



ERCIM "ALAIN  
BENSOUSSAN" FELLOWSHIP  
PROGRAMME



## Scientific Report

First name / Family name

Amyr Borges Fortes Neto

Nationality

Brazilian

Name of the *Host Organisation*

University of Cyprus

First Name / family name  
of the *Scientific Coordinator*  
Period of the fellowship

Yiorgos Chrysanthou

01/10/2017 to 30/09/2018

## I - SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

Project: Navigation assisted by Neural Networks

This project's objective is to provide a Convolutional Neural Network (CNN) to assist navigation of avatars in virtual environments. A scenario was built using the RISE Institute Centre 3D model, and an avatar was inserted. A user study was run where the participants were supposed to reach predefined goals in the scenario. We made sure that the goals positions were in places that force the user to dodge obstacles. The users performed the task with and with out the neural network navigation assistant and scored how easy (or difficult) it was to navigate on each case. The results were published in the VHCIE (Virtual Humans and Crowds in Immersive Environments – <https://sites.google.com/site/vhcieieevr2018/>) workshop during the IEEE-VR 2018 in Reutlingen, Germany, entitled “Virtual Environment Navigation Assisted by Neural Networks”.

### Project: Pedestrian Crossing Behaviour

The objective is to create a crossing behaviour model to endow agents of simulated crowds to decide whether to cross the street, or not, based on current surrounding traffic. This project was developed in collaboration with the INRIA Institute, located at Rennes, France, under supervision of Prof. Julien Petré. During the REP period, Prof. Petré proposed a model based on geometric approach, considering relative speed vectors, closest distance based on relative trajectories and time to reach close distance. This model was implemented, and other ideas came up after this. Now, the laboratory has two implemented models of crossing behaviour that are prone to comparison. Besides scientific articles which will be written on top of these models, there is clear interest of car industry on the matter, with the objective of developing commercial autonomous vehicles.

### Project: Study of Human Behaviour in Emergency Situations

This project is being developed under collaboration with Alejandro Jerez Rios, PhD candidate, and Dr. Nuria Pelechano from UPC (*Universitat Politècnica de Catalunya*). For the study, a Virtual Reality (VR) scenario was created to simulate an emergency situation. The behaviour of the participant in response to eminent danger, along with her/his biometric signals are being acquired as data for future analysis. With this data, we expect to understand better people behaviour during emergencies, and simulate more realistic and accurate behaviour on virtual agents in crowds.

Reviews of articles to conferences and journals:

- Review for the I3D ACM SIGGRAPH Symposium.
- Review for the CAVW - Computer Animation and Virtual Worlds Journal published by Wiley.
- Two Reviews for the CASA 2018: The 31th Conference on Computer Animation and Social Agents.
- Review for the CGF 2017: Computer Graphics Forum journal.
- Two Reviews for the Computer and Graphics journal.

## II - PUBLICATION(S) DURING YOUR FELLOWSHIP

Accepted

- Georgios Kyriltsias, Amyr Borges Fortes Neto, Panayiotis Charalambous, Marios Avraamides, Yiorgos Chrysanthou: "Virtual Environment Navigation Assisted by Neural Networks." IEEE-VR 2018, VHCIE, Reutlingen, Germany.

To be Written:

- Georgios Kyrlitsias, Amyr Borges Fortes Neto, Panayiotis Charalambous, Julien Petré, Yiorgos Chrysanthou: "Scenarios with Crowds and Traffic."
- Alejandro Rios Jerez, Amyr Borges Fortes Neto, Nuria Pelechano, Yiorgos Chrysanthou: "Parameters for Emergency Behaviour in Virtual Crowds."

### **III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES**

IEEE-VR 2018 – VHCIE Seminar (Virtual Humans and Crowds in Immersive Environments  
- <https://sites.google.com/site/vhcieieeevr2018/>)

Participated as speaker during the VHCIE Seminar to present the paper entitled "Virtual Environment Navigation Assisted by Neural Networks"

### **IV – RESEARCH EXCHANGE PROGRAMME (REP)**

Host: INRIA Institute, Rennes, France.

Coordinator: Dr. Julien Petré

Project: Road Crossing Behaviour

During the period of REP, a model proposed and discussed with Prof. Julien Petré was conceived and implemented. The collaboration continued after this period, when another model was also implemented by research group member Georgios Kyrlitsias. Now the laboratory has two implemented models which are prone to comparison. It is expected to develop a virtual environment with cars and pedestrians. The addition of road crossing behaviour ability in virtual crowd agents results in more realistic scenarios, opening a branch for urban crowd simulation. Furthermore, it is possible to develop scenarios for autonomous cars navigation strategies. This creates a framework to develop and test autonomous cars in a cheap and safe environment.