

# Abhinav Valada

University of Freiburg, Department of Computer Science  
Robot Learning Lab  
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## Education

### Dr. rer. nat. (Ph.D.) in Computer Science

UNIVERSITY OF FREIBURG — **summa cum laude (with highest distinction)**

Thesis: *Discovering and Leveraging Deep Multimodal Structure for Reliable Robot Perception and Localization*

First Reviewer: Prof. Dr. Wolfram Burgard, University of Freiburg, Germany

Second Reviewer: Prof. Dr. Dieter Fox, University of Washington, USA

Freiburg, Germany

Aug. 2014 - Feb. 2019

### M.S. in Robotics

CARNEGIE MELLON UNIVERSITY

Thesis: *An Autonomous Robot for Manipulation and Mapping of NFT Installations*

Advisors: Prof. Dr. George Kantor and Prof. Dr. Paul Scerri, Carnegie Mellon University, USA

Pittsburgh, USA

Jan. 2012 - Dec. 2013

### B.Tech in Electronics and Instrumentation Engineering

VIT UNIVERSITY

Thesis: *Design and Development of a Wireless Sensor Network System for Precision Agriculture*

Advisor: Prof. Dr. George Kantor, Carnegie Mellon University, USA

Vellore, India

Jun. 2006 - Dec. 2010

## Academic & Industry Experience

### Assistant Professor & Director of the Robot Learning Lab

UNIVERSITY OF FREIBURG, DEPARTMENT OF COMPUTER SCIENCE, ROBOT LEARNING LAB

Freiburg, Germany

Dec. 2019 - Present

### Postdoctoral Research Scientist

UNIVERSITY OF FREIBURG, DEPARTMENT OF COMPUTER SCIENCE, AUTONOMOUS INTELLIGENT SYSTEMS LAB

Freiburg, Germany

Mar. 2019 - Nov. 2019

### Scientific Research Staff

UNIVERSITY OF FREIBURG, DEPARTMENT OF COMPUTER SCIENCE, AUTONOMOUS INTELLIGENT SYSTEMS LAB

Freiburg, Germany

Aug. 2014 - Feb. 2019

### Co-founder & Director of Operations

PLATYPUS LLC

Pittsburgh, USA

Aug. 2012 - Aug. 2015

### Systems Engineer

NATIONAL ROBOTICS ENGINEERING CENTER

Pittsburgh, USA

Jul. 2013 - Jul. 2014

### Systems/Software Engineer

CARNEGIE MELLON UNIVERSITY, THE ROBOTICS INSTITUTE, FIELD ROBOTICS CENTER

Pittsburgh, USA

Nov. 2011 - Jun. 2013

### Research Scholar

CARNEGIE MELLON UNIVERSITY, THE ROBOTICS INSTITUTE, FIELD ROBOTICS CENTER

Pittsburgh, USA

Jan. 2010 - Oct. 2011

### Research Assistant

VIT UNIVERSITY

Vellore, India

Aug. 2008 - Dec. 2009

### Research Associate

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

Chennai, India

May. 2009 - Jul. 2009

### Research Intern

ABB ROBOTICS

Bangalore, India

Apr. 2008 - Jun. 2008

## Honors & Awards

2020 **Winner**, ECCV Robust Vision Challenge 2020 - Panoptic Segmentation

Virtual

2020 **Finalist for Georges Giralt PhD Award**, for the Best Robotics PhD Thesis in Europe

Malaga, Spain

2018 **RSS Pioneers**, Robotics: Science and Systems conference (RSS)

Pittsburgh, USA

2017 **Doctoral Consortium Award**, The International Symposium on Robotics Research (ISRR)

Puerto Varas, Chile

2009 **Chancellor's Scholarship**, VIT University

Vellore, India

# Funded Projects

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## Embodied Cognitive Robotics

EVA MAYR-STIHL STIFTUNG

Role: Principal Investigator

University of Freiburg

2020-2022

## Brain Controlled Service Robots (ServiceBots)

GERMAN CLUSTER OF EXCELLENCE BRAINLINKS-BRAINTOOLS

Role: Principal Investigator

University of Freiburg

2020-2022

## From Learning to Relearning Algorithmic Fairness for Detering Biased Outcomes in Socially-Aware Robot Navigation (Robots4SocialGood)

GERMAN CLUSTER OF EXCELLENCE BRAINLINKS-BRAINTOOLS

Role: Principal Investigator

University of Freiburg

2020-2022

## Intel. System for Autonomous Monitoring of Production Plants in Industry 4.0 (ISA 4.0)

FEDERAL MINISTRY OF EDUCATION AND RESEARCH (BMBF)

Role: Principal Investigator

University of Freiburg

2020-2022

## Sensor Systems for Localization of Trapped Victims in Collapsed Infrastructure (SORTIE)

FEDERAL MINISTRY OF EDUCATION AND RESEARCH (BMBF)

Role: Principal Investigator

University of Freiburg

2020-2022

## Open Deep Learning Toolkit for Robotics (OpenDR)

EUROPEAN COMMISSION H2020

Role: Principal Investigator

University of Freiburg

2020-2022

## Unmanned Aerial Vehicles for Rescuing and Recovering Victims (FOUNT<sup>2</sup>)

FEDERAL MINISTRY OF EDUCATION AND RESEARCH (BMBF)

Role: Involved in the acquisition and realization. Project and technical leader for AIS; PI: Prof. Wolfram Burgard

University of Freiburg

2017-2019

## Robust Localization Using Deep Landmark Features (RLDL)

SAMSUNG GRO

Role: Involved in the acquisition and realization. Project and technical leader for AIS; PI: Prof. Wolfram Burgard

University of Freiburg

2017-2018

## Reliable Lifelong Navigation for Mobile Robots (LifeNav)

EUROPEAN COMMISSION FP7-IDEAS

Role: Research scientist; PI: Prof. Wolfram Burgard

University of Freiburg

2015-2016

## Collaborative Center for Applied Research on Ambient Assisted Living (ZAFH-AAL)

MINISTRY OF SCIENCE AND THE ARTS OF BADEN-WÜRTTEMBERG

Role: Research scientist; PI: Prof. Wolfram Burgard

University of Freiburg

2014-2015

## Autonomous Haulage System (AHS)

CATERPILLAR INC.

Role: Research engineer; PI: Dr. Peter Rander

National Robotics Eng. Center

2013-2014

## Enhanced Teleoperation

U.S. ARMY TANK AUTOMOTIVE RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (TARDEC)

Role: Research engineer; PI: Dr. Peter Rander

National Robotics Eng. Center

2013-2014

## Cooperative Robotic Watercraft (CRW)

CMU VISIONARY PROJECT

Role: Research engineer and sensors lead; PI: Prof. George Kantor

Carnegie Mellon University

2010-2014

## Subterranean Robotics

ANGLO AMERICAN PLC

Role: Research engineer; PI: Prof. George Kantor

Carnegie Mellon University

2011-2012

## Hydroponic Automation

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

Role: Research engineer; PI: Prof. George Kantor

Carnegie Mellon University

2011-2013

## Distributed SensorWebs

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) SCRI-MINDS

Role: Research engineer; PI: Prof. George Kantor

Carnegie Mellon University

2010-2013

## Invited Talks

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### **Towards Self-Learning Robots**

PLENARY, IEEE INTERNATIONAL CONFERENCE ON UNMANNED SYSTEMS (ICUS 2020)

*Virtual*

*Sep. 2020*

### **Towards Coherent Scene Understanding of Dynamic Environments**

AUTOSENS CONFERENCE

*Virtual*

*Jul. 2020*

### **Towards Coherent Scene Understanding of Dynamic Environments**

TOYOTA RESEARCH INSTITUTE

*Los Altos, USA*

*Jul. 2020*

### **Efficient and Coherent Panoptic Segmentation**

WAYVE

*London, UK*

*Jul. 2020*

### **Self-Supervised Deep Learning**

UNIVERSITY OF FREIBURG, FREIBURG CENTER FOR DATA ANALYSIS AND MODELING

*Freiburg, Germany*

*May 2020*

### **Embodied Cognitive Robotics: Rethinking the Relationship Between Perception and Action**

SAPIENZA UNIVERSITY OF ROME, SEMINARS IN AI

*Rome, Italy*

*Mar. 2020*

### **Deep Learning for Robot Perception and Localization**

ROBERT BOSCH CENTER FOR DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

*Chennai, India*

*Sep. 2018*

### **Navigational Autonomy for UAVs Operating in Post-Disaster Environments**

INDO-GERMAN WORKSHOP ON SENSOR SYSTEMS FOR LOCALIZATION OF TRAPPED VICTIMS IN COLLAPSED INFRASTRUCTURE

*New Delhi, India*

*Sep. 2018*

### **Learning Deep Multimodal Features for Reliable Scene Understanding**

FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY

*Pittsburgh, USA*

*Jul. 2018*

### **Adaptive Semantic Segmentation**

NVIDIA GPU TECHNOLOGY CONFERENCE EUROPE

*Amsterdam, Netherlands*

*Sep. 2016*

### **Techniques for Reliable Robot Perception in Unstructured Environments**

IROS WORKSHOP ON STATE ESTIMATION AND TERRAIN PERCEPTION

*Daejeon, Korea*

*Oct. 2016*

### **Robust and Real-Time Deep Scene Understanding of Unstructured Environments**

FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY

*Pittsburgh, USA*

*Jun. 2016*

### **An Autonomous Robot for Manipulation and Mapping of NFT Installations**

FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY

*Pittsburgh, USA*

*Dec. 2013*

### **Intelligent Irrigation using Wireless Sensor Networks**

INTERNATIONAL CONFERENCE OF AGRICULTURAL ENGINEERING

*Valencia, Spain*

*Jul. 2012*

### **Intelligent Environmental Monitoring using Fleets of Autonomous Surface Crafts**

VIT ALUMNI LECTURE

*Vellore, India*

*Jun. 2012*

### **Development of the Cooperative Robotic Watercraft**

THE INDIAN INSTITUTE OF TECHNOLOGY MADRAS

*Chennai, India*

*Jun. 2012*

### **Development of a Multi-Hop Routing Protocol for Distributed Sensing Applications**

FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY

*Pittsburgh, USA*

*Sep. 2010*

### **Probabilistic Planning for Mobile Robots**

GUEST LECTURE, IEEE RESONANCE, VIT UNIVERSITY

*Vellore, India*

*Jul. 2008*

## Teaching

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### **Deep Learning for Autonomous Systems**

UNIVERSITY OF FREIBURG

- Seminar course on deep learning techniques for autonomous systems.

*WS 2020*

### **Self-Supervised Learning**

UNIVERSITY OF FREIBURG

- Seminar course on self-supervised learning.

*SS 2020*

## Foundations of Deep Learning

UNIVERSITY OF FREIBURG

- Foundations of deep learning.

WS 2019-Present

## Deep Learning Laboratory

UNIVERSITY OF FREIBURG

- Introduction to Deep Learning, optimization, projects on robot learning.

WS 2018-Present

## Deep Learning for Autonomous Driving

UNIVERSITY OF FREIBURG

- Introduction to Deep Learning and ADAS, working with TensorFlow, projects on various self-driving car tasks.

SS 2018

## Robot Navigation

UNIVERSITY OF FREIBURG

- Seminar course on advanced robot navigation research.

WS 2015-17

## Robot Perception

UNIVERSITY OF FREIBURG

- Seminar course on advanced robot perception research.

WS 2015

## Supervision

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current	<b>Eugenio Chisari,</b>	PhD
current	<b>Nikhil Gosala,</b>	PhD
current	<b>Tim Welschehold,</b>	PostDoc
current	<b>Daniele Cattaneo,</b>	PostDoc
current	<b>Daniel Honerkamp,</b>	PhD
current	<b>Juana Valeria Hurtado Rincon,</b>	PhD
2020	<b>Jing Lu,</b>	Master Thesis
2020	<b>Chengxin Wang,</b>	Master Project
2020	<b>Yiğit Yükselen,</b>	Master Project
2020	<b>Rohit Mohan,</b>	Master Project
2019	<b>Francisco Rivera,</b> Self-Supervised Multimodal Tracking	Master Project
2019	<b>Manav Madan,</b> (Fraunhofer IPM) Compression of Convolutional Neural Networks	Master Thesis
2019	<b>Eduardo Alvarado,</b> (Bosch - Automated Driving) Kalman Filter Object Tracking using Learned Sensor Measurement Models	Master Thesis
2018	<b>Borna Bešlić,</b> Dynamic Object Invariant Space Generation	Master Project
2018	<b>Himanshu Maurya,</b> Autonomous Landing of Aerial Vehicles in Rubbles	DAAD Internship
2018	<b>Rohit Mohan,</b> Robust Multimodal Segmentation in Challenging Perceptual Conditions	Bachelor Thesis
2018	<b>Moritz Mohr,</b> Next Best View Planning for Autonomous Exploration and Mapping	Bachelor Thesis
2017	<b>Jay Patravali,</b> Landmark-based Visual Localization using Deep Convolutional Neural Networks	Internship
2017	<b>Louay Abdelgawad,</b> Room Layout Estimation using Deep Convolutional Neural Networks	Master Project
2017	<b>Hanna Stellmach,</b> Multimodal Localization using Deep Convolutional Neural Networks	Master Project
2017	<b>Mayank Mittal,</b> Predicting Landing Sites in Aerial Images from Disaster Scenarios	DAAD Internship
2017	<b>Rohit Suri,</b> Laser-Camera Label Transfer for Semantic Segmentation	DAAD Internship
2016	<b>Johan Vertens,</b> Semantic Segmentation of Moving Objects	Master Thesis
2016	<b>Ankit Dhall,</b> Robust Deep Semantic Segmentation using Convoluted Mixture of Deep Experts	DAAD Internship
2016	<b>Julian Kunzelmann,</b> Multimodal Vegetation Segmentation using Up-Convolutional Neural Networks	Bachelor Thesis
2015	<b>Gonzalo Nuno Estevez,</b> Navigational Autonomy for Nano-Quadrotors	Bachelor Thesis

## Academic Activities

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### EDITORIAL SERVICES

**Area Chair,** Conference on Robot Learning (CoRL) 2020

**Associate Editor,** IEEE Robotics and Automation Letters (RA-L) 2019-Present

**Program Committee Member,** Robotics: Science and Systems (RSS) 2020

**Associate Editor,** IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2020

**Associate Editor,** IEEE International Conference on Robotics and Automation (ICRA) 2020

**Program Committee Member,** 24th European Conference on Artificial Intelligence (ECAI), 2020

**Program Committee Member,** AAAI Conference on Artificial Intelligence, Student Abstract and Poster Program, 2020, 2021

**Program Committee Member**, Conference on Robot Learning (CoRL) 2019  
**General Co-chair**, RSS Pioneers, Robotics: Science and Systems Conference (RSS) 2019

## WORKSHOP ORGANIZATION

**Self-Supervised Robot Learning**, Robotics: Science and Systems Conference (RSS) 2020  
**3D-Deep Learning for Automated Driving**, IEEE Intelligent Vehicles Symposium (IV) 2020

## REVIEWING

### Journals

International Journal of Robotics Research (IJRR), International Journal of Computer Vision (IJCV), IEEE Transactions on Robotics (T-RO), IEEE Transactions on Neural Networks and Learning Systems (TNNLS), Robotics and Autonomous Systems (RAS), IEEE Robotics and Automation Letters (RA-L), IEEE Robotics & Automation Magazine, Journal of Field Robotics (JFR), International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI), IEEE Transactions on Industrial Electronics (T-IE), IEEE Transactions on Multimedia (T-MM), Sensors

### Conferences

Robotics: Science and Systems (RSS), Conference on Robot Learning (CoRL), IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), International Conference on Field and Service Robotics (FSR), International Symposium on Robotics Research (ISRR), European Conference on Mobile Robotics (ECMR), International Conference on Advanced Robotics (ICAR), German Conference on Pattern Recognition (GCPR), International Conference on Intelligent Robotics and Applications (ICIRA)

## DEPARTMENTAL SERVICES

- **HPC cluster administrator**, Autonomous Intelligent Systems, University of Freiburg
- **Web administrator**, Field Robotics Center, Carnegie Mellon University
- **Public spaces committee member**, Field Robotics Center, Carnegie Mellon University
- **Organization committee member**, International Conference on Sensors and Related Networks, 2007

## Publications

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### MANUSCRIPTS UNDER REVIEW

- **EfficientPS: Efficient Panoptic Segmentation**  
Rohit Mohan, Abhinav Valada  
*Under Review: International Journal of Computer Vision, arXiv preprint arXiv:2004.02307 (APR. 2020). 2020*

### REFEREED JOURNAL AND CONFERENCE PUBLICATIONS

- **Self-Supervised Visual Terrain Classification from Unsupervised Acoustic Feature Learning**  
Jannik Zürn, Wolfram Burgard, Abhinav Valada  
*IEEE Transactions on Robotics (T-RO) (SEPT. 2020). 2020*
- **Multimodal Interaction-aware Motion Prediction for Autonomous Street Crossing**  
Noha Radwan, Wolfram Burgard, Abhinav Valada  
*International Journal of Robotics Research (IJRR) (AUG. 2020). 2020*
- **Vision-Based Autonomous UAV Navigation and Landing for Urban Search and Rescue**  
Mayank Mittal, Rohit Mohan, Wolfram Burgard, Abhinav Valada  
*International Symposium on Robotics Research (ISRR), 2019*
- **Self-Supervised Model Adaptation for Multimodal Semantic Segmentation**  
Abhinav Valada, Rohit Mohan, Wolfram Burgard  
*International Journal of Computer Vision (IJCV), Special Issue: Deep Learning for Robotic Vision (2019). 2019*
- **Robot Localization in Floor Plans using a Room Layout Edge Extraction Network**  
Federico Boniardi\*, Abhinav Valada\*, Rohit Mohan, Tim Caselitz, Wolfram Burgard  
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019*
- **VLocNet++: Deep Multitask Learning for Semantic Visual Localization and Odometry**  
Noha Radwan\*, Abhinav Valada\*, Wolfram Burgard  
*IEEE Robotics and Automation Letters (RA-L) 3.4 (2018) PP. 4407–4414. 2018*
- **Deep Auxiliary Learning for Visual Localization and Odometry**  
Abhinav Valada\*, Noha Radwan\*, Wolfram Burgard  
*IEEE International Conference on Robotics and Automation (ICRA), 2018*
- **Perspectives on Deep Multimodal Robot Learning**  
Wolfram Burgard, Abhinav Valada, Noha Radwan, Tayyab Naseer, Jingwei Zhang, Johan Vertens, Oier Mees, Andreas Eitel, Gabriel Oliveira  
*International Symposium on Robotics Research (ISRR), 2017*
- **SMSnet: Semantic Motion Segmentation using Deep Convolutional Neural Networks**  
Johan Vertens\*, Abhinav Valada\*, Wolfram Burgard  
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017*

- **AdapNet: Adaptive Semantic Segmentation in Adverse Environmental Conditions**  
Abhinav Valada, Johan Vertens, Ankit Dhall, Wolfram Burgard  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2017
- **Deep Spatiotemporal Models for Robust Proprioceptive Terrain Classification**  
Abhinav Valada, Wolfram Burgard  
*The International Journal of Robotics Research (IJRR)* 36.13-14 (2017) PP. 15211–1539. 2017, **(INVITED)**
- **Deep Multispectral Semantic Scene Understanding of Forested Environments Using Multimodal Fusion**  
Abhinav Valada, Gabriel L. Oliveira, Thomas Brox, Wolfram Burgard  
*International Symposium on Experimental Robotics* (2017) PP. 465–477. 2017
- **Deep Learning for Human Part Discovery in Images**  
Gabriel Leivas Olivera, Abhinav Valada, Wolfram Burgard, Thomas Brox  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2016
- **Autonomous Indoor Robot Navigation Using a Sketch Interface for Drawing Maps and Routes**  
Federico Boniardi, Abhinav Valada, Wolfram Burgard, Gian Diego Tipaldi  
*IEEE International Conference on Robotics and Automation (ICRA)*, 2016
- **Deep Feature Learning for Acoustics-based Terrain Classification**  
Abhinav Valada, Luciano Spinello, Wolfram Burgard  
*International Symposium on Robotics Research 2* (2015) PP. 21–37. 2015, **(SELECTED IN TOP 10)**
- **Planning Efficient Paths through Dynamic Flow Fields in Real World Domains**  
Christopher Tomaszewski, Abhinav Valada, Paul Scerri  
*MTS/IEEE OCEANS*, 2013
- **An Intelligent Approach to Hysteresis Compensation while Sampling using a Fleet of Autonomous Watercraft**  
Abhinav Valada, Christopher Tomaszewski, Balajee Kannan, Prasanna Velagapudi, George A Kantor, Paul Scerri  
*International Conference on Intelligent Robotics and Applications (ICIRA)*, 2012
- **Automation of Hydroponic Installations using a Robot with Position Based Visual Feedback**  
Niels Tanke, Guoming Alex Long, Dhruv Agrawal, Abhinav Valada, George A Kantor  
*International Conference of Agricultural Engineering (CIGR-Ageng)*, 2012
- **Base Station Design and Architecture for Wireless Sensor Networks**  
David Kohanbash, Abhinav Valada, George A Kantor  
*International Conference of Agricultural Engineering (CIGR-Ageng)*, 2012
- **Development of a Low Cost Multi-Robot Autonomous Marine Surface Platform**  
Abhinav Valada, Prasanna Velagapudi, Balajee Kannan, Christopher Tomaszewski, George A Kantor, Paul Scerri  
*International Conference on Field and Service Robotics (FSR)*, 2012
- **Real-World Testing of a Multi-Robot Team**  
Paul Scerri, Prasanna Velagapudi, Balajee Kannan, Abhinav Valada, Christopher Tomaszewski, John M Dolan, Adrian Scerri, Kumar Shaurya Shankar, Luis Lorenzo Bill-Clark, George A Kantor  
*11th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2012
- **DSRP: Distributed SensorWeb Routing Protocol**  
Abhinav Valada, David Kohanbash, George A Kantor  
*21st International Conference on Electronics, Communications and Computers (CONIELECOMP)*, 2011
- **Development of a Distributed Wireless Sensing System for Agriculture**  
David Kohanbash, Abhinav Valada, George A Kantor  
*International Symposium on Wireless Sensor Network for Agriculture*, 2012

## REFEREED WORKSHOP PUBLICATIONS

- **CMRNet++: Map and Camera Agnostic Monocular Visual Localization in LiDAR Maps**  
Daniele Cattaneo, Domenico Giorgio Sorrenti, Abhinav Valada  
*IEEE International Conference on Robotics and Automation (ICRA) Workshop on Emerging Learning and Algorithmic Methods for Data Association in Robotics*, 2020
- **MOPT: Multi-Object Panoptic Tracking**  
Juana Valeria Hurtado, Rohit Mohan, Wolfram Burgard, Abhinav Valada  
*The IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshop on Scalability in Autonomous Driving*, 2020
- **Vision-based Autonomous Landing in Catastrophe-Struck Environments**  
Mayank Mittal\*, Abhinav Valada\*, Wolfram Burgard  
*Workshop on Vision-based Drones: What's Next? at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2018
- **Incorporating Semantic and Geometric Priors in Deep Pose Regression**  
Abhinav Valada\*, Noha Radwan\*, Wolfram Burgard  
*Workshop on Learning and Inference in Robotics: Integrating Structure, Priors and Models at Robotics: Science and Systems (RSS)*, 2018
- **Learning Reliable and Scalable Representations Using Multimodal Multitask Deep Learning**  
Abhinav Valada, Wolfram Burgard  
*RSS Pioneers at Robotics: Science and Systems (RSS)*, 2018
- **Convolved Mixture of Deep Experts for Robust Semantic Segmentation**  
Abhinav Valada, Ankit Dhall, Wolfram Burgard

- **Towards Robust Semantic Segmentation using Deep Fusion**  
Abhinav Valada, Gabriel Leivas Olivera, Thomas Brox, Wolfram Burgard  
*Workshop on Limits and Potentials of Deep Learning in Robotics at Robotics: Science and Systems (RSS)*, 2016
- **Autonomous Indoor Robot Navigation Using Sketched Maps and Routes**  
Federico Boniardi, Abhinav Valada, Wolfram Burgard, Gian Diego Tipaldi  
*Workshop on Model Learning for Human-Robot Communication at Robotics: Science and Systems (RSS)*, 2015
- **Visual Obstacle Avoidance for Autonomous Watercraft using Smartphones**  
Tarek El-Gaaly, Christopher Tomaszewski, Abhinav Valada, Prasanna Velagapudi, Balajee Kannan, Paul Scerri  
*Autonomous Robots and Multirobot Systems workshop (ARMS, at AAMAS)*, 2013
- **Irrigation Control Methods for Wireless Sensor Network**  
David Kohanbash, Abhinav Valada, George A Kantor  
*American Society of Agricultural and Biological Engineers (ASABE) Annual Meeting*, 2012
- **Real-World Testing of a Multi-Robot Team**  
Paul Scerri, Prasanna Velagapudi, Balajee Kannan, Abhinav Valada, Christopher Tomaszewski, John M Dolan, Adrian Scerri, Kumar Shaurya Shankar, Luis Lorenzo Bill-Clark, George A Kantor  
*Autonomous Robots and Multi-Robot Systems Workshop at the 11th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2012
- **Wireless Sensor Networks and Actionable Modeling for Intelligent Irrigation**  
David Kohanbash, Abhinav Valada, George A Kantor  
*American Society of Agricultural and Biological Engineers (ASABE) Annual Meeting*, 2011

## OTHER PUBLICATIONS

- **Discovering and Leveraging Deep Multimodal Structure for Reliable Robot Perception and Localization**  
Abhinav Valada  
*PhD Thesis, University of Freiburg, Department of Computer Science, doi: 10.6094/UNIFR/17427*, 2019
- **An Autonomous Robot for Manipulation and Mapping of Hydroponic NFT Installations**  
Abhinav Valada  
*MS Thesis, Tech. rep. CMU-RI-TR-28-13, Carnegie Mellon University, Robotics Institute*, 2013
- **Design and Development of a Wireless Sensor Network System for Precision Agriculture**  
Abhinav Valada  
*BTech Thesis, Tech. rep. CMU-RI-TR-10-21, Carnegie Mellon University, Robotics Institute*, 2010

## Undergraduate Activities

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### SELECTED COMPETITIONS

2009	<b>Runner up, Best Paper Award</b> , International Technical Symposium Kshtij	<i>Kharagpur, India</i>
2009	<b>Runner up, Best Paper Award</b> , National Technical Symposium GraVITas	<i>Vellore, India</i>
2009	<b>Best Robot Design Award</b> , National Technical Symposium Efusion	<i>Vellore, India</i>
2009	<b>Winner, National Mobile Robot Racing Competition</b> , VIT University	<i>Vellore, India</i>
2009	<b>Second Place, Business Plan Competition</b> , National Technical Symposium Greenon	<i>Vellore, India</i>
2008	<b>Best Paper Award</b> , National Technical Symposium Techtatva	<i>Manipal, India</i>
2008	<b>Winner, My Idea Program</b> , Lemelson Recognition and Mentoring Programme and DST Govt. of India	<i>Vellore, India</i>
2008	<b>Winner, National Coding Competition</b> , Computer Society of India and Indian Society for Tech. Education	<i>Vellore, India</i>
2008	<b>Winner, National Mobile Robot Racing Competition</b> , VIT University	<i>Vellore, India</i>
2008	<b>Third Place, AUV Design Competition</b> , National Technical Symposium Electroutsav	<i>Vellore, India</i>

### SELECTED POSTER PRESENTATIONS

- **A Subsumption Architecture Based Behavioral Robot Using Synthetic Psychology**  
Abhinav Valada, Vaani Madhuram, Swimmi Singh  
*National Technical Symposium GraVITas*, 2009
- **Wireless Soil Moisture Control System**  
Abhinav Valada  
*My Idea Program, Technology Business Incubator, VIT University*, 2009
- **Sensory Slip Control Gripper for Industrial Robots**  
Abhinav Valada  
*International Technical Symposium Kshtij*, 2009
- **Tactile Sensing and Control of Robotic Manipulators**  
Abhinav Valada, Shlok Kumar  
*National technical symposium Sadhana*, 2008
- **Real Time Sensory Anti-slip Gripper for Industrial Robots**  
Abhinav Valada  
*My Idea Program, Technology Business Incubator, VIT University*, 2008

- **Real Time Intelligent Force/Position Control Mechanism for Dexterous Manipulation**  
Abhinav Valada  
*National Technical Symposium Techtatva, 2008*
- **Sensory Gripping System for Variable Products**  
Abhinav Valada  
*National Technical Symposium Techtatva, 2008*
- **Intelligent Sensory Slip Control for Industrial Robots”**; National technical symposium efusion  
Abhinav Valada  
*National Technical Symposium Efusion, 2008*

## Software & Datasets

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### Semantic Scene Understanding

<http://deepscene.cs.uni-freiburg.de>

- Live demo of the state-of-the-art unimodal and multimodal semantic segmentation using AdapNet and AdapNet++ on various benchmarks.
- Freiburg Forest Dataset - Pixel-level semantic labels of unstructured forested environments.

### Semantic Visual Localization

<http://deeploc.cs.uni-freiburg.de>

- Live demo of the state-of-the-art multi-task visual localization, semantic segmentation and odometry estimation using VLocNet and VLocNet++.
- DeepLoc Dataset - Pixel-level semantic labels and 6-DoF camera poses for images.

### Semantic Motion Segmentation

<http://deepmotion.cs.uni-freiburg.de>

- State-of-the-art SMSnet models that jointly predict the pixel-level semantic object class and motion status.
- Cityscapes Motion Dataset - Pixel-level semantic and motion annotations of images from the Cityscapes benchmark.
- KITTI Motion Dataset - Pixel-level semantic and motion annotations of images from the KITTI benchmark.

### Autonomous UAV Navigation and Landing

<http://autoland.cs.uni-freiburg.de>

- AutoLand Dataset - 1.2 Million RGB images of collapsed urban buildings with corresponding groundtruth for depth, surface normals, semantics and 6-DoF camera pose information.

### Acoustics-based Terrain Classification

<http://deepterrain.cs.uni-freiburg.de>

- Live demo of the state-of-the-art terrain classification using only audio signals of vehicle-terrain interactions.
- AudioTerrain Dataset - Over 6 hours of annotated audio clips of vehicle-terrain interactions on 9 different indoor and outdoor terrains.

### Semantic Segmentation of Human Body Parts

<http://aisdatasets.cs.uni-freiburg.de>

- Freiburg People in Disaster Dataset - Pixel-level semantic annotations of human body parts in an environment that mimics a disaster scenario with clutter and heavy occlusion.
- Range Segmentation Dataset - Pixel-level semantic annotations of human body parts at different distances from the camera.

## Media Coverage

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### Advanced AI Model Enables Coherent Scene Recognition for Autonomous Vehicles

*selfdrivingcars360, 2020*

### Deep Learning: Wie selbstfahrende Autos Szenen besser verstehen

*autocad-magazin, 2020*

### New deep analysis breaks information in picture recognition capacity of self-driving automobiles

*news8plus, 2020*

### AI Model Enhances Image Recognition Ability Of Self-Driving Cars

*pioneeringminds, 2020*

### Advanced AI Model Enables Coherent Scene Recognition for Autonomous Vehicles

*azorobotics, 2020*

### Neues KI-Modell verbessert die Umfelderkennung

*springerprofessional, 2020*

### Deep learning method improves environment perception of self-driving cars

*eenewsautomotive, 2020*

### Neue Methoden des Deep Learning

*intellincar, 2020*

### EfficientPS: New State-of-the-art Model in Panoptic Segmentation

*Neurohive, 2020*

### Faster and more effective scene understanding

*EurekaAlert, 2020*

### Faster and more effective scene understanding

*News Break, 2020*

### Freiburger Forscherteam besser als Google

*elektroniknet, 2020*

### New deep learning research breaks records in image recognition ability of self-driving cars

*innovations report, 2020*

### Faster and more effective scene understanding

*Miragenews, 2020*

### New deep learning research breaks records in image recognition ability of self-driving cars

*TechXplore, 2020*

### FOUNT<sup>2</sup> – Einsatz für die Wissenschaft

*Technisches Hilfswerk, 2019*



**Robotic Crocodiles**

**Crocodile Robot Dodges Hippo ... for Science!**

**Robots: A Fun Context for Learning**

**For Surveying Dangerous Hippo Pools, Platypus Robots Go Where People Can't**

**Dirty and Dangerous**

**Platypus Floats Idea of Affordable Environmental Robotics**

**Cooperative Robotic Watercraft**

**CMU's Team Develops Environmental Robotics**

**CMU Startup Adds Robotics to Water**

*Discovery Channel, 2015*

*NBC News, 2014*

*Grow a Generation, 2014*

*Environmental Monitor, 2014*

*Cary Institute, 2014*

*Business Times, 2012*

*Robots.net, 2012*

*Business Journal, 2012*

*Pittsburgh Business Times, 2012*