



Master in Artificial Intelligence (UPC-URV-UB)

Master's Thesis Proposal

General Information

Master's Thesis Title: *Augmented reality in the wild.*

Publication Date: 04/11/10

Expiry Date: 04/11/11

Modality: **research work**

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Observations:

Student's Name:
(if already known)

M.Sc. Thesis Description

Brief Description: (a 4-5 lines long paragraph)

Augmented reality mixes computer generated graphics with real imaging using computer vision techniques. However, nowadays, augmented reality is still a very young field of research, and its applications usually involve predefined tags. In this master thesis we want use computer vision and artificial intelligence techniques to explore the viability of using natural landmarks as keypoints for computer graphics reference.

Detailed Description: (a half-page or one-page description, may include a brief task planning)

Augmented reality mixes computer generated graphics with real imaging using computer vision techniques. However, nowadays, augmented reality is still a very young field of research, and its applications usually involve predefined tags. In this master thesis we want use computer vision and artificial intelligence techniques to explore the viability of using natural landmarks as keypoints for computer graphics reference and matching.

Keypoint detection is a fundamental step in computer vision for trimming the amount of data to be processed and only focus on that which is more relevant. One of the main applications of keypoints is to solve in a robust way the problem of template matching. In that problem an image has to be aligned to a certain template. The computation of robust keypoints reduces this problem to a simpler one, aligning the keypoints. The same notion can be used if we want to align a computer generated scene with an image. A correspondence between the information of the image and the CG scene must be performed. Using keypoints this problem is reduced to tracking the keypoints in the image.

The workflow of this work is as follows: first, estimation of the depth from motion allows to segment a real scene in parallax planes that will help handling occlusions. Second, a set of keypoints must be identified and aligned in both the CG model and in real images for obtaining the correct orientation and building the adequate scene. And finally, those key points must be properly tracked when the camera moves handling possible occlusions.

References: (bibliographical references, relevant web links, etc.)

S. Hinterstoisser, V. Lepetit, S. Benhimane, P. Fua, and N. Navab, [Learning Real-Time Perspective Patch Rectification](#). *International Journal of Computer Vision*

M. Ozuysal, M. Calonder, V. Lepetit, and P. Fua, [Fast Keypoint Recognition using Random Ferns](#). *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2010.

E. Molla and V. Lepetit, [Augmented Reality for Board Games](#). In *Proceedings of the International Symposium on Mixed and Augmented Reality*, 2010.

Observations:

Programming skills are required for adequately handling computer graphics engine and computer vision libraries.

Location and Date: Barcelona,

To the Academic Commission of the Master in Artificial Intelligence (CAIMIA)