ESR 13

Name: Simon Senecal

Your credentials: Physics Engineer / MsC in Art & Science

Start day: 02/06/2014 **End day:** 02/02/2017

Involved in WP: WP1, WP4, WP5, WP7 Hosting Institution: MIRALab

My Research Training Activity in ITN-DCH

A. Summary of the Career Development Plan:

The Ph.D. research project, Real-time human avatar interaction, is about to investigate new ways to interact with a virtual avatar in real time, using motion sensing. The main goal is to develop a new model of interaction based on animation technics and physics law. The research step will be:

- Development of a real-time positional tracking system
- Development of an interactive model physics-based dedicated to avatars
- Optimizing the model to match natural smoothness reaction
- Run naive tests with random people and children

During the first year, I learned different methods related to the fields of computer graphics and got sufficient knowledge and practice to start writing publications and develop my own interactive system.

B. Core Research Training Activity:

During the first year, a complete training has been given to the ESR in the fields of motion capture, 3D modelling, and others technics and resources related to the virtual human's research:

- **Motion capture**

ESR13 has been trained on digitizing motion of people. For example when they are dancing or making a particular action. In the context of ITN-DCH, we will use this technical and the knowledge of MIRALab to record a ceremony of a priest, which can be considered part of intangible heritage.

- **3D Semantically enriched modelling**

We have different technics to build 3D objects. One of them is to use photogrammetry to reconstruct a person from a bunch of photos. Another way is to use Constructive Geometry to make volumes from scratch.

- **Motion synthesis and editing**

Once the data is acquired we need to edit the motion and / or animation to have good final rendering. For that purpose, we often use different blending or re-targeting technics.

- **Real-time programming**

As for interactive applications, we need to program the scripts in the way to have best visual feedback. A training was also given concerning real-time programming and perceptual rendering.

C. **Secondments:**

1. 7Reasons: for two weeks (from 09/03/2015 to 20/03/2015)

   The mission of this particular secondments was to work mainly on the first case study: the Byzantine church of Asinou, located in the Troodos Mountain, Cyprus. Our objective was to start a dissemination collaborative framework that allows us to use, structure and visualize acquired information. A 3D visualization online platform has been made in collaboration with ESR1 Chance Coughenour and ESR9 Marleen de Kramer. It allows to navigate around coarse 3D model and lead to external 3D point cloud views:

   http://case-study1.itn-dch.net/

2. CUT: for two weeks (from 08/06/2015 to 19/06/2015)
   The main mission of this particular secondments will be to acquire motion capture of a priest during a religious ceremony. The different motion that the priest will achieve corresponds to intangible knowledge transmit through generation.

3. FORTH: for one month (from 12/08/2015 to 12/09/2015)
   The main mission of this particular secondments will be to use previously acquired data, and test augmented reality and rendering technics on it.

D. Dissemination & Outreach:

The research's applications of my work in the framework of virtual avatar interaction may be published in "International Conference on Computer Vision" or in "IEEE Transactions on Visualization and Computer Graphics".

I am currently working on an article for CIPA and SEHEA conferences in collaboration with others ESRs.

I have participated in the various event organized by the project committee, as well as the Euromed2014 conference and the Researcher's Night 2014.

E. **Added Value to my Future Research Career:**

Being part of a huge European research project such as ITN-DCH is very good for making new connections with partners across Europe but also other young researchers. It may lead to collaborative work and common publication. The mandatories internships are also very important as they bring to all of us interdisciplinary technics from various fields and a global view of research.

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