

## Triennial Final Report

PhD candidate: Altieri Federico

Cycle: XXX

Curriculum: Ph. D. in Information Engineering

Thesis title: **Adoption of the network gaming paradigm for technology mediated learning in education**

Supervisor: prof. Sergio Canazza Targon

### Part 1: Educational

Courses attended during the three years:

- **Statistical Methods** (CFU 6) Prof. Lorenzo Finesso
- **Real-Time Systems and applications** (CFU 5) Prof. Gabriele Manduchi
- **Digital Processing of Measurement Information** (CFU 4) Prof. Claudio Narduzzi
- **The FFT and its use in digital signal processing** (CFU 5) Prof. Silvano Pupolin

Other schools and courses attended:

- Summer School of the 12th edition of Sound and Music Computing conference, hosted by University of Maynooth, Ireland:
  - o Hands-on Foley Sound workshop with Ardmore Sound, Caoimhe Doyle and Jean McGrath;
  - o Workshop on modern digital studio mastering techniques by MSB Mastering, Ireland;
  - o Creative Coding for Natural User Interfaces - Stephen Howell (Microsoft Ireland);
  - o Group introduction followed by Lecture in Sound Texture Synthesis algorithm Dr Sean O'Leary (IRCAM);
  - o Workshop on Parallel computing and GPUs for audio processing by Professor John Fitch (University of Bath);
  - o Workshop by Xilinx Ireland on FPGA Technology and Audio;
  - o MAKER.IE DIY Fuzz Guitar Pedal Workshop.

International conferences attended:

- SMC 15 – Sound and Music Computing Conference 2015 – Maynooth (Ireland) 2015
- MET 2016 – Music, Education, Technology – London 2016
- iED Europe 2016 – Europe immersive Education – Padua 2016

National conferences attended:

- CIM 16 - XXI Colloqui di Informatica Musicale – Cagliari 2016

Periods abroad

- October 2016 / March 2017 (included) as “Visiting Lecturer” at the Institute of Education of the University College of London under the supervision of Dr. Evangelos Himonides

Tutorship and support to teaching activities:

- Architettura degli elaboratori (Canale 5) during AA 2015/2016 under the supervision of doct. Sandro Savino, with an amount of 40 hours spent (engaged as teaching aid)

- Architettura degli elaboratori (Canale 5) during AA 2016/2017 under the supervision of prof. Francesco Silvestri, with an amount of 100 hours spent (engaged as tutor junior)

Experience in a foreign institute: I spent a six-month experience at the University College of London, hosted by prof. Evangelos Himonides inside his office at the Institute of Education.

## Part 2 Research activity

During the first year of my Ph. D. studentship, I had the occasion to learn and research the state-of-the-art progresses about the field known as Sound and Music Computing.

At the beginning, I concentrated mainly on the preservation of audio cultural heritage: during this period, I was part of the organizing committee of IPPSA 2015 (Digital philology for the preservation of audio archives – first international workshop), supported by our department and held Sept 9<sup>th</sup> 2015 inside Villa Contarini in Piazzola sul Brenta (PD).

At the beginning of the second year, I started to shift my attention to my actual thematic: interactive instruments for education. Initially, I begun by working side by side with my colleague and fellow Marcella Mandanici, who last year discussed her Ph. D. thesis about the effects of interactive spaces on students of primary school.

My first collaboration with Marcella was about the building and the experimentation of a game of her creation: *Good or Bad?*. We tested it on general audience and on a controlled environment: results showed a general increase of the engaging power of the game when used with an interactive space (floor projection with motion-tracking technology). I also worked with her on the building and testing of *Harmonic Walk*, a project born to study the possibility to deliver music teaching through interactive spaces and *serious games*.

I am actually working on a paper to be submitted to an international journal that will show the results found during this research. Exploiting this fundamental first experience, I had the chance to expand my knowledge and investigate the world of the so-called *serious games*, which are games that, besides the obvious entertainment goal, are built up with the aim to teach some topics or train some particular player's activity. In particular, on my third year, I exploited my period spent at the Institute Of Education of the UCL to find an unexplored research path on this field: how some gaming context services can be helpful to keep the students motivated to play our serious games.

In other words, I suggest, in my thesis, the development and the study of these unexplored paradigms of the entertainment, by investigating about the innovations introduced by the commercial videogames market (social networking between players, achievement systems...) and importing them into the field of the electronic instruments for education. In this, the abroad experience was precious, in particular the contact with the current project that is running at IoE, where is under development a "meta-game" for teachers, to help them to define new games even without particular programming skills. Meeting and knowing this project gave me the right stimulus to investigate in this field.

To define my model, I undertook an investigation on desires and expectations of both the actors interested by such a paradigm in a theoretical educational scope: the students/players and the teachers.

Interviews and continuous feedback helped me on developing a framework that have all the desired characteristics to be proposed as a part of the formative offering of schools: the next step will consist on the on-field test, which I sincerely hope will be the next step of my research on these technologies.

This model led to the definition of a prototype, called PONG (Pedagogical Online Network for Gaming), that should be the technological base for the further development of the project in the future. This development process led me to learn some modern technologies, like the Spring Framework and the non-relational databases.

As a secondary activity, I kept spending time on supporting the group of the SMC laboratory that takes care about preservation of audio cultural heritage, putting basis for some perceptive experiments about equalization on analogic audio carriers' playback. I also suggested, promoted and contributed to the management of the modelling and the development of a new software to be used by the workers of this field. The project is currently ongoing with the collaboration of my supervisor.

### Part 3 Publications:

- M. Mandanici, A. Rodà, S. Canazza, and F. Altieri, "The 'Harmonic walk' and enactive knowledge: An Assessment Report," in *The 12th Sound and Music Computing Conference*, 2015.
- F. Altieri, M. Mandanici, S. Canazza, A. Rodà, E. Menegatti, and M. Munaro, "'Good or Bad?' Potenziare L'ascolto attivo mediante spazi interattivi," in *XXI Colloquio di Informatica musicale*, 2016.
- Rodà, F. Altieri, M. Mandanici, N. Pretto, and S. Canazza, "'Good or Bad?': an Augmented Reality Game to Engage Users in Active Music Listening Tasks," in *6th European Immersive Education Summit*, 2016.
- M. Mandanici, F. Altieri, A. Rodà, and S. Canazza, "Listen, Move, Learn: full body interactions in a music learning floor camera space," in *Proceedings of the Sempre MET2016: researching music, education, technology*, 2016.

Padova, 30/8/2017

Federico Altieri



Prof. Sergio Canazza Targon

