



**UNIVERSITY OF CENTRAL FLORIDA**  
CENTER FOR RESEARCH IN COMPUTER VISION

# Dr. Olaf Hellwich

## Technical University Berlin

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**“Integrating Close-Range 3D Computer Vision and Synthetic Aperture Radar  
Satellite Remote Sensing”**

Friday, June 21, 2013 · 2:00PM · HEC 101



### ABSTRACT

For the last decade the Computer Vision & Remote Sensing research group at Technical University Berlin has investigated both high-accuracy 3D reconstruction from close-range imagery e.g. acquired by synchronized trinocular video cameras, and Synthetic Aperture Radar (SAR) polarimetry, interferometry and tomography for the analysis agricultural and suburban areas. In the first two parts of the talk highlights from both areas will be presented. In 3D object reconstruction we achieved more efficient robust sensor orientation by explicitly analyzing neighborhood relations in-between images using a graph structure of image triplets. Furthermore, waterproof 3D reconstruction of anthropogenic objects from noisy point clouds has been substantially improved by simultaneous topologic decomposition and skeletonization using Markov Random Fields and Voronoi diagrams.

After a short treatment of SAR-specific image preprocessing, 3D reconstruction of urban objects using high-resolution SAR tomography and 3D point cloud segmentation will be introduced. We achieved improvements by combining tomography with polarimetric features. In the third part of the talk I will discuss the combination of high-resolution multi-view stereo reconstructions with much lower resolution SAR image data based on simulated SAR acquisitions. In case of success this would allow to transfer high precision satellite orbit information to terrestrial positioning – allowing various new applications.

### BIOGRAPHY

**Olaf Hellwich** received the M.Sc. degree in surveying engineering from University of New Brunswick in 1992 and the Ph.D. degree from Technische Universität München in 1997. He subsequently headed the Remote Sensing Group at the Department of Photogrammetry and Remote Sensing of Technische Universität München. Since 2001 he has been a Professor with Technische Universität Berlin, initially for photogrammetry and cartography and since 2004 for computer vision and remote sensing. From 2006 to 2009 he was Dean of TUB's Faculty of Electrical Engineering and Computer Science. His research interests are in 3-D object reconstruction e.g. from video sequences, object recognition e.g. real-time head pose estimation, and synthetic aperture radar remote sensing e.g. for surface motion estimation. Dr. Hellwich was the recipient of the Hansa Luftbild Prize of the German Society for Photogrammetry and Remote Sensing in 2000.