



Copyright © Badisches Landesmuseum

ISPRS TC I Midterm Symposium

Innovative Sensing

From Sensors to Methods and Applications

Karlsruhe, GERMANY

Hosted by the
Karlsruhe Institute of Technology
Institute of Photogrammetry and Remote Sensing



WELCOME TO KARLSRUHE

Welcome to the ISPRS Technical Commission I Midterm Symposium on “Innovative Sensing - From Sensors to Methods and Applications” held in Karlsruhe, Germany, on 10-12 October 2018. The symposium is organized by the ISPRS Technical Commission I “Sensor Systems” which is concerned with the design, construction, characterization, calibration and use of imaging and non-imaging sensors, sensor systems and sensor networks for photogrammetry, remote sensing and spatial information sciences. This includes the development of new and innovative technological concepts, yet likewise models and methods to optimally exploit, calibrate and thoroughly evaluate new sensors, networks and single sensor components.

The recent years were characterized by rapid developments in various fields of sensor technology, design of smart sensor networks, small unmanned platforms (UAS) and new satellite imaging concepts or satellite constellations, respectively. This includes the sector of - often low-cost - industrial imaging sensors and likewise the development of highly sophisticated and specialized sensors for Earth observation, thereby covering multiple modes of active or passive sensor technology and various scales of imaging.

In summary, the main topics of the symposium are:

- Innovative and integrated UAS-oriented sensor and (small) platform concepts
- Systems and methods for terrestrial and mobile mapping in complex indoor and outdoor environments
- Small and low-cost active sensing (micro-LiDAR and -RADAR sensors)
- Design and realization of sensors and constellations for digital aerial and spaceborne missions for Earth observation
- Geometric and radiometric properties, quality standards, and factors affecting data quality
- Benchmark definition, calibration and evaluation of imaging and non-optical imaging sensors
- Integrated platform guidance, navigation, direct georeferencing (positioning and orientation) and integrated sensor orientation
- On-board (pre-)processing and concepts for embedded systems

Regarding these topics, a diversity of contributions are provided by the ten ISPRS Commission I Working Groups and the two related ISPRS Intercommission Working Groups:

- WG I/1 Multi- and Hyperspectral Sensing
- WG I/2 LiDAR, Air- and Spaceborne Optical Sensing
- WG I/3 SAR and Microwave Sensing
- WG I/4 Calibration and Validation of Satellite Sensors
- WG I/5 New 3D Sensors for Metrology and Industrial Vision
- WG I/6 Multi-sensor Integration and Fusion
- WG I/7 Mobile Mapping Technology
- WG I/8 Satellite Constellations for Remote Sensing
- WG I/9 Integrated Sensor Orientation, Calibration, Navigation and Mapping
- WG I/10 Sensor Systems Verification, Benchmarks, Evaluation
- ICWG I/II UAS and Small Multi-sensor Platforms: Concepts and Applications
- ICWG I/IV Robotics for Mapping and Modelling

In total, we received 36 full paper submissions and 85 abstract submissions. The full paper submissions entered a strict double-blind peer-review process. Each paper was checked by at least three reviewers and, in case of strongly varying opinions, an additional external reviewer was involved for the acceptance decision. Finally, 22 full paper submissions were accepted for publication in the ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences (Volume IV-1). Among the remaining full paper submissions and the abstract submissions, a total number of 70 submissions were accepted for publication in the International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences (Volume XLII-1).

All provided reviews have been thoroughly checked regarding their level of detail and their quality. We are pleased to recognize the following researchers for their “Outstanding Contribution in Reviewing”:

- Michael Cramer
- Marcus Hebel
- Petra Helmholz
- Ludwig Hoegner
- Franz Rottensteiner
- Michael Schmitt
- Michael Weinmann

The program of the symposium is organized in seven technical sessions and two poster sessions. These sessions are complemented by three keynotes:

- K1 3D Reconstruction in Realtime
(Marc Stamminger)
- K2 Tandem-L or NewSpace SAR: Which Spaceborne Sensor Technology will Shape the Future?
(Alberto Moreira)
- K3 Visual Localization with Deep Convolutional Networks
(Torsten Sattler)

In addition, three full- or half-day tutorials are offered (9 October 2018) with special focus on young scientists and practitioners from industry and (non-)governmental agencies:

- T1 UAV and Deep Learning Technologies for Remote Sensing
(Raul Queiroz Feitosa, Petra Helmholz)
- T2 Topography and Bathymetry via Laser Scanning and Multi-Spectral Imaging – From Sensors to Applications
(Gottfried Mandlburger)
- T3 Photogrammetric Methods in the Machine Vision Industry
(Markus Ulrich)

We wish to thank all authors, the keynote speakers and the tutorial organizers for their contributions. Furthermore, we thank the members of the scientific committee for their excellent job in reviewing the received submissions and the members of the local organizing committee for their great support.

October 2018

Boris Jutzi, Martin Weinmann, Stefan Hinz

COMMITTEES

Symposium Committee

- Stefan Hinz – KIT-IPF, Germany
- Raul Queiroz Feitosa – PUC-Rio-DEE, Brazil
- Boris Jutzi – KIT-IPF, Germany

Publication Committee

- Martin Weinmann – KIT-IPF, Germany

Scientific Committee

- Helge Aasen – ETH Zurich, Switzerland
- Michael Arens – Fraunhofer IOSB, Germany
- Costas Armenakis – York University, Canada
- Krzysztof Bakuła – Warsaw University of Technology, Poland
- Timo Balz – Wuhan University, China
- Simon Buckley – University of Bergen, Norway
- Jorge Centeno – Universidade Federal do Paraná, Brazil
- Daniele Cerra – German Aerospace Centre (DLR), Germany
- Kaiqiang Chen – Chinese Academy of Sciences, China
- Min Chen – Purdue University, USA
- Kai-Wei Cheng – National Cheng Kung University, Taiwan
- Filiberto Chiabrandi – Politecnico di Torino, Italy
- Ismael Colomina – GeoNumerics, Spain
- Michael Cramer – Universität Stuttgart, Germany
- Naser El-Sheimy – University of Calgary, Canada
- Jean-Baptiste Féret – IRSTEA, France
- Markus Gerke – Technical University of Braunschweig, Germany
- Craig Glennie – University of Houston, USA
- José Alberto Gonçalves – University of Porto, Portugal
- Görres Grenzdörffer – Rostock University, Germany
- Marcus Hebel – Fraunhofer IOSB, Germany
- Petra Helmholz – Curtin University, Australia
- Ludwig Hoegner – TUM, Germany
- Dorota Iwaszczuk – Technical University Munich, Germany
- Karsten Jacobsen – Leibniz University Hannover, Germany

- Florent Lafarge – INRIA, France
- Andrea Masiero – University of Padova, Italy
- Jochen Meidow – Fraunhofer IOSB, Germany
- Rupert Müller – German Aerospace Centre (DLR), Germany
- Stephan Nebiker – FHNW, Switzerland
- Francesco Nex – University of Twente, Netherlands
- Daniela Poli – Terra Messflug GmbH, Austria
- Rongjun Qin – Ohio State University, USA
- Peter Reinartz – German Aerospace Centre (DLR), Germany
- Fabio Remondino – Bruno Kessler Foundation, Italy
- Petri Rönnholm – Aalto University, Finland
- Rafael Rosa – Bradar Indústria S.A., Brazil
- Franz Rottensteiner – Leibniz Universität Hannover, Germany
- Michael Schmitt – Technical University of Munich, Germany
- Jan Skaloud – Swiss Federal Institute of Technology EPFL, Switzerland
- Julian Smit – University of Cape Town, South Africa
- Uwe Soergel – University of Stuttgart, Germany
- Uwe Still – TUM, Germany
- Nora Tilly – University of Cologne, Germany
- Charles Toth – The Ohio State University, USA
- Wissam Wahbeh – FHNW, Switzerland
- Cheng Wang – Xiamen University, China
- Mi Wang – Wuhan University, China
- Jan Dirk Wegner – ETH Zurich, Switzerland
- Michael Weinmann – University of Bonn, Germany
- Chenglu Wen – Xiamen University, China

Local Organizing Committee

- Heike Birkel – KIT-IPF, Germany
- Ilse Engelmann – KIT-IPF, Germany
- Jens Kern – KIT-IPF, Germany
- Jens Leitloff – KIT-IPF, Germany
- Felix Riese – KIT-IPF, Germany
- Thomas Vögtle – KIT-IPF, Germany
- Sven Wursthorn – KIT-IPF, Germany

TABLE OF CONTENT

WELCOME TO KARLSRUHE	2
COMMITTEES	5
TABLE OF CONTENT	7
TUTORIALS (Tuesday, 9 October 2018 - 9:30am)	9
T1: UAV and Deep Learning Technologies for Remote Sensing	10
T2: Topography and Bathymetry via Laser Scanning and Multi-Spectral Imaging	11
T3: Photogrammetric Methods in the Machine Vision Industry	12
WELCOME RECEPTION (Tuesday, 9 October 2018 - 7:00pm)	13
SESSIONS (Wednesday, 10 October 2018 - 9:30am)	15
OO: Opening	15
K1: Keynote	15
O1: Multi-View and Multi-Modal Image Analysis	16
P1: Interactive Presentation (Poster)	17
O2: LiDAR and Optical Sensing	22
ICEBREAKER (Wednesday, 10 October 2018 - 7:00pm)	23
SESSIONS (Thursday, 11 October 2018 - 8:30am)	24
K2: Keynote	24
O3: SAR and Microwave Sensing	24
O4: Thermal, Multi- and Hyperspectral Sensing	25
P2: Interactive Presentation (Poster)	26
O5: Mobile Mapping	31
DINNER (Thursday, 11 October 2018 - 7:00pm)	32
SESSIONS (Friday, 12 October 2018 - 8:30am)	35
K3: Keynote	35
O6: Sensor Orientation and Navigation	35
O7: UAS and Small Multi-sensor Platforms	36
OC: Closing	36
RESTAURANTS	37
GENERAL INFORMATION	38
WiFi	38
Oral Presentation	39
Interactive Presentation (Poster)	39
MAKE YOUR NOTES	40
AUTHOR LIST	43



ge|ø|numerics

Thank you for sponsoring!

TUTORIALS (Tuesday, 9 October 2018 - 9:30am)

Venue: Jordan lecture hall, Schwidetsky lecture hall, Haid lecture hall (Ground floor)

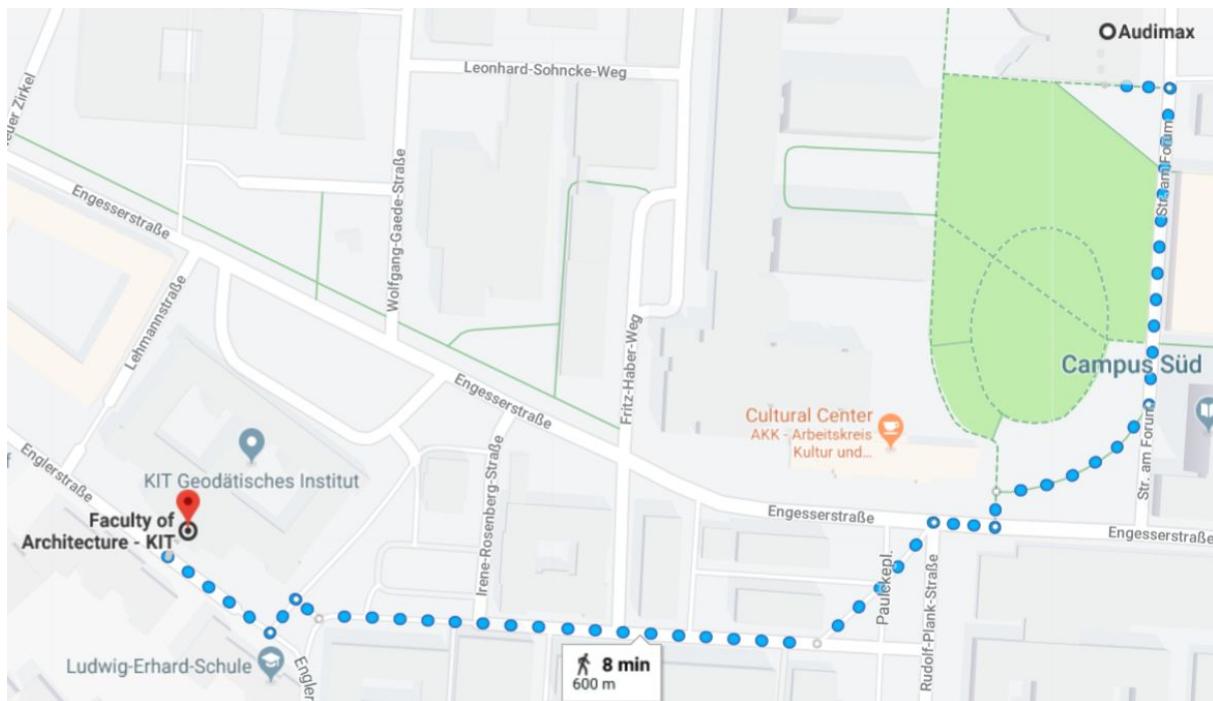
Address: [Englerstraße 7, 76131 Karlsruhe, Building 20.40](https://goo.gl/maps/SY83r2OW6xJ2)

There are three tutorials offered and they start at **9:30am**.

A certificate of attendance for the tutorials will be issued only to participants who attend the scheduled sessions.

Way from **KIT Audimax** to **KIT Building 20.40**.

(<https://goo.gl/maps/SY83r2OW6xJ2>)



T1: UAV and Deep Learning Technologies for Remote Sensing

Venue: Jordan lecture hall (Ground floor)

Address: Englerstraße 7, 76131 Karlsruhe, Building 20.40

Presenters



Prof. Raul Queiroz Feitosa

Pontifical Catholic University, Rio de Janeiro, Brazil

Dr. Petra Helmholz

Curtin University, Perth, Australia

Content

The workshop is organized in two parts. The first part covers an introduction into UAV systems including their sensors and specification followed by UAV specific flight planning and image processing procedures. The second part presents the fundamentals and applications of deep learning techniques for remote sensing image analysis.

Target group

PhD students/researchers/practitioners

Level

Intermediate

Duration

Full-day

**T2: Topography and Bathymetry via Laser Scanning and Multi-Spectral Imaging
- From Sensors to Applications**

Venue: Schwidefsky lecture hall (Ground floor)

Address: Englerstraße 7, 76131 Karlsruhe, Building 20.40

Presenter



Dr. Gottfried Mandlburger
University of Stuttgart, Stuttgart, Germany

Content

In this tutorial the basics of mapping topography and bathymetry from airborne laser scans and multi-spectral imagery are discussed. Special emphasis is laid on modern hybrid sensors providing, both, active laser scanners and passive camera systems on the same platform. Such multi-sensor systems are available for well established topographic LiDAR instruments utilizing IR laser sources, topo-bathymetric laser scanners using green laser radiation to measure submerged topography, and multi-spectral scanners especially for vegetation mapping, but also for recently introduced Single Photon LiDAR sensors. In all cases the laser scanners are usually coupled with RGB, CIR, or even RGBI cameras. The theoretical foundations for jointly processing scans and images for terrain mapping, both, above and below the water surface are first introduced in lecture sessions. The gained knowledge is subsequently applied and deepened in hands-on sessions based on real data using the scientific laser scanning and point cloud software OPALS.

Target group

PhD students/researchers/practitioners

Level

Intermediate

Duration

Full-day

T3: Photogrammetric Methods in the Machine Vision Industry

Venue: Haid lecture hall (Ground floor)

Address: Englerstraße 7, 76131 Karlsruhe, Building 20.40

Presenter



PD Dr.-Ing. Markus Ulrich
MVTec Software GmbH, Munich, Germany

Content

Machine vision is a key technology in the industrial manufacturing process and is used primarily for automation and quality assurance. For accurate and robust measurements in 2D and 3D sensor data in machine vision applications, photogrammetric methods must be adapted to industry-specific conditions and requirements. This is illustrated by three selected examples: camera calibration, hand-eye calibration, and object recognition in robotics. The tutorial is complemented by several real-world machine vision applications.

Target group

PhD students/researchers/practitioners

Level

Intermediate

Duration

Half-day

WELCOME RECEPTION (Tuesday, 9 October 2018 - 7:00pm)

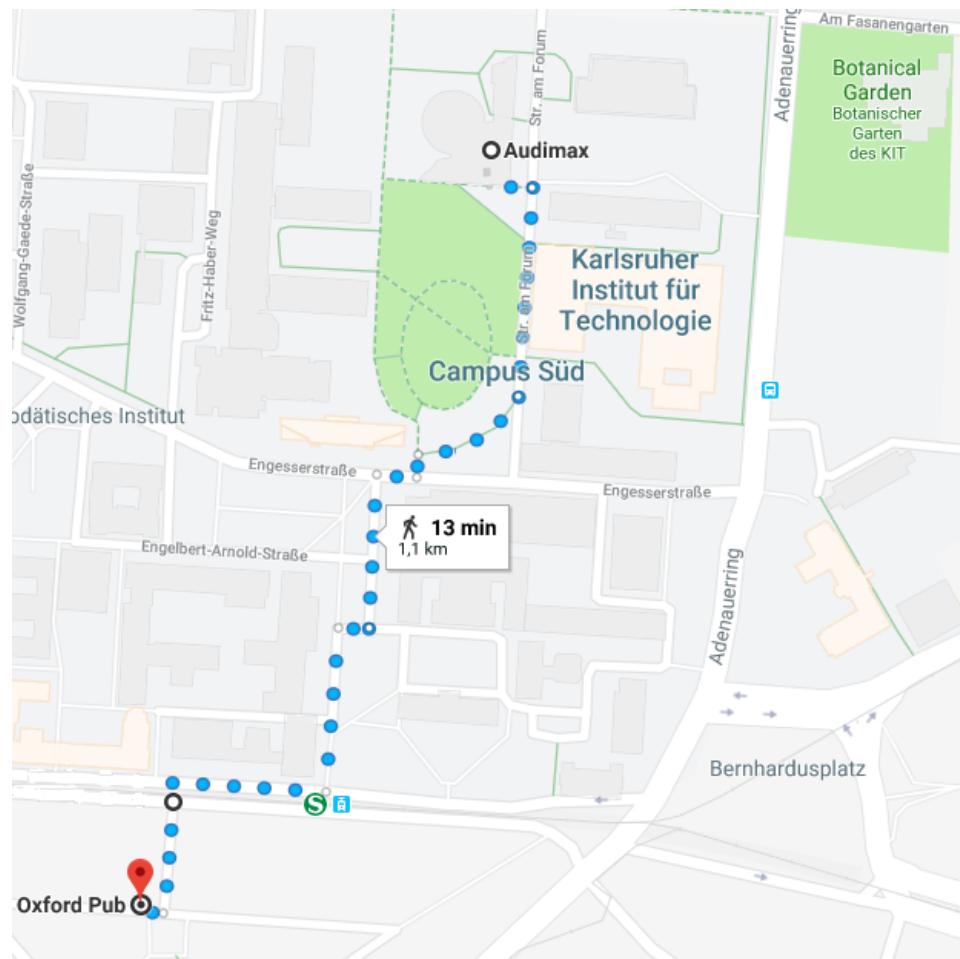
Venue: [Oxford Pub](#)

Address: [Fasanenstraße 6, 76131 Karlsruhe](#)

You might want to join the welcome reception at [Oxford Pub](#) if you arrive early in Karlsruhe. Please note, cost for your consumption is **not included in the conference fee**, you will have to pay for it yourself.

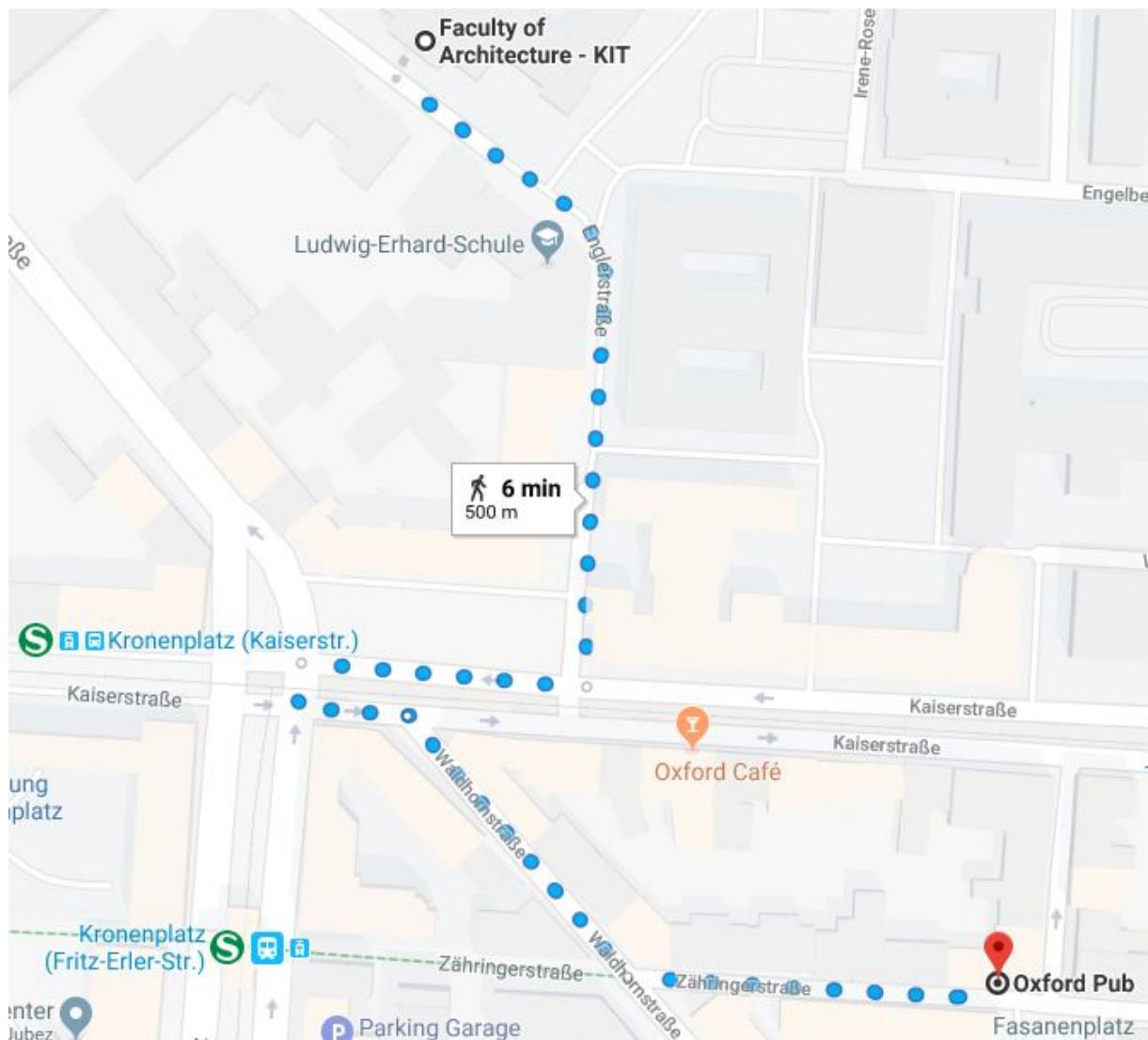
Way from KIT Audimax to Oxford Pub:

(<https://goo.gl/maps/E2KhZ2XNxwt>)



Way from **KIT Building 20.40** (Faculty of Architecture) to **Oxford Pub**:

(<https://goo.gl/maps/SJj8kn8MAFH2>)



SESSIONS (Wednesday, 10 October 2018 - 9:30am)

Venue: KIT Audimax

Address: Straße am Forum 1, 76131 Karlsruhe, Building 30.95



KIT Audimax, Building 30.95 (Photo [Helfrich](#) CC-BY-SA-3.0)

OO: Opening

Time: Wednesday, 10 October 2018, 9:30am - 10:00am
Stefan Hinz (ISPRS Technical Commission I President)
Uwe Stilla (DGPF President)
Charles Toth (ISPRS Council Representative)
Adriano Camps (IEEE-GRSS President)
Stewart Walker (Chair of The ISPRS Foundation, Inc. TIF)

K1: Keynote

Time: Wednesday, 10 October 2018, 10:00am - 11:00am
3D Reconstruction in Realtime Marc Stamminger
Department of Computer Science, Friedrich-Alexander University Erlangen-Nürnberg, Germany

O1: Multi-View and Multi-Modal Image Analysis

Time: Wednesday, 10 October 2018, 11:30am - 1:00pm

Session chairs: Cheng Wang (WG I/6 - Multi-sensor Integration and Fusion),
Andrea Lingua (WG I/6 - Multi-sensor Integration and Fusion)

COMBINING AIRBORNE OBLIQUE CAMERA AND LIDAR SENSORS: INVESTIGATION AND NEW PERSPECTIVES*

Isabella Toschi¹, Fabio Remondino¹, René Rothe², Kristin Klimek²

¹3D Optical Metrology (3DOM) unit, Bruno Kessler Foundation (FBK), Trento, Italy; ²Leica Geosystems AG, Geospatial Content Solutions, Heerbrugg, Switzerland; toschi@fbk.eu

*Oral Presentation and Interactive Presentation (Poster)

SEMANTIC SEGMENTATION OF AERIAL IMAGERY VIA MULTI-SCALE SHUFFLING CONVOLUTIONAL NEURAL NETWORKS WITH DEEP SUPERVISION

Kaiqiang Chen^{1,2}, Michael Weinmann³, Xian Sun¹, Menglong Yan¹, Stefan Hinz⁴, Boris Jutzi⁴,
Martin Weinmann⁴

¹Chinese Academy of Sciences, P.R. China; ²University of Chinese Academy of Sciences, P.R. China;
³University of Bonn, Germany; ⁴Karlsruhe Institute of Technology, Germany;

chenkaiqiang14@mails.ucas.ac.cn

AUTOMATIC 3D LANE MARKING RECONSTRUCTION USING MULTI-VIEW AERIAL IMAGERY

Chun-Yu Sheu², Franz Kurz¹, Pablo d'Angelo¹

¹German Aerospace Center (DLR), Remote Sensing Technology Institute, Wessling, Germany;

²University Stuttgart, Germany; chunyu.sheu@gmail.com

A STUDY OF USING FULLY CONVOLUTIONAL NETWORK FOR TREETOP DETECTION ON REMOTE SENSING DATA

Changlin Xiao^{1,2}, Rongjun Qin^{1,3}, Xu Huang¹, Jiaqiang Li²

¹Department of Civil, Environmental and Geodetic Engineering, The Ohio State University; ²Future Cities Laboratory, Singapore-ETH Centre, ETH Zurich; ³Department of Electrical and Computer Engineering, The Ohio State University; qin.324@osu.edu

P1: Interactive Presentation (Poster)

Time: Wednesday, 10 October 2018, 2:30pm - 4:00pm

Session chairs:

**Wang Mi (WG I/4 - Calibration and Validation of Satellite Sensors),
Petri Rönnholm (WG I/5 - New 3D Sensors for Metrology and Industrial Vision),
Petra Helmholz (WG I/10 - Sensor Systems Verification, Benchmarks, Evaluation)**

A STUDY ON THE VARIATIONS OF INNER ORIENTATION PARAMETERS OF A HYPERSPECTRAL FRAME CAMERA

Antonio Maria Garcia Tommaselli¹, Lucas Dias Santos¹, Adilson Berveglieri¹, Raquel Alves Oliveira², Eija Honkavaara²

¹Unesp, Brazil; ²Finnish Geospatial Research Institute FGI, Finland; a.tommaselli@unesp.br

EVALUATION AND CALIBRATION OF FIXED-WING UAV MOBILE MAPPING SYSTEM EQUIPPED WITH LIDAR AND OPTICAL SENSORS

Krzysztof Bakula¹, Wojciech Ostrowski¹, Magdalena Pilarska¹, Marcin Szender², Zdzisław Kurczyński¹

¹Warsaw University of Technology, Poland; ²Marcin Szender Polska, Poland;
krzysztof.bakula@pw.edu.pl

AN APPLICATION OF ROLL-INVARIANT POLARIMETRIC FEATURES FOR CROP CLASSIFICATION FROM MULTI-TEMPORAL RADARSAT-2 SAR DATA

Mustafa Ustuner¹, Fusun Balik Sanli¹, Saygin Abdikan², Mustafa Tolga Esetlili³, Gokhan Bilgin⁴

¹Dept. of Geomatic Engineering, Yildiz Technical University, Turkey; ²Dept. of Geomatic Engineering, Bulet Ecevit University, Turkey; ³Dept. of Soil Science and Plant Nutrition, Ege University, Turkey; ⁴Dept. of Computer Engineering, Yildiz Technical University, Turkey;
mustuner@yildiz.edu.tr

APPLICATION OF SIMPLIFIED SURFACE ENERGY BALANCE INDEX (S-SEBI) FOR CROP EVAPOTRANSPIRATION USING LANDSAT 8

Abdul Basit, Zahid Khalil, Haque Saad Ul

Institute of Space Technology, Pakistan; ab.basit93@gmail.com

CLASSIFICATION AND REPRESENTATION OF COMMONLY USED ROOFING MATERIAL USING MULTISENSORIAL AERIAL DATA

Rebecca Illehag^{1,3}, Dimitri Bulatov^{2,3}, Petra Helmholz³, David Belton³

¹Institute of Photogrammetry and Remote Sensing, Karlsruhe Institute of Technology, Germany;
²Fraunhofer IOSB, Ettlingen, Germany; ³Department of Spatial Sciences, Curtin University, Perth, WA, Australia; rebecca.illehag@kit.edu

DEEP LEARNING AND ANTHROPOMETRIC PLANE BASED WORKFLOW MONITORING BY DETECTING AND TRACKING WORKERS

Nima Ajam Gard¹, Jiawei Chen², Pingbo Tang², Alper Yilmaz¹

¹Photogrammetric Computer Vision Laboratory, United States of America; ²School of Sustainable Engineering and the Built Environment, United States of America; yilmaz.15@osu.edu

DLRAD – A FIRST LOOK ON THE NEW VISION AND MAPPING BENCHMARK DATASET

Franz Kurz¹, Daniel Waigand², Dominik Rosenbaum¹, Eleonora Vig¹, Corentin Henry¹, Nina Merkle¹, Veronika Gstaiger¹, Peter Reinartz¹, Sascha Knake-Langhorst²

¹DLR, Remote Sensing Technologies, Germany; ²DLR, Institute of Transportation Systems, Germany; franz.kurz@dlr.de

EFFECT OF DIFFERENT SEGMENTATION METHODS USING OPTICAL SATELLITE IMAGERY TO ESTIMATE FUZZY CLUSTERING PARAMETERS FOR SENTINEL-1A SAR IMAGES

Bulent Bayram¹, Nusret Demir², Burak Akpinar¹, Selen Oy², Firat Erdem¹, Thomas Vögtle³, Dursun Zafer Seker⁴

¹Yildiz Technical University, Istanbul, Turkey; ²Akdeniz University, Antalya, Turkey; ³Karlsruhe Institute of Technology, Karlsruhe, Germany; ⁴Istanbul Technical University, Istanbul, Turkey; bayram@yildiz.edu.tr

AN AUTOMATIC PROCEDURE FOR MOBILE LASER SCANNING PLATFORM 6 DOF TRAJECTORY CORRECTION FROM 3D TIE POINTS

Zille Hussnain, Sander Oude Elberink, George Vosselman

University of Twente, The Netherlands; s.z.hussnain@utwente.nl

BUILDING BOUNDARY EXTRACTION FROM LIDAR DATA USING A LOCAL ESTIMATED PARAMETER FOR ALPHA SHAPE ALGORITHM

Renato Cesar Dos Santos, Mauricio Galo, André Caceres Carrilho

São Paulo State University (UNESP), Brazil; renato_cstos@hotmail.com

AN EFFICIENT WEED DETECTION PROCEDURE USING LOW-COST UAV IMAGERY SYSTEM FOR PRECISION AGRICULTURE APPLICATIONS

Mohamed Hassanein, Naser El-Sheimy

University of Calgary, Canada; mohamed.hassanein2@ucalgary.ca

VEGETATION MAPPING OF A COASTAL DUNE COMPLEX USING MULTISPECTRAL IMAGERY ACQUIRED FROM AN UNMANNED AERIAL SYSTEM

Chen Suo, Eugene McGovern, Alan Gilmer

Dublin Institute Technology, Ireland; d15123973@mydit.ie

USE AND EVALUATION OF A SHORT RANGE SMALL QUADCOPTER AND A PORTABLE IMAGING LASER FOR BUILT HERITAGE 3D DOCUMENTATION

Alessio Calantropio, Filiberto Chiabrandi, Fulvio Rinaudo, Lorenzo Teppati Losè

DAD - Department of Architecture and Design, Politecnico di Torino, Lab G4CH – Laboratory of Geomatics for Cultural Heritage; filiberto.chiabrandi@polito.it

URBAN SUSTAINABLE ECOSYSTEMS ASSESSMENT THROUGH AIRBORNE EARTH OBSERVATION: LESSONS LEARNED

Ramon Alamús, Fernando Pérez, Luca Pipia, Jordi Corbera

Institut Cartogràfic i Geològic de Catalunya, Spain; ramon.alamus@icgc.cat

ULTRASONIC BASED HEADING ESTIMATION FOR AIDING LAND VEHICLE NAVIGATION IN GNSS DENIED ENVIRONMENT

Mohamed Osama Moursy Moussa¹, Adel Moussa^{1,2}, Naser El-Sheimy¹

¹Department of Geomatics Engineering, University of Calgary, Alberta, Canada; ²Department of Electrical Engineering, Port-Said University, Port Said, Egypt; mohamed.moussa1@ucalgary.ca

FEATURE MATCHING ENHANCEMENT OF UAV IMAGES USING GEOMETRIC CONSTRAINTS

Hani Mahmoud Mohammed, Naser El-Sheimy

University of Calgary, Canada; hmmohamm@ucalgary.ca

ULTRA-HIGH PRECISION UAV-BASED LIDAR AND DENSE IMAGE MATCHING

Michael Cramer¹, Norbert Haala¹, Dominik Laupheimer¹, Gottfried Mandlburger¹, Patrick Havel²

¹Institut für Photogrammetrie (ifp), Universität Stuttgart, Germany; ²German Federal Institute of Hydrology (BfG), Koblenz, Germany; michael.cramer@ifp.uni-stuttgart.de

UAV-LICAM SYSTEM DEVELOPMENT: CALIBRATION AND GEO-REFERENCING

Camilo Cortes¹, Mozhdeh Shahbazi¹, Patrick Menard²

¹Department of Geomatics Engineering, University of Calgary, Alberta, Canada; ²Centre de géomatique du Québec, Québec, Canada; cecortes@ucalgary.ca

TOWARDS STANDARDIZED EVALUATION OF IMAGE QUALITY FOR AIRBORNE CAMERA SYSTEMS

Henry Meißner¹, Michael Cramer², Ralf Reulke¹

¹German Aerospace Center, Berlin; ²Institute for Photogrammetry (ifp), University of Stuttgart; henry.meissner@dlr.de

THERMAL IR IMAGING: IMAGE QUALITY AND ORTHOPHOTO GENERATION

Artuom Sledz, Jakob Unger, Christian Heipke

Leibniz Universität Hannover, Germany; sledz@ipi.uni-hannover.de

TESTING DJI PHANTOM 4 PRO FOR URBAN GEOREFERENCING

Mariana de Sa Rodrigues da Silva, Ricardo Augusto Eger, Yuzi Anai Zanardo Rosenfeldt, Carlos Loch

University of Santa Catarina, Brazil; maridesa.arquitetura@gmail.com

TERRISCOPE: AN OPTICAL REMOTE SENSING RESEARCH PLATFORM USING AIRCRAFT AND UAS FOR THE CHARACTERISATION OF CONTINENTAL SURFACES

Yannick Boucher¹, Alexandre Amiez², Philippe Barillot³, Christian Chatelard³, Christophe Coudrain⁴, Philippe Déliot¹, Nicolas Rivière¹, Thomas Rivière¹, Laure Roupioz¹

¹ONERA / DOTA, Université de Toulouse, F-31055 Toulouse - France; ²ONERA / DTIS, Université de Toulouse, F-31055 Toulouse - France; ³ONERA / DOTA, F-13661 Salon cedex Air - France; ⁴ONERA / DOTA, Université Paris Saclay, F-91123 Palaiseau - France;
Yannick.Boucher@onera.fr

TANDEM-X MISSION, PRODUCTS AND PERSPECTIVES

Johannes Böer, Christopher Wecklich, Paola Rizzoli, Manfred Zink
German Aerospace Center (DLR), Germany; johannes.boer@dlr.de

STATISTICAL OUTLIER DETECTION METHOD FOR AIRBORNE LIDAR DATA

André Carrilho, Mauricio Galo, Renato Santos
São Paulo State University, Brazil; carrilho.acc@gmail.com

SMILE CORRECTION IN THE ENMAP GROUND SEGMENT PROCESSOR: A QUALITATIVE ANALYSIS

Maximilian Martin Langheinrich, Rudolf Richter, Raquel de los Reyes, Gintautas Palubinskas, Tobias Storch
German Aerospace Center, Germany; maximilian.langheinrich@dlr.de

SYSTEMATIC GEOMETRIC IMAGE ERRORS OF VERY HIGH RESOLUTION OPTICAL SATELLITES

Karsten Jacobsen
Leibniz Universität Hannover, Germany; jacobsen@ipi.uni-hannover.de

SEMANTIC LABELING OF STRUCTURAL ELEMENTS IN BUILDINGS BY FUSING RGB AND DEPTH IMAGES IN AN ENCODER-DECODER CNN FRAMEWORK

Dorota Iwaszczuk^{1,2}, Zoltan Koppanyi¹, Nima A. Gard¹, Bing Zha¹, Charles Toth¹, Alper Yilmaz¹
¹Ohio State University, United States of America; ²Technical University of Munich, Germany;
dorota.iwaszczuk@tum.de

SEGMENT-AND-COUNT: VEHICLE COUNTING IN AERIAL IMAGERY USING ATROUS CONVOLUTIONAL NEURAL NETWORKS

Seyed Majid Azimi, Eleonora Vig, Franz Kurz, Peter Reinartz
Remote Sensing Technology Institute (IMF), German Aerospace Center (DLR), Germany;
seyedmajid.azimi@dlr.de

ROCK GLACIER MONITORING USING AERIAL PHOTOGRAPHS: CONVENTIONAL VS. UAV-BASED MAPPING – A COMPARATIVE STUDY

Viktor Kaufmann¹, Gernot Seier², Wolfgang Sulzer², Matthias Wecht², Qian Liu³, Gerhard Lauk³, Michael Maurel⁴

¹Institute of Geodesy, Graz University of Technology, Austria; ²Department of Geography and Regional Science, University of Graz, Austria; ³Institute of Applied Geosciences, Graz University of Technology, Austria; ⁴Institute of Computer Graphics and Vision, Graz University of Technology, Austria; viktor.kaufmann@tugraz.at

REAL-TIME ON-BOARD OBSTACLE AVOIDANCE FOR UAVS BASED ON EMBEDDED STEREO VISION

Boitumelo Ruf^{1,2}, Sebastian Monka¹, Matthias Kollmann¹, Michael Grinberg¹
¹Fraunhofer IOSB, Germany; ²Institute of Photogrammetry and Remote Sensing, KIT;
boitumelo.ruf@iosb.fraunhofer.de

ROBOT VISION: CALIBRATION OF WIDE-ANGLE LENS CAMERAS USING COLLINEARITY CONDITION AND K-NEAREST NEIGHBOUR REGRESSION

Jacky Chow^{1,2}, Ivan Detchev³, Kathleen Ang^{2,4}, Kristian Morin⁵, Karthik Mahadevan⁶, Nicholas Louie²

¹Department of Medicine, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada; ²Department of Research and Development, Vusion Technologies, Calgary, Alberta, Canada; ³Department of Geomatics Engineering, Schulich School of Engineering, University of Calgary, Calgary, Alberta, Canada; ⁴Department of Computer Science, Faculty of Science, University of Calgary, Calgary, Alberta, Canada; ⁵Leica Geosystems, Heerbrugg, Canton of St. Gallen, Switzerland; ⁶Department of Electrical and Computer Engineering, Faculty of Engineering, University of Alberta, Edmonton, Alberta, Canada; jckchow@ucalgary.ca

MULTI-DATE SENTINEL1 SAR IMAGE TEXTURES DISCRIMINATE PERENNIAL AGROFORESTS IN A TROPICAL FOREST-SAVANNAH TRANSITION LANDSCAPE*

Frederick Nkeumoe Numbisi^{1,2}, Frieke van Coillie¹, Robert De Wulf¹

¹Ghent University, Laboratory of Forest Management and Spatial Information Techniques, Coupure Links 653, 9000 Gent, Belgium; ²World Agroforestry Centre (ICRAF), West and Central Africa Regional Programme, PO Box 16317, Yaoundé, Cameroon; frednumbisi@gmail.com

***Oral Presentation and Interactive Presentation (Poster)**

MULTI-CAMERA SYSTEM CALIBRATION OF A LOW-COST REMOTELY OPERATED VEHICLE FOR UNDERWATER CAVE EXPLORATION*

Erica Nocerino, Mohamad Motasem Nawaf, Mauro Saccone, Mohamed Ben Ellefi, Jérôme Pasquet, Jean-Philip Royer, Pierre Drap

AMU - Aix-Marseille Université, France; erica.nocerino@univ-amu.fr

***Oral Presentation and Interactive Presentation (Poster)**

ACCURATE VISUAL LOCALIZATION IN OUTDOOR AND INDOOR ENVIRONMENTS EXPLOITING 3D IMAGE SPACES AS SPATIAL REFERENCE*

Daniel Rettenmund¹, Markus Fehr¹, Stefan Cavegn^{1,2}, Stephan Nebiker¹

¹FHNW University of Applied Sciences and Arts Northwestern Switzerland, Switzerland;

²University of Stuttgart, Germany; daniel.rettenmund@fhnw.ch

***Oral Presentation and Interactive Presentation (Poster)**

O2: LiDAR and Optical Sensing

Time: Wednesday, 10 October 2018 4:00pm - 5:30pm

Session chairs: José Alberto Gonçalves (WG I/2 - LiDAR, Air- and Spaceborne Optical Sensing), Daniela Poli (WG I/2 - LiDAR, Air- and Spaceborne Optical Sensing)

FEASIBILITY INVESTIGATION ON SINGLE PHOTON LIDAR BASED WATER SURFACE MAPPING

Gottfried Mandlburger^{1,2}, Boris Jutzi³

¹University of Stuttgart, Institute for Photogrammetry, Stuttgart, Germany; ²TU Vienna, Department of Geodesy and Geoinformation, Austria; ³Karlsruhe Institute of Technology (KIT), Institute of Photogrammetry and Remote Sensing, Germany; gottfried.mandlburger@ifp.uni-stuttgart.de

AN EVALUATION PIPELINE FOR INDOOR LASER SCANNING POINT CLOUDS

Samer Karam, Michael Peter, Siavash Hosseinyalamdary, George Vosselman
University of Twente, Faculty ITC; s.karam@utwente.nl

LIGHT FIELD CAMERA AS TOOL FOR FORENSIC PHOTOGRAMMETRY*

Till Sieberth¹, Rene Wackrow², Valeria Hofer¹, Vera Barrera¹

¹University of Zurich, Institute of Forensic Medicine and Imaging, 8057 Zürich, Switzerland;
²Loughborough University, School of Architecture, Building and Civil Engineering, Loughborough
LE11 3TU, United Kingdom; till.sieberth@irm.uzh.ch

*Oral Presentation and Interactive Presentation (Poster)

DISPARITY REFINEMENT OF BUILDING EDGES USING ROBUSTLY MATCHED STRAIGHT LINES FOR STEREO MATCHING

Xu Huang¹, Rongjun Qin¹, Min Chen²

¹Department of Civil, Environmental and Geodetic Engineering, The Ohio State University;
²Faculty of Geosciences and Environmental Engineering, Southwest Jiaotong University;
qin.324@osu.edu

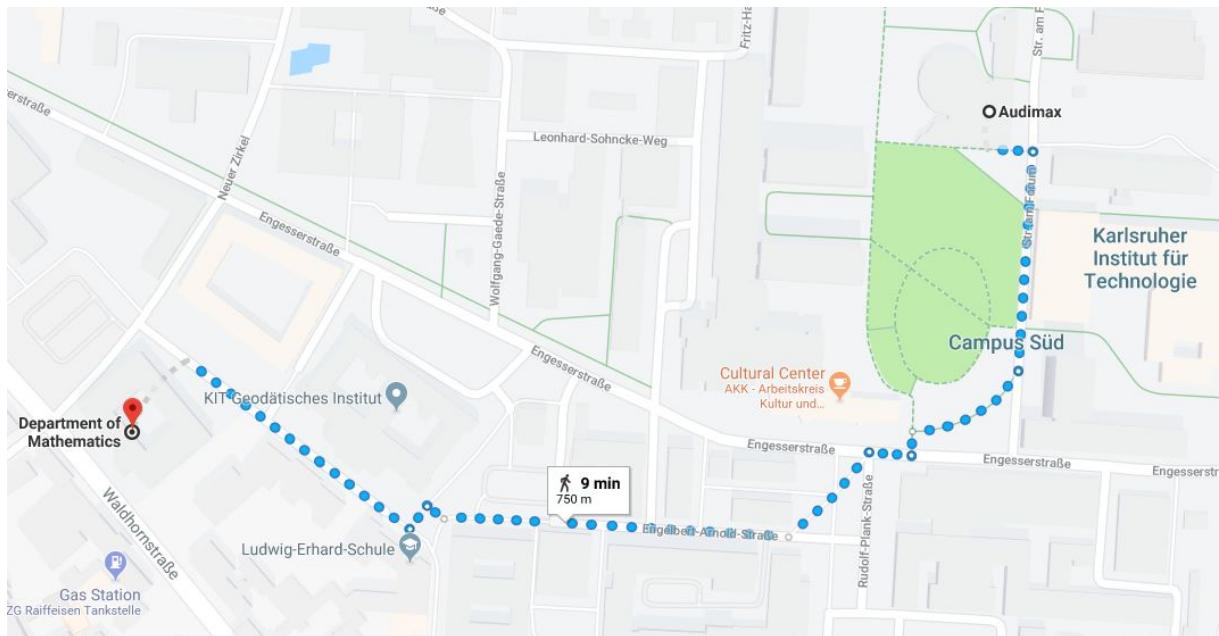
ICEBREAKER (Wednesday, 10 October 2018 - 7:00pm)

Venue: [KIT Mathematics Building](#) (with Live Music)

Address: [Englerstraße 2, 76131 Karlsruhe, Building 20.30](#)

Way from KIT Audimax to the KIT Mathematics Building:

(<https://goo.gl/maps/yhaJoRbn9dp>)



SESSIONS (Thursday, 11 October 2018 - 8:30am)

Venue: KIT Audimax

Address: Straße am Forum 1, 76131 Karlsruhe, Building 30.95

K2: Keynote

Time: Thursday, 11 October 2018, 8:30am - 9:30am

Session chair: Stefan Hinz

TANDEM-L OR NEWSPACE SAR: WHICH SPACEBORNE SENSOR TECHNOLOGY WILL SHAPE THE FUTURE?

[Alberto Moreira^{1,2}](#)

¹Microwaves and Radar Institute, German Aerospace Center (DLR), Germany; ²Institute of Radio Frequency Engineering and Electronics, KIT, Germany

O3: SAR and Microwave Sensing

Time: Thursday, 11 October 2018, 9:30am - 11:00am

Session chair: Michael Schmitt (WG I/3 - SAR and Microwave Sensing)

[THE SEN12 DATASET FOR DEEP LEARNING IN SAR-OPTICAL DATA FUSION](#)

[Michael Schmitt¹, Lloyd Haydn Hughes¹, Xiao Xiang Zhu^{1,2}](#)

¹Technical University of Munich (TUM), Germany; ²German Aerospace Center (DLR);
m.schmitt@tum.de

[SAR-SHARPENING IN THE KENNAUGH FRAMEWORK APPLIED TO THE FUSION OF MULTI-MODAL SAR AND OPTICAL IMAGES](#)

[Andreas Schmitt¹, Anna Wendleder²](#)

¹Munich University of Applied Sciences, Germany; ²German Aerospace Center;
andreas.schmitt@hm.edu

[SAR TO OPTICAL IMAGE SYNTHESIS FOR CLOUD REMOVAL WITH GENERATIVE ADVERSARIAL NETWORKS](#)

[Jose David Bermudez Castro¹, Dario Augusto Borges Oliveira², Patrick Haap¹, Raul Queiroz Feitosa¹](#)

¹Pontifical Catholic University of Rio de Janeiro, Brazil; ²IBM Research; bermudez@ele.puc-rio.br

[MULTI-DATE SENTINEL1 SAR IMAGE TEXTURES DISCRIMINATE PERENNIAL AGROFORESTS IN A TROPICAL FOREST-SAVANNAH TRANSITION LANDSCAPE*](#)

[Frederick Nkeumoe Numbisi^{1,2}, Frieke van Coillie¹, Robert De Wulf¹](#)

¹Ghent University, Laboratory of Forest Management and Spatial Information Techniques, Coupure Links 653, 9000 Gent, Belgium; ²World Agroforestry Centre (ICRAF), West and Central Africa Regional Programme, PO Box 16317, Yaoundé, Cameroon; frednumbisi@gmail.com

***Oral Presentation and Interactive Presentation (Poster)**

O4: Thermal, Multi- and Hyperspectral Sensing

Time: Thursday, 11 October 2018, 11:30am - 1:00pm

Session chairs: Rupert Müller (WG I/1 - Multi- and Hyperspectral Sensing),
Ralf Reulke (WG I/10 - Sensor Systems Verification, Benchmarks, Evaluation)

INVESTIGATIONS ON THE POTENTIAL OF HYPERSPECTRAL AND SENTINEL-2 DATA FOR LAND-COVER / LAND-USE CLASSIFICATION

Martin Weinmann, Philipp M. Maier, Janine Florath, Uwe Weidner
Karlsruhe Institute of Technology (KIT), Germany; martin.weinmann@kit.edu

COPERNICUS SENTINEL-2 DATA FOR THE DETERMINATION OF GROUNDWATER WITHDRAWAL IN THE MAGHREB REGION

Clemence Dubois¹, Fabian Stoffner¹, Andre C. Kalia¹, Moritz Sandner², Moez Labiadh³, Mustapha Mimouni³

¹Federal Institute for Geosciences and Natural Resources, Germany; ²University of Hildesheim, Germany; ³Observatory of the Sahara and Sahel, Tunisia; andre.kalia@bgr.de

DEVELOPING A MACHINE LEARNING FRAMEWORK FOR ESTIMATING SOIL MOISTURE WITH VNIR HYPERSPECTRAL DATA

Sina Keller, Felix M. Riese, Johanna Stötzer, Philipp M. Maier, Stefan Hinz
Karlsruhe Institute of Technology, Germany; sina.keller@kit.edu

INFRARED MEASUREMENTS AND ESTIMATION OF TEMPERATURE IN THE RESTRICTIVE SCOPE OF AN INDUSTRIAL CEMENT PLANT

Raoul Gabriel¹, Sina Keller², Jörg Matthes², Patrick Waibel², Hubert B. Keller², Stefan Hinz²
¹ci-tec GmbH, Karlsruhe; ²Karlsruhe Institute of Technology, Germany; r.gabriel@ci-tec.de

P2: Interactive Presentation (Poster)

Time: Thursday, 11 October 2018, 2:30pm - 4:00pm

Session chairs:

Karsten Jacobsen (WG I/4 - Calibration and Validation of Satellite Sensors),

Peter Reinartz (WG I/8 - Satellite Constellations for Remote Sensing),

Dorota Iwaszczuk (WG I/10 - Sensor Systems Verification, Benchmarks, Evaluation)

REGISTRATION OF UAV DATA AND ALS DATA USING POINT TO DEM DISTANCES FOR BATHYMETRIC CHANGE DETECTION

Richard Boerner, Yusheng Xu, Ludwig Hoegner, Uwe Stilla

Technical University Munich, Germany; richard.boerner@tum.de

ON THE CATEGORIZATION OF HIGH ACTIVITY OBJECTS USING DIFFERENTIAL ATTRIBUTE PROFILES

Markus Boldt¹, Antje Thiele^{1,2}, Karsten Schulz¹, Stefan Hinz²

¹Fraunhofer IOSB, Germany; ²Karlsruhe Institute of Technology KIT, Germany;
markus.boldt@iosb.fraunhofer.de

NETWORK ADJUSTMENT OF AUTOMATIC RELATIVE ORIENTATION FROM IMAGE SEQUENCES

Chao-Chieh Lin, Yi-Hsing Tseng, Kuan-Ying Lin, Kai-Wei Chiang

National Cheng Kung University, Taiwan; azsxd2014@gmail.com

MODELLING ERRORS IN X-RAY FLUOROSCOPIC IMAGING SYSTEMS USING PHOTOGRAMMETRIC BUNDLE ADJUSTMENT WITH A DATA-DRIVEN SELF-CALIBRATION APPROACH

Jacky Chow^{1,2}, Derek Lichti³, Kathleen Ang⁴, Kaleel Al-Durgham³, Gregor Kuntze⁵, Gulshan Sharma⁵, Janet Ronsky⁵

¹Department of Medicine, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada; ²Department of Research and Development, Vusion Technologies, Calgary, Alberta, Canada; ³Department of Geomatics Engineering, Schulich School of Engineering, University of Calgary, Calgary, Alberta, Canada; ⁴Department of Computer Science, Faculty of Science, University of Calgary, Calgary, Alberta, Canada; ⁵Department of Mechanical and Manufacturing Engineering, Schulich School of Engineering, University of Calgary, Calgary, Alberta, Canada; jckchow@ucalgary.ca

MOBILE MAPPING SYSTEM BASED ON ACTION CAMERA AND PRECISE GNSS

José Goncalves, Andre Pinhal

University of Porto - Science Faculty, Portugal; jagoncal@fc.up.pt

MOSAICKING VERY-HIGH-RESOLUTION HELICOPTER-BORNE IMAGES ACQUIRED OVER DRIFTING ARCTIC SEA ICE USING COTS SENSORS

Chang-Uk Hyun¹, Hyun-cheol Kim²

¹Korea Polar Research Institute, Republic of South Korea; ²Korea Polar Research Institute, Republic of South Korea; chyun@kopri.re.kr

MICRO-RADAR AND UWB AIDED UAV NAVIGATION IN GNSS DENIED ENVIRONMENT

Shady Zahran¹, Mostafa Mostafa¹, Andrea Masiero², Adel Moussa¹, Antonio Vettore², Naser El-Shemy¹

¹Geomatics Multi-Sensor Systems, Department of Geomatics, University of Calgary,;

²Interdepartmental Research Center of Geomatics (CIRGEO), University of Padova;
amelsaye@ucalgary.ca

MOBILE LASER SCANNING SYSTEMS FOR GPS/GNSS-DENIED ENVIRONMENT MAPPING

Chenglu Wen¹, Yan Xia¹, Yuhan Lian¹, Yudi Dai¹, Jinbing Tan¹, Cheng Wang¹, Jonathan Li^{1,2}

¹Xiamen University, People's Republic of China; ²Faculty of Environment, University of Waterloo;
clwen@xmu.edu.cn

MEASURING IN IMAGES WITH PROJECTIVE GEOMETRY

Bastian Erdnüß

Karlsruhe Institute of Technology KIT, Germany; bastian.erdnuess@kit.edu

METHODOLOGY FOR DIRECT REFLECTANCE MEASUREMENT FROM A DRONE: SYSTEM DESCRIPTION, RADIOMETRIC CALIBRATION AND LATEST RESULTS

Lauri Markelin¹, Juha Suomalainen¹, Raquel Alvares de Oliveira¹, Niko Viljanen¹, Roope Näsl¹, Barry Scott², Theo Theoccharous², Claire Greenwell², Nigel Fox², Eija Honkavaara¹

¹Finnish Geospatial Research Institute FGI, Finland; ²National Physical Laboratory NPL, UK;
lauri.markelin@nls.fi

LOCALIZATION OF A CAR BASED ON MULTI-SENSOR FUSION

Hojun Kim, Impyeong Lee

University of Seoul, Republic of South Korea; zzimss@uos.ac.kr

MARKER-BASED LOCALIZATION OF THE MICROSOFT HOOLENS IN BUILDING MODELS

Patrick Hübner, Martin Weinmann, Sven Wursthorn

Karlsruhe Institute of Technology (KIT), Germany; patrick.huebner@kit.edu

KINEMATIC CALIBRATION USING LOW-COST LIDAR SYSTEM FOR MAPPING AND AUTONOMOUS DRIVING APPLICATIONS

Guang-Je Tsai¹, Kai-Wei Chiang¹, Naser El-Shemy²

¹National Cheng Kung University, Taiwan; ²University of Calgary, Canada; tpp1114@gmail.com

LEM BENCHMARK DATABASE FOR TROPICAL AGRICULTURAL REMOTE SENSING APPLICATION

Ieda Sanches¹, Raul Feitosa², Bruno Montibeller¹, Alfredo Luiz³, Marinalva Soares¹, Pedro Diaz¹, Victor Prudente¹, Denis Vieira¹

¹National Institute for Space Research; ²Pontifical Catholic University of Rio de Janeiro; ³Brazilian Agricultural Research Corporation; raul@ele.puc-rio.br

INVESTIGATING THE USE OF COASTAL BLUE IMAGERY FOR BATHYMETRIC MAPPING OF INLAND WATER BODIES

Gottfried Mandlburger¹, Jens Kremer², Frank Steinbacher³, Ramona Baran³

¹Institute for Photogrammetry, University of Stuttgart, Germany; ²IGI mbH, Kreuztal, Germany;

³AirborneHydroMapping GmbH, Innsbruck, Austria; gottfried.mandlburger@ifp.uni-stuttgart.de

INITIAL EVALUATION OF 3D RECONSTRUCTION OF CLOSE OBJECTS WITH SMARTPHONE STEREO VISION

Andrea Masiero, Francesca Fissore, Marco Piragnolo, Alberto Guarnieri, Francesco Pirotti, Antonio Vettore

University of Padua, Italy; antonio.vettore@unipd.it

INTEGRATION OF INS AND GNSS FOR GRAVIMETRIC APPLICATION WITH UAS

Cheng-An Lin, Kai-Wei Chiang, Chung-Yen Kuo

National Cheng Kung University, Taiwan; p68011068@mail.ncku.edu.tw

INDEPENDENT ON-ORBIT GEOMETRIC CALIBRATION OF OPTICAL SATELLITE BASED ON WEIGHTED VIRTUAL OBSERVATION

Bo Yang, YingDong Pi

Wuhan University, People's Republic of China; 93341186@qq.com

HYPERSPECTRAL PANORAMIC IMAGING

Malte Mueller-Rowold², Ralf Reulke¹

¹HU-Berlin, Germany; ²DLR, Berlin; Gustav.Mueller-Rowold@dlr.de

GLIBERTY-GENERALIZED MODEL FOR SPECTRAL CHARACTERISTIC OF CONIFEROUS LEAVES AND BROAD-LEAVED LEAVES

Yunkai Guo, Guanxing An, Chao Feng, Qiong Xie, Jian Li, Fengsong Zhou

Changsha University of Science & Technology; 1097021740@qq.com

FUSION OF TLS AND RGB POINT CLOUDS WITH TIR IMAGES FOR INDOOR MOBILE MAPPING

Ludwig Hoegner¹, Thomas Abmair², Dragana Totic¹, Stefan Turzer², Uwe Stilla¹

¹Technical University of Munich; ²University of Applied Sciences Munich;

Ludwig.Hoegner@tum.de

FUSION OF SENTINEL-2 AND PLANETSCOPE IMAGERY FOR VEGETATION DETECTION AND MONITORING

Mateo Gašparović¹, Damir Medak¹, Ivan Pilaš², Luka Jurjević², Ivan Balenović²

¹Faculty of Geodesy, University of Zagreb, Croatia; ²Croatian Forest Research Institute, Croatia; mgasparovic@geof.hr

GLOBAL REFINEMENT OF TERRESTRIAL LASER SCANNER DATA REGISTRATION USING WEIGHTED SENSOR POSES

Daniel Rodrigues dos Santos, Fabiano Freiman, Nadisson Pavan

UFPR, Brazil; danielsantos@ufpr.br

HONEY CROP ESTIMATION FROM SPACE: DETECTION OF LARGE FLOWERING EVENTS IN WESTERN AUSTRALIAN FORESTS

Tristan Campbell, Peter Fearn

Curtin University, Australia; tristan.campbell@postgrad.curtin.edu.au

IMPACT OF REDUCTION OF RADIOMETRIC RESOLUTION IN HYPERSPECTRAL IMAGES ACQUIRED OVER FOREST FIELD

Gabriela Takahashi Miyoshi¹, Nilton Nobuhiro Imai¹, Antonio Maria Garcia Tommaselli¹, Eija Honkavaara²

¹São Paulo State University (UNESP), Brazil; ²Finnish Geospatial Research Institute FGI, Finland;
takahashi.gabi@gmail.com

EVALUATION OF DYNAMIC AD-HOC UWB INDOOR POSITIONING SYSTEM

Mostafa Sakr¹, Andrea Masiero², Naser El-Sheimy¹

¹University of Calgary, Canada; ²University of Padua, Italy; masiero@dei.unipd.it

DWELLING EXTRACTION IN REFUGEE CAMPS USING CNN – FIRST EXPERIENCES AND LESSONS LEARNT

Omid Ghorbanzadeh, Dirk Tiede, Zahra Dabiri, Martin Sudmanns, Stefan Lang

Salzburg University, Austria; omid.ghorbanzadeh@stud.sbg.ac.at

COMPARISON OF TWO METHODS FOR 2D POSE ESTIMATION OF INDUSTRIAL WORKPIECES - CNN VS. CLASSICAL IMAGE PROCESSING SYSTEM

Clarissa Siegfarth, Thomas Voegtle, Christopher Fabinski

Karlsruhe Institute of Technology, Germany; thomas.voegtle@kit.edu

COMPARISON OF THE METHODS FOR MAPPING OF SELECTED TRAFFIC MARKINGS ON FIRST CLASS ROADS IN THE CZECH REPUBLIC

Václav Šafář¹, Jakub Karas², Pavel Černota³, Jiří Pospíšil³

¹Research Institute of Geodesy, Topography and Cartography, v.v.i, Czech Republic; ²Upvision Ltd., Czech Republic; ³Technical University of Ostrava, Faculty of Mining and Geology, Department of Geodesy and Mine Surveying, Czech Republic; vaclav.safar@vugtk.cz

EXPLOITING ALS AND DIM DATA FOR SEMANTIC SEGMENTATION USING CNNS

Florian Politz, Monika Sester

Leibniz Universität Hannover, Germany; florian.politz@ikg.uni-hannover.de

REVISITING THE APOLLO MAPPING CAMERA SYSTEM*

Kenneth Lee Edmundson¹, Oleg Alexandrov², Brent A. Archinal¹, Kris J. Becker³, Tammy L. Becker³, Jesse A. Mapel¹, Zachary M. Moratto⁴, Ara V. Nefian², Janet O. Richie¹, Mark S. Robinson⁵, Makayla R. Shepherd¹, John R. Shinaman¹, Ethan D. Smith¹

¹United States Geological Survey, Astrogeology Science Center, Flagstaff, Arizona, USA; ²NASA Ames Research Center, Moffett Field, CA, USA; ³Lunar & Planetary Science Laboratory, University of Arizona, Tucson, Arizona, USA; ⁴Google, Inc., Mountain View, California, USA;

⁵Arizona State University, Tempe, Arizona, USA; kedmundson@usgs.gov

***Oral Presentation and Interactive Presentation (Poster)**

LIGHT FIELD CAMERA AS TOOL FOR FORENSIC PHOTOGRAHMETRY*

Till Sieberth¹, Rene Wackrow², Valeria Hofer¹, Vera Barrera¹

¹University of Zurich, Institute of Forensic Medicine and Imaging, 8057 Zürich, Switzerland;

²Loughborough University, School of Architecture, Building and Civil Engineering, Loughborough LE11 3TU, United Kingdom; till.sieberth@irm.uzh.ch

***Oral Presentation and Interactive Presentation (Poster)**

**COMBINING AIRBORNE OBLIQUE CAMERA AND LIDAR SENSORS:
INVESTIGATION AND NEW PERSPECTIVES***

Isabella Toschi¹, Fabio Remondino¹, René Rothe², Kristin Klimek²

¹3D Optical Metrology (3DOM) unit, Bruno Kessler Foundation (FBK), Trento, Italy; ²Leica

Geosystems AG, Geospatial Content Solutions, Heerbrugg, Switzerland; toschi@fbk.eu

***Oral Presentation and Interactive Presentation (Poster)**

05: Mobile Mapping

Time: Thursday, 11 October 2018, 4:00pm - 5:30pm

Session chairs: Nasser El-Sheimy (WG I/7 - Mobile Mapping Technology),
Kei-Wei Cheng (WG I/7 - Mobile Mapping Technology)

DEVELOPMENT OF A PORTABLE HIGH PERFORMANCE MOBILE MAPPING SYSTEM USING THE ROBOT OPERATING SYSTEM

Stefan Blaser¹, Stefan Cavegn^{1,2}, Stephan Nebiker¹

¹Institute of Geomatics, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Muttenz, Switzerland; ²Institute for Photogrammetry, University of Stuttgart, Germany;
stefan.blaser@fhnw.ch

MULTI-CAMERA SYSTEM CALIBRATION OF A LOW-COST REMOTELY OPERATED VEHICLE FOR UNDERWATER CAVE EXPLORATION*

Erica Nocerino, Mohamad Motasem Nawaf, Mauro Saccone, Mohamed Ben Ellefi, Jérôme Pasquet, Jean-Philip Royer, Pierre Drap

AMU - Aix-Marseille Université, France; erica.nocerino@univ-amu.fr

*Oral Presentation and Interactive Presentation (Poster)

ACCURATE VISUAL LOCALIZATION IN OUTDOOR AND INDOOR ENVIRONMENTS EXPLOITING 3D IMAGE SPACES AS SPATIAL REFERENCE*

Daniel Rettenmund¹, Markus Fehr¹, Stefan Cavegn^{1,2}, Stephan Nebiker¹

¹FHNW University of Applied Sciences and Arts Northwestern Switzerland, Switzerland;

²University of Stuttgart, Germany; daniel.rettenmund@fhnw.ch

*Oral Presentation and Interactive Presentation (Poster)

DATA PROCESSING AND RECORDING USING A VERSATILE MULTI-SENSOR VEHICLE

Björn Borgmann, Volker Schatz, Hilke Kieritz, Clemens Scherer-Klöckling, Marcus Hebel, Michael Arens

Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB, Germany;
bjoern.borgmann@iosb.fraunhofer.de

For further information and live-demos the MULTI-SENSOR VEHICLE [MODISSA](#) will be available at the Symposium in front of the KIT Audimax.

Please get in touch with the authors!

DINNER (Thursday, 11 October 2018 - 7:00pm)

Venue: [Ettlingen Palace](#)

Address: [Schlossplatz 1, 76275 Ettlingen](#)

To get there there are two options to Ettlingen Palace from KIT Audimax.

- Walk and one tram (recommended)
- Short walk and two trams

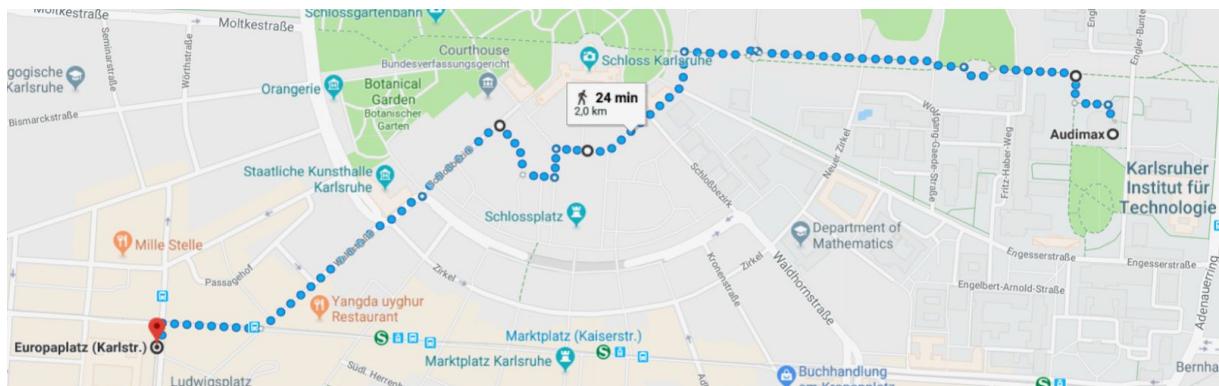
Please use provided tickets for the tram ride. Validate your ticket by using the stamp machines located at each door immediately after boarding the public transport vehicle!

Walk and one tram (recommended)

Nice stroll along the *Karlsruhe Palace*. Walk from **KIT Audimax** to tram stop **Karlsruhe Europaplatz** passing by *Karlsruhe Palace*, *Palace Garden* and the *Federal Court of Justice*. Then travel about 30 minutes by tram (**S1 Bad Herrenalb** or **S11 Ittersbach**, every 10 minutes) from **Karlsruhe Europaplatz** to **Ettlingen Erbprinz/Schloss**. Then it's just a walk of 100m to **Ettlingen Palace**.

Way from **KIT Audimax** to **Karlsruhe Europaplatz** (about 2km):

(<https://goo.gl/maps/NrPpGxg53A2>)

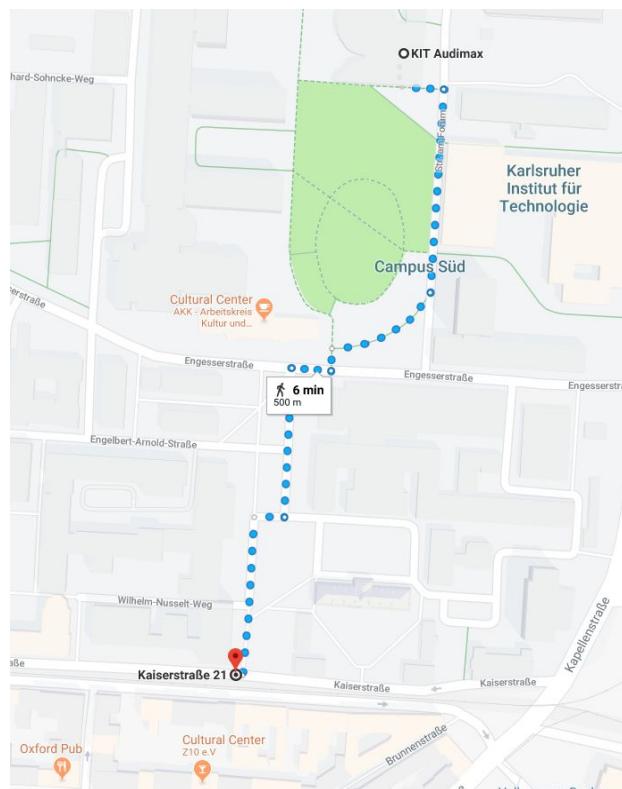


Short walk and two trams

Walk about 500m from **KIT Audimax** to tram stop **Durlacher Tor/KIT-Campus Süd**. Then travel by tram to **Karlsruhe Main Station** (**4 Tivoli via HBF** - !! not S4 !!) and then again by tram to **Ettlingen Erbprinz/Schloss** (**S1 Bad Herrenalb** or **S11 Ittersbach**, regularly every 10 minutes). Then it's just a walk of 100m to **Ettlingen Palace**. Consider about 30-45 minutes to get there.

Way from **KIT Audimax** to tram stop **Durlacher Tor/KIT-Campus Süd**:

(<https://goo.gl/maps/6CEjQrwaVFL2>)



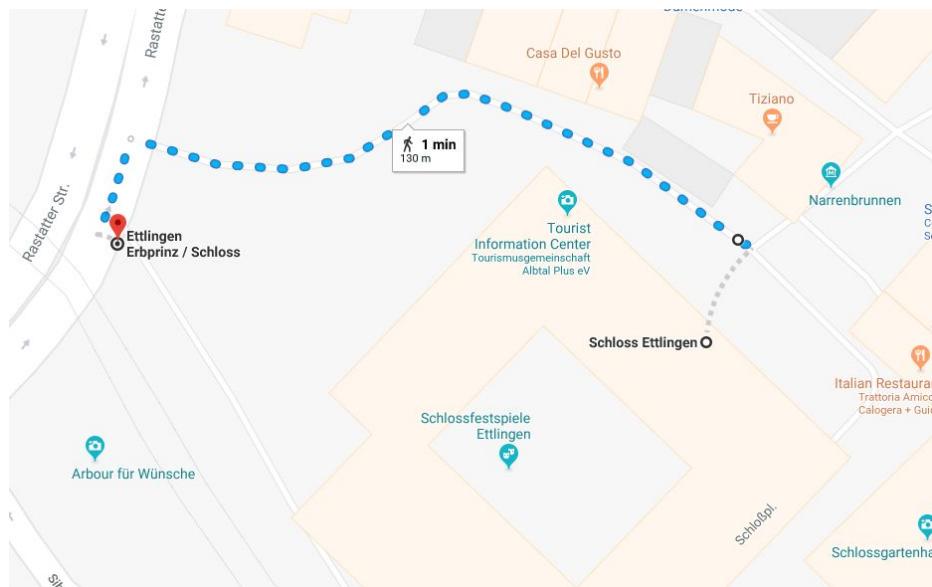
Tram from **Karlsruhe (Durlacher Tor/KIT-Campus Süd or Europaplatz)** to **Ettlingen Erbprinz/Schloss**:

(<https://www.kvv.de/en/plan-trip>)



Way from Ettlingen Erbprinz/Schloss to Ettlingen Palace.

(<https://goo.gl/maps/usChWKzD5LK2>)



Way Back

Just vice versa, same trams, other direction. Return to **Karlsruhe City** by tram from tram stop **Ettlingen Erbprinz/Schloss** (**S1 Hochstetten** or **S11 Neureut**, regularly every 20 minutes).

Please note, last tram back to **Karlsruhe City** is at **00:29am**. Taxi service is available close to the tram stop.

SESSIONS (Friday, 12 October 2018 - 8:30am)

Venue: KIT Audimax

Address: Straße am Forum 1, 76131 Karlsruhe, Building 30.95

K3: Keynote

Time: Friday, 12 October 2018, 8:30am - 9:30am

Session chair: Boris Jutzi

VISUAL LOCALIZATION WITH DEEP CONVOLUTIONAL NETWORKS

[Torsten Sattler](#)

Computer Vision and Geometry Group, ETH Zürich, Switzerland

O6: Sensor Orientation and Navigation

Time: Friday, 12 October 2018, 9:30am - 11:00am

Session chairs: Michael Cramer (WG I/9 - Integrated Sensor Orientation, Calibration, Navigation and Mapping), Stephan Nebiker (ICWG I/IV - Robotics for Mapping and Modelling)

[REVISITING THE APOLLO MAPPING CAMERA SYSTEM*](#)

[Kenneth Lee Edmundson](#)¹, Oleg Alexandrov², Brent A. Archinal¹, Kris J. Becker³, Tammy L. Becker³, Jesse A. Mapel¹, Zachary M. Moratto⁴, Ara V. Nefian², Janet O. Richie¹, Mark S. Robinson⁵, Makayla R. Shepherd¹, John R. Shinaman¹, Ethan D. Smith¹

¹United States Geological Survey, Astrogeology Science Center, Flagstaff, Arizona, USA; ²NASA Ames Research Center, Moffett Field, CA, USA; ³Lunar & Planetary Science Laboratory, University of Arizona, Tucson, Arizona, USA; ⁴Google, Inc., Mountain View, California, USA;

⁵Arizona State University, Tempe, Arizona, USA; kedmundson@usgs.gov

***Oral Presentation and Interactive Presentation (Poster)**

[CNN-BASED INITIAL LOCALIZATION IMPROVED BY DATA AUGMENTATION](#)

[Markus Sebastian Mueller](#), Alexander Metzger, Boris Jutzi
Karlsruhe Institute of Technology, Germany; markus.mueller5@kit.edu

[ENHANCEMENT OF REAL TIME SCAN MATCHING FOR UAV INDOOR NAVIGATION USING VEHICLE MODEL](#)

[Shady Abdelkader Zakarya Zahran](#)¹, Adel Mohamed Moussa¹, Abu Bakr Sesay², Naser El-Sheimy¹

¹Department of Geomatics Engineering, The University of Calgary; ²Department of Electrical Engineering, The University of Calgary; shady.zahran1@ucalgary.com

[CALIBRATION STUDY OF A TRIMBLE ACX4 SYSTEM FOR DIRECT GEOREFERENCING MAPPING APPLICATIONS](#)

Leonardo Ercolin Filho, [Edson Mitishita](#)
Universidade Federal do Paraná, Brazil; mitishita@ufpr.br

O7: UAS and Small Multi-sensor Platforms

Time: Friday, 12 October 2018, 11:30am - 1:00pm

Session chairs: Francesco Nex (ICWG I/II - UAS and Small Multi-sensor Platforms: Concepts and Applications), Filliberto Chiabrando (ICWG I/II - UAS and Small Multi-sensor Platforms: Concepts and Applications)

TERRAIN AWARE IMAGE CLIPPING FOR REAL-TIME AERIAL MAPPING

Daniel Hein, Ralf Berger

DLR / German Aerospace Center, Germany; daniel.hein@dlr.de

EXTRACTION OF SOLAR CELLS FROM UAV-BASED THERMAL IMAGE SEQUENCES

Ludwig Hoegner, Nikolas Pfaffenzeller, Lena Wagner, Uwe Stilla

Technical University Munich (TUM), Germany; Ludwig.Hoegner@tum.de

DEEP CROSS-DOMAIN BUILDING EXTRACTION FOR SELECTIVE DEPTH ESTIMATION FROM OBLIQUE AERIAL IMAGERY

Boitumelo Ruf^{1,2}, Laurenz Thiel¹, Martin Weinmann²

¹Fraunhofer IOSB; ²Institute of Photogrammetry and Remote Sensing, KIT;
boitumelo.ruf@iosb.fraunhofer.de

PILOT STUDY ON THE RETRIEVAL OF DBH AND DIAMETER DISTRIBUTION OF DECIDUOUS FOREST STANDS USING CAST SHADOWS IN UAV-BASED ORTHOMOSAICS

Teja Kattenborn^{1,2}, Jaime Hernandez³, Javier Lopatin¹, Gilbert Kattenborn², Fabian Ewald Fassnacht¹

¹Karlsruhe Institute for Technology, Germany; ²GeoCopter, Germany; ³Universidad de Chile, Chile;
teja.kattenborn@kit.edu

OC: Closing

Time: Friday, 12 October 2018, 1:00pm - 1:30pm

Uwe Stilla (DGPF President)

Francesco Nex (GSW19 Committee Member)

Tania Landes (ISPRS2020 Delegate)

Stefan Hinz (ISPRS Technical Commission I President)

RESTAURANTS

There are many student bars and restaurants in walking distance in the area around Kaiserstraße. Be aware students will also enter the places at about 1:00pm for lunch break. Some selected restaurants for lunch and dinner:

L'Osteria, Zähringerstraße 69, 76133 Karlsruhe , Phone +49 721 81966875, menu 

Chiang Mai, Durlacher Allee 11, 76131 Karlsruhe , Phone +49 721 6624883, menu 

Hans im Glück , Karl-Friedrich-Str. 12, 76133 Karlsruhe , Phone +49 721 86428517, menu 

Oxford-Pub , Fasanenstraße 6, 76131 Karlsruhe , Phone +49 721 46716285, menu , lunch 

Oxford-Café , Kaiserstr. 57, 76133 Karlsruhe , Phone +49 721 3831598

Marktlücke , Karl-Friedrich-Straße 8, 76133 Karlsruhe , Phone +49 721 6699829, lunch (pdf) , menu (pdf) 

Mauritius , Kaiserstr. 47, 76131 Karlsruhe , Phone +49 721 51637660, lunch , menu 

Die Kippe, Gottesauer Str. 23, 76131 Karlsruhe , Phone +49 721 697829

Vogel , Kapellenstraße 50, 76131 Karlsruhe , Phone +49 721 377571

Pfannestiel , Am Künstlerhaus 53, 76131 Karlsruhe , Phone +49 721 6607799, lunch 

Il Caminetto , Kronenstraße 5, 76133 Karlsruhe , Phone +49 721 380682, menu 

Fünf Sterne , Ruppurrer Str. 1, 76137 Karlsruhe , Phone +49 721 3504788, lunch 

Zum kleinen Ketterer , Adlerstr. 34, 76133 Karlsruhe , Phone +49 721 3540099, menu 

Multi-Kulti, Schlossplatz 19, 76131 Karlsruhe , Phone +49 721 9209797, menu 

Only for small groups:

Café Palaver , Steinstraße 23, 76133 Karlsruhe , Phone +49 721 377647, lunch (pdf) 

Gold , Ludwig-Wilhelm-Straße 12, 76131 Karlsruhe , Phone +49 721 6268238, lunch 

Zwiebel , Durlacher Allee 24, 76131 Karlsruhe , Phone +49 721 7228687, lunch 

GENERAL INFORMATION

Currency and Payment

The currency in Germany is Euro (EUR €). Credit cards like Visa and Mastercard are often accepted, also debit cards like Maestro are popular. Cash is accepted everywhere, many smaller stores only accept cash. ATMs accept credit and debit cards.

Electricity

The electrical voltage in Germany is 230 Volt. Plugs are type F (compatible with C and E).

Identification

Passport or ID card, please check your travel recommendations.

Language

English is spoken by many people in Germany. Announcements in the trains are usually in German, sometimes in English.

Visa

EU Citizens do not need a visa to enter Germany. Citizens of many other countries do not need a visa for visits up to 90 days. A [list of countries](#) can be found at the [visa regulations of German Federal Foreign Office](#).

Weather

October in Karlsruhe can be very sunny, as Karlsruhe is one of the warmest places in Germany. Temperatures vary in general from 7°C/45°F to 16°C/60°F at day.

WiFi

Free WiFi is provided at the Symposium and most places in Karlsruhe. Therefore connect your device to **KA-WLAN** or **KA-sWLAN** (SSID) and confirm with OK.

(<https://www.ka-wlan.de/>)

Beside this **Eduroam** (SSID) is available at KIT. Please note, to use **Eduroam** you need a user account from an affiliated university.

Oral Presentation

- Speakers will find their time slot for the presentation in the program.
- Please copy your presentation (PowerPoint or PDF) on CD/DVD or USB stick. Presentations have to be uploaded in time before the session starts.
- A conference notebook is used for all presentations.
 - The following software will be available: Adobe Acrobat Reader, Microsoft Powerpoint, LibreOffice.
 - If you are using video in your presentation, please check for the correct video codec after the upload.
- Please contact the session chairs before the session starts.
- **The time slot for an oral presentation is 18 minutes. Additionally 4 minutes are allocated for discussion.**



KIT Audimax auditorium (Photo [Poinsignon, Muller & Lachat](#) CC-BY-SA-3.0)

Interactive Presentation (Poster)

- Preparation of a poster:
 - Size of poster boards: width 120 cm x height 180 cm.
 - **Recommended size for a poster:**
DIN A0 (portrait) width 841 mm x height 1189 mm.
- Please come with your poster to the REGISTRATION DESK for further information at latest 12:30pm on presentation day.
- At least one author of each poster has to be available at the poster for interactive presentations during the poster session.
- Posters can be removed after the poster session.

MAKE YOUR NOTES

MAKE YOUR NOTES

MAKE YOUR NOTES

AUTHOR LIST

<u>Author</u>	<u>Session</u>	<u>Author</u>	<u>Session</u>
Abdikan, Saygin	P1	Bulatov, Dimitri	P1
Abmayr, Thomas	P2	Calantropio, Alessio	P1
Akpınar, Burak	P1	Campbell, Tristan	P2 Presenter
Al-Durgham, Kaleel	P2	Carrilho, André Caceres	P1 Presenter, P1
Alamús, Ramon	P1 Presenter	Cavegn, Stefan	O5, O5
Alexandrov, Oleg	O6	Černota, Pavel	P2
Alvares de Oliveira, Ra.	P2	Chatelard, Christian	P1
Amiez, Alexandre	P1	Chen, Jiawei	P1
An, Guanxing	P2 Presenter	Chen, Kaiqiang	O1 Presenter
Ang, Kathleen	P1, P2	Chen, Min	O2
Angelo, Pablo	O1	Chiabrando, Filiberto	P1 Presenter
Archinal, Brent A.	O6	Chiang, Kai-Wei	P2, P2, P2
Arens, Michael	O5	Chow, Jacky	P1 Presenter, P2 Presenter
Argany, Meysam	P2	Corbera, Jordi	P1
Azimi, Seyed Majid	P1 Presenter	Cortes, Camilo	P1 Presenter
Bakula, Krzysztof	P1 Presenter	Coudrain, Christophe	P1
Balenović, Ivan	P2	Cramer, Michael	P1 Presenter, P1
Balik Sanlı, Fusun	P1	Dabiri, Zahra	P2
Baran, Ramona	P2	Dai, Yudi	P2
Barillot, Philippe	P1	de los Reyes, Raquel	P1
Barrera, Vera	O2	De Wulf, Robert	O3
Basit, Abdul	P1 Presenter	Déliot, Philippe	P1
Bayram, Bulent	P1 Presenter	Demir, Nusret	P1
Becker, Kris J.	O6	Detchev, Ivan	P1
Becker, Tammy L.	O6	Diaz, Pedro	P2
Belton, David	P1	Dos Santos, Daniel Rodr.	P2 Presenter
Berger, Ralf	O7	Dos Santos, Renato Ces.	P1 Presenter
Bermudez Castro, Jose	O3 Presenter	Drap, Pierre	O5
Berveglieri, Adilson	P1	Dubois, Clemence	O4
Bilgin, Gokhan	P1	Edmundson, Kenneth L.	O6 Presenter, P2 Presenter
Blaser, Stefan	O5 Presenter	Eger, Ricardo Augusto	P1
Böer, Johannes	P1 Presenter	El-Sheimy, Naser M	P1, P1, P1, P2, P2, P2, O6
Boerner, Richard	P2 Presenter	Ellefi, Mohamed Ben	O5
Boldt, Markus	P2 Presenter	Ercolin Filho, Leonardo	O6
Borges Oliveira, Dario	O3	Erdem, Firat	P1
Borgmann, Björn	O5 Presenter	Erdnüß, Bastian	P2 Presenter
Boucher, Yannick	P1 Presenter	Esetlili, Mustafa Tolga	P1

<u>Author</u>	<u>Session</u>	<u>Author</u>	<u>Session</u>
Esetlili, Mustafa Tolga	P1	Huang, Xu	O2, O1
Fabinski, Christopher	P2	Hübner, Patrick	P2 Presenter
Fassnacht, Fabian Ewald	O7, P2 Presenter	Hughes, Lloyd Haydn	O3
Fearns, Peter	P2	Hussnain, Zille	P1 Presenter
Fehr, Markus	O5	Hyun, Chang-Uk	P2 Presenter
Feitosa, Raul	P2 Presenter	Ilehag, Rebecca	P1 Presenter
Feng, Chao	P2	Imai, Nilton Nobuhiro	P2
Fissore, Francesca	P2	Iwaszczuk, Dorota	P1 Presenter
Florath, Janine	O4	Jacobsen, Karsten	P1 Presenter
Fox, Nigel	P2	Jurjević, Luka	P2
Freiman, Fabiano	P2	Jutzi, Boris	O1, O2, O6
Gabriel, Raoul	O4 Presenter	Kalia, Andre C.	O4 Presenter
Galo, Mauricio	P1, P1	Karam, Samer	O2 Presenter
Gard, Nima Ajam	P1, P1	Karas, Jakub	P2
Gašparović, Mateo	P2 Presenter	Kattenborn, Gilbert	O7
Ghorbanzadeh, Omid	P2 Presenter	Kattenborn, Teja	O7 Presenter
Gilmer, Alan	P1	Kaufmann, Viktor	P1 Presenter
Goncalves, José	P2 Presenter	Keller, Hubert B.	O4
Greenwell, Claire	P2	Keller, Sina	O4 Presenter, O4
Grinberg, Michael	P1	Khalil, Zahid	P1
Gstaiger, Veronika	P1	Kieritz, Hilke	O5
Guarnieri, Alberto	P2	Kim, Hojun	P2 Presenter
Guo, Yunkai	P2	Kim, Hyun-Cheol	P2
Haala, Norbert	P1	Klimek, Kristin	O1
Haap, Patrick	O3	Knake-Langhorst, S.	P1
Hartig, Florian	P2	Kollmann, Matthias	P1
Hassanein, Mohamed	P1 Presenter	Koppanyi, Zoltan	P1
Havel, Patrick	P1	Kremer, Jens	P2
Hebel, Marcus	O5	Kuntze, Gregor	P2
Hein, Daniel	O7 Presenter	Kuo, Chung-Yen	P2
Heipke, Christian	P1	Kurczyński, Zdzisław	P1
Helmholz, Petra	P1	Kurz, Franz	O1, P1 Presenter, P1
Henry, Corentin	P1	Labiadh, Moez	O4
Hernandez, Jaime	O7	Lang, Stefan	P2
Hinz, Stefan	O1, O4, O4, P2	Langheinrich, Max. M.	P1 Presenter
Hoegner, Ludwig	O7 Presenter, P2, P2 Pres.	Latifi, Hooman	P2
Hofer, Valeria	O2	Lauk, Gerhard	P1
Honkavaara, Eija	P1, P2, P2	Laupheimer, Dominik	P1
Hosseinyalamdary, Siav.	O2	Lee, Impyeong	P2

<u>Author</u>	<u>Session</u>	<u>Author</u>	<u>Session</u>
Li, Jian	P2	Moussa, Mohamed O. M.	P1 Presenter
Li, Jiaqiang	O1	Mueller, Markus S.	O6 Presenter
Li, Jonathan	P2	Mueller-Rowold, Malte	P2 Presenter
Lian, Yuhan	P2	Näsi, Roope	P2
Lichti, Derek	P2	Nawaf, Mohamad M.	O5
Lin, Chao-Chieh	P2	Nebiker, Stephan	O5, O5
Lin, Cheng-An	P2 Presenter	Nefian, Ara V.	O6
Lin, Kuan-Ying	P2 Presenter	Nocerino, Erica	O5 Presenter, P1 Presenter
Liu, Qian	P1	Numbisi, Frederick N.	O3 Presenter, P1 Presenter
Loch, Carlos	P1	Oliveira, Raquel Alves	P1
Lopatin, Javier	O7	Ostrowski, Wojciech	P1
Louie, Nicholas	P1	Oude Elberink, Sander	P1
Luiz, Alfredo	P2	Oy, Selen	P1
Mahadevan, Karthik	P1	Palubinskas, Gintautas	P1
Maier, Philipp M.	O4, O4	Pasquet, Jérôme	O5
Mandlburger, Gottfried	O2 Presenter, P1, P2 Pres.	Pavan, Nadisson	P2
Mapel, Jesse A.	O6	Pérez, Fernando	P1
Markelin, Lauri	P2 Presenter	Peter, Michael	O2
Masiero, Andrea	P2 Presenter, P2, P2	Pfaffenzeller, Nikolas	O7
Matthes, Jörg	O4	Pi, YingDong	P2
Maurer, Michael	P1	Pilarska, Magdalena	P1
McGovern, Eugene	P1	Pilaš, Ivan	P2
Medak, Damir	P2	Pinhal, Andre	P2
Meißner, Henry	P1 Presenter	Pipia, Luca	P1
Menard, Patrick	P1	Piragnolo, Marco	P2
Merkle, Nina	P1	Pirotti, Francesco	P2
Metzger, Alexander	O6	Politz, Florian	P2 Presenter
Mimouni, Mustapha	O4	Pospíšil, Jiří	P2
Mitishita, Edson	O6 Presenter	Prudente, Victor	P2
Miyoshi, G. Takahashi	P2 Presenter	Qin, Rongjun	O1 Presenter O2 Presenter
Mohammed, Hani M.	P1 Presenter	Queiroz Feitosa, Raul	O3
Monka, Sebastian	P1	Reinartz, Peter	P1, P1
Montibeller, Bruno	P2	Remondino, Fabio	O1
Moratto, Zachary M.	O6	Rettenmund, Daniel	O5 Presenter, P1 Presenter
Morin, Kristian	P1	Reulke, Ralf	P1, P2
Mostafa, Mostafa	P2	Richie, Janet O.	O6
Mostafavi, Mir-Abolfazl	P2	Richter, Rudolf	P1
Moussa, Adel Mohamed	P1, P2 Presenter, O6	Riese, Felix M.	O4

<u>Author</u>	<u>Session</u>	<u>Author</u>	<u>Session</u>
Rinaudo, Fulvio	P1	Soares, Marinalva	P2
Rivière, Nicolas	P1	Steinbacher, Frank	P2
Rivière, Thomas	P1	Still, Uwe	O7, P2, P2
Rizzoli, Paola	P1	Stoffner, Fabian	O4
Robinson, Mark S.	O6	Storch, Tobias	P1
Ronsky, Janet	P2	Stötzer, Johanna	O4
Rosenbaum, Dominik	P1	Sudmanns, Martin	P2
Rosenfeldt, Yuzi Anai Z.	P1	Sulzer, Wolfgang	P1
Rothe, René	O1	Sun, Xian	O1
Roupioz, Laure	P1	Suo, Chen	P1 Presenter
Royer, Jean-Philip	O5	Suomalainen, Juha	P2
Ruf, Boitumelo	O7 Presenter, P1 Presenter	Szender, Marcin	P1
Saad Ul, Haque	P1	Tan, Jinbing	P2
Saccone, Mauro	O5	Tang, Pingbo	P1
Šafář, Václav	P2 Presenter	Teppati Losè, Lorenzo	P1
Sakr, Mostafa	P2	Theocharous, Theo	P2
Sanches, Ieda	P2	Thiel, Laurenz	O7
Sandner, Moritz	O4	Thiele, Antje	P2
Santos, Lucas Dias	P1	Tiede, Dirk	P2
Santos, Renato	P1	Tommaselli, Antonio M.	P1 Presenter, P2
Schatz, Volker	O5	Toschi, Isabella	O1 Presenter, P2 Presenter
Scherer-Klöckling, C.	O5	Tosic, Dragana	P2
Schmitt, Andreas	O3 Presenter	Toth, Charles	P1
Schulz, Karsten	P2	Tsai, Guang-Je	P2 Presenter
Scott, Barry	P2	Tseng, Yi-Hsing	P2
Seier, Gernot	P1	Turzer, Stefan	P2
Seker, Dursun Zafer	P1	Unger, Jakob	P1
Sesay, Abu Bakr	O6	Ustuner, Mustafa	P1 Presenter
Sester, Monika	P2	van Coillie, Frieke	O3
Shahbazi, Mozhdeh	P1	Vettore, Antonio	P2, P2 Presenter
Sharma, Gulshan	P2	Vieira, Denis	P2
Shepherd, Makayla R.	O6	Vig, Eleonora	P1, P1
Sheu, Chun-Yu	O1 Presenter	Viljanen, Niko	P2
Shinaman, John R.	O6	Vögtle, Thomas	P1, P2 Presenter
Sieberth, Till	O2 Presenter, P2 Presenter	Vosselman, George	O2, P1
Siegfarth, Clarissa	P2	Wackrow, Rene	O2
Silva, Mariana de Sa R.	P1 Presenter	Wagner, Lena	O7
Sledz, Artuom	P1 Presenter	Waibel, Patrick	O4
Smith, Ethan D.	O6	Waigand, Daniel	P1

<u>Author</u>	<u>Session</u>	<u>Author</u>	<u>Session</u>
Wang, Cheng	P2	Xie, Qiong	P2
Wecht, Matthias	P1	Xu, Yusheng	P2
Wecklich, Christopher	P1	Yan, Menglong	O1
Weidner, Uwe	O4	Yang, Bo	P2 Presenter
Weinmann, Martin	P2, O1, O4 Presenter, O7	Yilmaz, Alper	P1 Presenter, P1
Weinmann, Michael	O1	Zahran, Shady	P2, O6 Presenter
Wen, Chenglu	P2 Presenter	Zha, Bing	P1
Wendleder, Anna	O3	Zhou, Fengsong	P2
Wursthorn, Sven	P2	Zhu, Xiao Xiang	O3
Xia, Yan	P2	Zink, Manfred	P1
Xiao, Changlin	O1		

Start	End	Tuesday, 9 October 2018
09:00	12:00	Registration
		Venue: KIT Audimax
		Address: Straße am Forum 1, 76131 Karlsruhe, Building 30.95
09:30	05:00	T1 - UAV and Deep Learning Technologies for Remote Sensing
		Raul Feitosa, PUC-Rio, Brazil & Petra Helmholz, Curtin University, Australia
09:30	05:00	T2 - Topography and Bathymetry via Laser Scanning and Multi-Spectral Imaging
		Gottfried Mandlburger, University of Stuttgart, Germany
09:30	01:00	T3 - Photogrammetric Methods in the Machine Vision Industry
		Markus Ulrich, MVTEC Software GmbH, Germany

07:00	WELCOME RECEPTION
	Venue: Oxford Pub
	Address: Fasanenstraße 6, 76131 Karlsruhe

Start	End	Wednesday, 10 October 2018
08:00	12:00	Registration
09:30	10:00	OO: Opening
10:00	11:00	K1: 3D Reconstruction in Realtime
		Marc Stamminger, FAU, Germany
11:00	11:30	Coffee service
11:30	01:00	O1: Multi-View and Multi-Modal Image Analysis
01:00	02:30	Lunch (restaurant area around KIT)
02:30	04:00	P1: Interactive Presentation (Poster) with Coffee service
04:00	05:30	O2: LiDAR and Optical Sensing

07:00	ICEBREAKER
	Venue: KIT Mathematics Building
	Address: Englerstraße 2, 76131 Karlsruhe, Building 20.30

Start	End	Thursday, 11 October 2018
08:00	12:00	Registration
08:30	09:30	K2: Tandem-L or NewSpace SAR
		Alberto Moreira, DLR & KIT, Germany
09:30	11:00	O3: SAR and Microwave Sensing
11:00	11:30	Coffee service
11:30	01:00	O4: Thermal, Multi- and Hyperspectral Sensing
01:00	02:30	Lunch (restaurant area around KIT)
02:30	04:00	P2: Interactive Presentation (Poster) with Coffee service
04:00	05:30	O5: Mobile Mapping

07:00	CONFERENCE DINNER
	Venue: Ettlingen Palace
	Address: Schlossplatz 1, 76275 Ettlingen

Start	End	Friday, 12 October 2018
08:00	12:00	Registration
08:30	09:30	K3: Visual Localization with Deep Convolutional Networks
		Torsten Sattler, ETH Zürich, Switzerland
09:30	11:00	O6: Sensor Orientation and Navigation
11:00	11:30	Coffee service
11:30	01:00	O7: UAS and Small Multi-sensor Platforms
01:00	01:30	OC: Closing