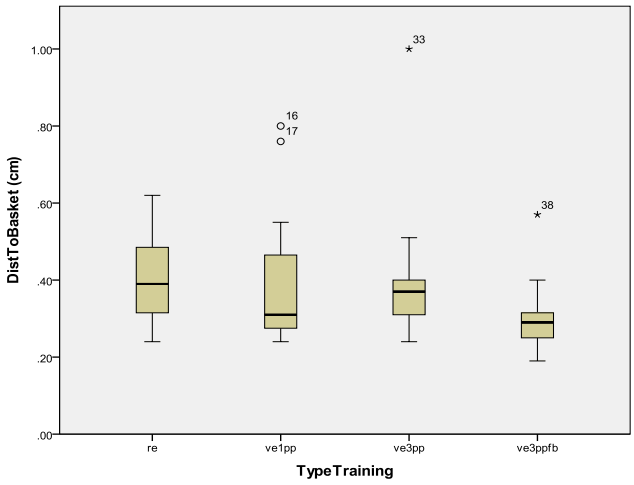


Figure 3: average distance between the final position of the ball and the middle of the basketball ring success depending on the situation (real RE, first person view 1PP, 3rd person view 3PP, and 3rd person view with accelerator 3PPFB).

4. Conclusion

This work is multidisciplinary as it involves skills in computer science, virtual reality, sports science and biomechanics. Using Immersia in this VISIONAIR project was a unique chance to address such a complex problems. Indeed basketball free throw involves large spaces (requiring large screens), high speeds (requiring high-speed tracking facilities) and high accuracy (requiring accurate motion capture facilities).

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