



MARGARITA PAPAETHYMIU, ESR10

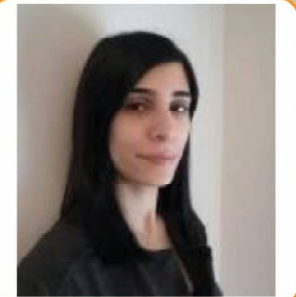
Interactive and Mixed reality environments in Digital Cultural Heritage

Foundation of Research and Technology (FORTH)

Institute of Computer Science

Main Objectives

- Vision based user gesture tracking and activity recognition
- Geometric and Illumination registration for dynamic scenes in AR
- Context-Aware Adaptive Rendering System for User-Centric Pervasive Computing Environments
- Cross-testing and validation with Europeana and MoW metadata model



BACKGROUND



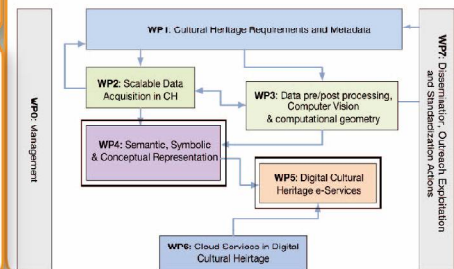
University of Cyprus
 • BSc in Computer Science
 • MSc in Computer Games and Interactive Technologies

SUBMISSIONS

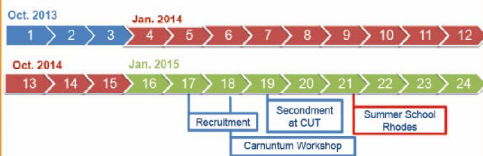
- AGACSE15
- A Conformal Geometric Algebra framework for Mixed Reality and mobile display

WORK PACKAGES

WP4: Deliverable 4.1
 WP5: Deliverable 5.1, 5.2, 5.4



ITN-DCH TIMELINE



SECONDMENTS

Cyprus University of Technology (6th – 20th April)

PLANNING: Université de Genève, The University of Warwick, Centre for Research and Technology Hellas

RESEARCH FIELDS

Augmented Reality app

- glGA: a lightweight shader based C++ CG framework
- MetaioSDK: markerless tracking using SLAM
- Supported by glGA framework and Unity3d
- **envisaged innovation:** Attaining a high level of believability and realism of real-time registration between real scene and virtual augmentation. To accomplish this the camera position-orientation and projection should be consistent (geometrical registration). Moreover, lighting-shading of virtual objects with respect to real objects should be consistent (illumination registration). We will focus on developing a method for illumination registration for deformable characters using PRT and HDR IBL methods.



Precomputed Radiance Transfer

- Method used for Global Illumination in order to produce more realistic results using environment maps
- Soft shadows and interreflections
- Low order Spherical Harmonics (SH) to present lighting and transfer functions
- **envisaged innovation:** Development of novel methods for Spherical Harmonics handling using a single GA framework. By using GA objects (rotors) the spherical harmonics real-time management will be more efficient compared to existing methods



Geometric algebra (GA) and Conformal Geometric Algebra (CGA)

- Powerful computational framework
- Focus on achieving higher performance
- Express quaternions as GA Rotors
- CGA to include translations, dilations and inversions
- Can be used to handle SH, rotation interpolation and smoother AR camera movement
- **envisaged innovation:** Application of a single CGA method for interactive virtual character animation blending and AR camera tracking in order to improve the performance and consistency of transformations compared to other mathematical frameworks like linear and quaternion algebra



Home Country



Host Country



Host Organization

