

## MARCEL KAUFMANN

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### CAPABILITIES AND EXPERTISE

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#### **Strategic design of experiments and hands-on experience in Earth observation, computer vision, robotics and space education:**

- Development of algorithms for satellite based remote sensing
- Characterization of new time-of-flight [ToF] 3D camera sensors
- Utilization of 6-axis robots for automating experiments
- Mentoring the United Space School Class of 2013 in Houston, TX

#### **Teamwork, communication and soft skills:**

- Management of international projects and team leadership
- Excellent communication skills, particularly in presenting complex data to both scientists and non-scientists
- High comfort level with challenging tasks



### EDUCATION

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#### **École Polytechnique de Montréal**

##### **Ph.D. Student in Computer Engineering**

- "Making Innovative Space Technologies" Laboratory
- Focusing research on swarm robotics for lunar exploration
- Developing a self-adaptive computing payload for small-sats

Sep 2017 to present  
Montréal, Canada

#### **International Space University**

##### **Space Studies Program 2017**

- Graduated this inter\*-national \*-disciplinary and \*-cultural program with a GPA of A-
- Focus: "The Future of Internet of Things and their Applicability to Space and Energy"

Jun 2017 to Aug 2017  
Cork, Ireland

#### **University of Applied Sciences Darmstadt**

##### **M.Sc. in Photonics and Computer Vision**

- Thesis: False Alarm Reduction in Unsupervised Synthetic Aperture Radar Coherent Change Detection [SAR-CCD] Systems
- Thesis grade: 1.0 [Scaled 1.0 to 5.0; 1.0 = best]
- Cum. GPA: 1.9 [Scaled 1.0 to 5.0; 1.0 = best]

Apr 2015 to Nov 2016  
Darmstadt, Germany

#### **University of Applied Sciences Darmstadt**

##### **B.Sc. in Photonics and Computer Vision**

- Thesis: Characterization of Time-of-Flight Camera Prototypes
- Thesis grade: 1.3 [Scaled 1.0 to 5.0; 1.0 = best]
- Cum. GPA: 2.2 [Scaled 1.0 to 5.0; 1.0 = best]

Oct 2011 to Mar 2015  
Darmstadt, Germany

### RELEVANT WORK EXPERIENCE

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#### **S[&]T Corporation**

##### *Scientific Software Engineer*

- Developed R&D solutions for space, science and defence
- Implemented algorithms for satellite data processing and analysis

Nov 2016 to Jun 2017  
Delft, The Netherlands

#### **Orbital Eye B.V. and S[&]T Corporation**

##### *R&D Intern as part of the Erasmus Programme and Master's Thesis*

- Developed algorithms for SAR-CCD systems in MATLAB
- Increased the ground coverage up to 97% in boundary regions
- Reduced the false alarm rate by more than 80%

Apr 2016 to Oct 2016  
Delft, The Netherlands

#### **Basler AG and University of Applied Sciences Darmstadt**

##### *Research Assistant*

- Characterized the accuracy and precision of ToF 3D cameras
- Implemented a GenICam interface in C++

Jun 2015 to Feb 2016  
Darmstadt, Germany

#### **Basler AG**

##### *Preliminary R&D Intern and Bachelor's Thesis*

- Conducted research on ToF camera prototypes
- Implemented a ToF camera driver for the open source MILAN software in C++

Nov 2014 to Mar 2015  
Ahrensburg, Germany

#### **Robert Bosch GmbH**

##### *Engineering Placement Student*

- Integrated an inspection tool for detecting defects in silicon wafers
- Tested and verified algorithms using MATLAB

Sep 2013 to Feb 2014  
Reutlingen, Germany

## SKILL SUMMARY

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Programming	Science & Engineering	Computer	Soft & Personal	Languages
C/C++   CMake	Image Processing	Windows	Teamwork	English [fluent]
OpenCV   PCL	Computer Vision	Mac   Ubuntu	Communication	German [native]
Python   Qt   PyQt	Robot Vision	Adobe Suite	Presentation	Dutch [limited]
MATLAB	Optics   Zemax	Office   LaTeX	Stress Management	French [beginner]

## FURTHER INTERNATIONAL SPACE RELATED EXPERIENCE

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- ESA Academy** Oct 2018  
*Selected Candidate* Transinne, Belgium
- Selected for the Concurrent Engineering Challenge to develop a small satellite
- Space Generation Congress and International Astronautical Congress** Sep 2016  
*Delegate and DLR Scholarship Winner* Guadalajara, Mexico
- Presented results of the SGAC Earth Observation working group at SGC
  - Represented Germany as one of two DLR Standout Student Scholarship winners
- United Space School** Jul 2013 to Aug 2013  
*Team Leader and Mentor* Houston, TX, USA
- Supervised the international "Robotics and Space Suit Team"
  - Cooperated with the University of Houston Clear Lake and NASA's JSC
- International Space School** Jul 2007 to Aug 2007  
*National Representative for Germany* Houston, TX, USA
- Worked in an international team of 25+ nations
  - Gained intercultural team experience and planned a manned mission to Mars

## HONORS AND AWARDS

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- 35 under 35 Award: International Institute for Space Commerce** 2018
- Honoured by Canadian Astronaut C. Hadfield, American Astronaut J. Hernandez, South Korean Astronaut S. Yi, and three industry representatives to be one of the brightest young researchers and overall game changers in the Space industry
- Arbour Foundation Scholarship** 2018
- Selected Graduate Scholarship Recipient 2018
- Space and Satellite Professionals International Scholarship** 2017
- Scholarship to attend the Satellite 2018 Conference in Washington, DC
- European Space Agency ISU Scholarship** 2017
- Scholarship to attend ISU SSP17 in Cork, Ireland
- DLR Standout Student Scholarship** 2016
- Honored to attend the 15<sup>th</sup> SGC and the 67<sup>th</sup> IAC in Guadalajara, Mexico
- Gisbert Manskopf Award ("Abiturientenpreis")** 2009
- Award for community active students presented to one individual annually
- Third Place nationwide - Invent a Chip** 2008
- Invented a Driving Assistance Chip and implemented it in Verilog
- First Place - NASA Competition at secondary school** 2007
- Honored to represent Germany among 25+ nations at Space School

## PROGRAMMING MARATHON AWARDS (HACKATHONS)

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- First Place - "Hackatown" Competition Polytechnique Montréal, Canada** 2018
- Developed an AI based system to optimize the people flow within public transportation
- Second Place - ImplementAI Competition McGill, Montréal, Canada** 2017
- Prototyped a robot for the health care industry using vision and language understanding
- Global Nominee - NASA Space Apps Challenge Noordwijk, The Netherlands** 2017
- Developed an app to raise skin cancer awareness using satellite data
- Global Nominee - NASA Space Apps Challenge Noordwijk, The Netherlands** 2016
- Developed a flood risk application in a team of five
- Global Nominee - NASA Space Apps Challenge Frankfurt, Germany** 2015
- Solved the Spacebot Stereo Vision Challenge in a team of five

## VOLUNTEER WORK

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- TEDx RheinMain** Jan 2015 to 2017  
*Organizational Team Member* Frankfurt Area, Germany  
· Assisted in planning the TEDx Datanauts Pitch Day and Main Event
- German Red Cross - Ambulance Team** May 2010 to Mar 2016  
*Substitute Emergency Medical Technician* Marburg Area, Germany  
· Volunteer on the ambulance team and substitute full-time EMTs
- District of Schwalm-Eder** 2011, 2012, 2014, 2015  
*Emergency Medical Technician* Northern Germany  
· Provided first aid and life support in a governmental summer youth camp

## ACADEMIC COMMITTEE WORK

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- Faculty Council, Dept. of Mathematics and Science** 2012 to 2014 and 2015 to 2016  
*Elected Departmental Representative* Darmstadt, Germany  
· Managed decisions regarding the faculty's budget and new employees
- Examination Board, Photonics and Computer Vision** Mar 2014 to Mar 2015  
*Elected Departmental Representative* Darmstadt, Germany  
· Reviewed the exam plans for all semesters and improved scheduling
- Student Council, Dept. of Mathematics and Science** Mar 2012 to Feb 2014  
*Elected Student Representative* Darmstadt, Germany  
· Represented the student body publicly as spokesperson

## PUBLICATIONS

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- [1] **Marcel Kaufmann**, Jacopo Panerati, and Giovanni Beltrame (2018) Towards a Symbiotic Human and Multi-Robot Planetary Exploration System: Resilient Topologies for Space Exploration, Robotics: Science and Systems Autonomous Space Robotics Workshop
- [2] **Marcel Kaufmann**, Vivek Shankar Varadharajan, and Giovanni Beltrame (2018) A Self-Adaptive Data Handling System for Small Satellites and its Impact on Future Satellite Operations , International Astronautical Congress, Bremen, Germany
- [3] **Marcel Kaufmann**, Maxime Barthélemy, and Giovanni Beltrame (2018) Automating the Design of Thermal Control Systems, *submitted to MDPI Aerospace*
- [4] Jacopo Panerati, **Marcel Kaufmann**, Aidan Cowley, and Giovanni Beltrame (2018) A Symbiotic Human and Multi-Robot Planetary Exploration System, International Astronautical Congress, Bremen, Germany
- [5] Marco Minelli, **Marcel Kaufmann**, Jacopo Panerati, Cinara Ghedini, Giovanni Beltrame, and Lorenzo Sabattini (2018) Stop, Think, Roll: online gain optimization for resilient multi-robot topologies, International Symposium on Distributed Autonomous Robotic Systems (DARS)
- [6] Jacopo Panerati, Marco Minelli, Cinara Ghedini, Lucas Meyer, **Marcel Kaufmann**, Giovanni Beltrame, and Lorenzo Sabattini (2018) Robust Connectivity Maintenance for Fail-liable Robots *submitted to Autonomous Robots*
- [7] Tania Amorim, ..., **Marcel Kaufmann**, et. al. (2017) The Future of Internet of Things and their Applicability to Space and Energy. IAC Papers Archive. , International Astronautical Congress, Adelaide, Australia
- [8] **Marcel Kaufmann** (2016) False Alarm Reduction in Unsupervised Synthetic Aperture Radar Coherent Change Detection Systems, Darmstadt University of Applied Sciences M.Sc. thesis archive
- [9] **Marcel Kaufmann**, Stephan Naser (2016) Characterization and Calibration of a pulsed Time-of-Flight Camera. Oldenburg 3D days 2016. Photogrammetrie Laserscanning Optische Messtechnik. Editors: Luhmann/Schumacher. ISBN: 9783879076048, p. 218-225
- [10] **Marcel Kaufmann** (2015) Characterization of Time-of-Flight Camera Prototypes, Darmstadt University of Applied Sciences B.Sc. thesis archive