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Computer Vision

CRL's Computer Vision Group (CVG) conducts cutting-edge research in 3D computer vision and machine learning with the aim to improve the ability of software to understand and interpret visual data. In our work we support Toshiba's overall mission to create modern technology with a positive impact on society. Our main focus is on fundamental and academically oriented research, and consequently we also have ongoing collaborations with top UK universities.

More about CVG ►

RESEARCH

Online Structure from Motion

The problem of online structure from motion is also known as simultaneous localisation and mapping. It involves a system that estimates a sensor's pose and the structure of the environment in real-time. We develop methods for visual odometry, loop closure detection and pose graph optimization.

Scale Exploiting Minimal Solvers for Relative Pose with Calibrated Cameras, S. Liwicki et al., BMVC (2017)

Online Variational Bayesian Motion Averaging, G. Bourmaud, ECCV (2016)

The Likelihood-Ratio Test and Efficient Robust Estimation, A. Cohen et al., ICCV (2015)

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Visual Text-to-Speech

In collaboration with CRL's Speech Technology Group we produced a complete system for expressive visual text-to-speech. Our system is able to producing expressive verbal and visual output in the form of a 'talking head', given an input text and a set of continuous expression weights.

Expressive Visual Text-to-Speech as an Assistive Technology for Individuals with Autism Spectrum Conditions, S. A. Cassidy et al., CVIU (2016) / free

Photo-Realistic Expressive Text to Talking Head Synthesis, V. Wan et al., Interspeech (2013) / free

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Optimization Methods

Energy-minimization methods are ubiquitous in computer vision and related fields. In our work we design efficient low-level optimization strategies at pixel level, and robust optimization methods for 3D vision problems with high complexity.

pOSE: Pseudo Object Space Error for Initialization-Free Bundle Adjustment, J. H. Hong et al., CVPR (2018) / free

Maximum Consensus Parameter Estimation by Reweighted ℓ1 Methods, P. Purkait et al., EMMCVPR (2017)

Generalized Fusion Moves for Continuous Label Optimization, C. Zach, ACCV (2016)

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More CVG Research ►

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Publications

A CNN Based Approach for the Near-Field Photometric Stereo Problem
F. Logothetis, I. Budvytis, R. Mecca, R. Cipolla
R-AL, April 2021 / **arXiv**

Rotation Equivariant Orientation Estimation for Omnidirectional Localization
C. Zhang, I. Budvytis, S. Liwicki, R. Cipolla
ACCV, November 2020 / free

Embodied Visual Navigation with Automatic Curriculum Learning in Real Environments
S. Morad, R. Mecca, R. P. K. Poudel, S. Liwicki, R. Cipolla
BMVC, September 2020 / **arXiv** / free

A Spherical Approach to Planar Semantic Segmentation
C. Zhang, S. He, S. Liwicki
BMVC, September 2020 / free

Orientation-aware Semantic Segmentation on Icosahedron Spheres
C. Zhang, S. Liwicki, W. Smith, R. Cipolla
ICCV, October 2019 / **arXiv**

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