JULIUS ERBACH

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PUBLICATIONS

EvShutter: Transforming Events for Unconstrained Rolling Shutter Correction [pdf] CVPR
Authors: J. Erbach, S. Tulyakov, P. Vitoria, A. Bochicchio, Y. Li   2023

TimeLens: Event-based Video Frame Interpolation [pdf]   CVPR 2021
Authors: S. Tulyakov, D. Gehrig, S. Georgoulis, J. Erbach, M. Gehrig, Y. Li, D. Scaramuzza

Event-based Image Deblurring with Dynamic Motion Awareness [pdf]   ECCV-W 2022
Authors: P. Vitoria, S. Georgoulis, S. Tulyakov, A. Bochicchio, J. Erbach, Y. Li

Multi-Bracket High Dynamic Range Imaging with Event Cameras [pdf]   CVPR-W 2022
Authors: N. Messikommer, S. Georgoulis, D. Gehrig, S. Tulyakov, J. Erbach, A. Bochicchio, Y. Li, D. Scaramuzza

EDUCATION

Swiss Federal Institute of Technology (ETH Zurich)   *September 2019 - September 2021*
Master in Robotics, Systems and Control with distinction   Overall Grade: 5.76/6
Focus on Machine Learning and Perception

Swiss Federal Institute of Technology (ETH Zurich)   *September 2015 - September 2018*
Bachelor in Mechanical Engineering   Overall Grade: 5.58/6
Focus on Mechatronics and Control

WORK EXPERIENCE

ETH Zurich, Photogrammetry and Remote Sensing Group   September 2024 - present
Under Supervision of Prof. Konrad Schindler, Prof. Bernt Schiele, Dr. Jan-Eric Lenssen

My research focuses on computer vision, leveraging learned priors from large models such as diffusion models, large language models, and vision-language models ato enhance tasks like 3D modeling, scene understanding, and computational photography. I aim to harness these rich priors to advance visual perception and real-world applications.

Huawei Research Center , Zurich   September 2021 - 2024
Research Engineer, Computer Vision and Machine Learning

Developed state a the art algorithm for event based rolling shutter correction (EvShutter published at CVPR 2023) and other computational photography algorithms. Construction of multi-camera machine vision setup utilizing a beamsplitter including the recording, post processing and real-time inference in ROS, C++ and Python.

Huawei Research Center , Zurich   September 2020 - January 2021
Intern, Computer Vision and Machine Learning

Worked on multiple research projects related to computational photography with event cameras. Co-authored 1 paper and and co-invented a patent on a different project.

Development of different calibration methods for a stereo setup consisting of frame based and event camera. Work on stereo registration between two different sensors types. Recording of datasets.

BMW Group , Munich   February 2019 - July 2019
Intern, Transmission Pre-Development

Conduction of measurements and maintenance work at a test bench. Implementation of control functions in the test bench software. Development of the signal processing and calibration for a new sensor. Tools used: Matlab, Simulink, Dymola

Teaching Assistant at ETH   Autumn 2016 - Spring 2020

Held weekly seminars and corrected assignments for the D-MAVT courses in *Mechanics I*, *Computer Science*, *Control Systems I*, *Electrical Engineering*

PROJECTS

Master Thesis   Grade: 6/6
Stereo Alignment for a Hybrid Camera Setup Consisting of an Event and a RGB Camera
The goal of this project was to register events from an event camera in RGB images filmed by a standard frame-based camera, with both sensors in a stereo setup. This can allow different downstream tasks to utilize information from both sensor modalities. Depth information can be obtained as a byproduct of this solution.

Semester Project   Grade: 6/6
Multi-View Object Detection
The goal of this project was to improve the accuracy of object detection networks by combining information from multiple frames using projective geometry.

Lecture Project (3D Vision)   Grade: 6/6
Semantic Features for Localization
During this group project, a pipeline was developed, that extracts semantic information from camera images and maps them in 3D using stereo and lidar data. A particle filter was then developed, that enables localization in the mapped environment.

Research Work   Grade: 6/6
Control strategies of pulsatile ventricular assist devices
The goal of this project was to find, analyze and compare different control algorithms and strategies for pulsatile ventricular assist devices.

Bachelor Thesis   Grade 6/6
A framework for endothelial cell segmentation and analysis
An automated image analysis framework was programmed that was able to detect cell nuclei and segment whole cells using a marker-based watershed algorithm. Post-processing tools as splitting of overlapping objects and feature analysis like cell orientation, size, density etc. were implemented too.

TECHNICAL STRENGTHS

Programming   Python, PyTorch, Tensorflow, C++, ROS, OpenCV, Matlab, Simulink
Software & Tools MS Office, Latex, UNIX, Git

EXTRA-CIRRUCULAR

Voluntary Work

Head of the event technology team at Evangelisches Gymnasium zum Grauen Kloster

Sports and Hobbies

Competitive Sailing, member of D/C Squad, representative of Germany at the ISAF Youth Worlds 2014 (12. place)

Photography, Skiing, Kite Surfing, Scuba Diving, Race Biking