Markerless facial motion capture using low cost hardware
PhD Thesis Proposal

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Proposed co-supervisor: Miguel Tavares Coimbra
Host Institution: IT – Instituto de Telecomunicações
Location: DCC, FCUP
Main Research Area: Computer Graphics, Computer Vision

Introduction: Current state-of-the-art facial motion capture systems for cinema and video-games use high-speed cameras and markers for accurate 3D shape extraction. The hardware and computational power requirements of these solutions limits them to high-budget projects and to the production phase of digital media. In this work we aim at exploring the possibility of using low cost hardware (e.g. webcams) and low budget markerless solutions to the facial motion capture problem, enabling its usage for other possibilities such as web-conferencing or interactive video games.

The complementary backgrounds of the proposed supervisors in both Computer Graphics [1-3], and Computer Vision [4-6], paves the way for novel ideas and fresh approaches to this problem, hopefully leading to low-cost robust solutions to this ground-breaking topic.

Objectives and Proposed Methodology:
- Review the state-of-the-art in marker-based facial motion capture.
- Review the state-of-the-art in face recognition.
- Research, develop and test algorithms for markerless facial motion capture.
- Create a hardware prototype that integrates the developed algorithms.
- Publish all results in high-impact journals and conferences.

References:
[1] V. Orvalho, "Fast and Reusable Facial Rigging and Animation", in SIGGRAPH, ACM. August 2007

[2] V. Orvalho, "Reusabale Facial Rigging: Create Once Use Many" in SCA, ACM. August 2007.

[3] V. Orvalho "Creating Faces: Reusing Character Rig and Animations.", in EUROGRAPHICS, ACM. Sep 2007.

[4] J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "Automated Topographic Segmentation and Transit Time Estimation in Endoscopic Capsule Exams", accepted for publication in IEEE Transactions in Medical Imaging.

[5] M. Coimbra, and J.P. Silva Cunha, "MPEG-7 visual descriptors – Contributions for automated feature extraction in capsule endoscopy", in IEEE Trans. Circuits and Systems for Video Technology, vol. 16/5, 2006, pp. 628-637.

[6] M. Coimbra, and M. Davies, "Approximating optical flow within the MPEG-2 compressed domain" in IEEE Transactions on Circuits and Systems for Video Technology, Volume: 15 , Issue: 1 , Jan. 2005, pp. 103-107.

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