

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 **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

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	<i>University of Freiburg</i> 2020-2022
Sensor Systems for Localization of Trapped Victims in Collapsed Infrastructure (SORTIE) FEDERAL MINISTRY OF EDUCATION AND RESEARCH (BMBF) Role: Principal Investigator	<i>University of Freiburg</i> 2020-2022
Open Deep Learning Toolkit for Robotics (OpenDR) EUROPEAN COMMISSION H2020 Role: Principal Investigator	<i>University of Freiburg</i> 2020-2022
Unmanned Aerial Vehicles for Rescuing and Recovering Victims (FOUNT²) FEDERAL MINISTRY OF EDUCATION AND RESEARCH (BMBF) Role: Involved in the acquisition and realization. Project and technical leader for AIS; PI: Prof. Wolfram Burgard	<i>University of Freiburg</i> 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	<i>University of Freiburg</i> 2017-2018
Reliable Lifelong Navigation for Mobile Robots (LifeNav) EUROPEAN COMMISSION FP7-IDEAS Role: Research scientist; PI: Prof. Wolfram Burgard	<i>University of Freiburg</i> 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	<i>University of Freiburg</i> 2014-2015
Autonomous Haulage System (AHS) CATERPILLAR INC. Role: Research engineer; PI: Dr. Peter Rander	<i>National Robotics Eng. Center</i> 2013-2014
Enhanced Teleoperation U.S. ARMY TANK AUTOMOTIVE RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (TARDEC) Role: Research engineer; PI: Dr. Peter Rander	<i>National Robotics Eng. Center</i> 2013-2014
Cooperative Robotic Watercraft (CRW) CMU VISIONARY PROJECT Role: Research engineer and sensors lead; PI: Prof. George Kantor	<i>Carnegie Mellon University</i> 2010-2014
Subterranean Robotics ANGLO AMERICAN PLC Role: Research engineer; PI: Prof. George Kantor	<i>Carnegie Mellon University</i> 2011-2012
Hydroponic Automation UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) Role: Research engineer; PI: Prof. George Kantor	<i>Carnegie Mellon University</i> 2011-2013
Distributed SensorWebs UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) SCRI-MINDS Role: Research engineer; PI: Prof. George Kantor	<i>Carnegie Mellon University</i> 2010-2013

Invited Talks

Self-Supervised Deep Learning UNIVERSITY OF FREIBURG, FREIBURG CENTER FOR DATA ANALYSIS AND MODELING	<i>Freiburg, Germany</i> May 2020
Embodied Cognitive Robotics: Rethinking the Relationship Between Perception and Action SAPIENZA UNIVERSITY OF ROME, SEMINARS IN AI	<i>Rome, Italy</i> Mar. 2020
Deep Learning for Robot Perception and Localization ROBERT BOSCH CENTER FOR DATA SCIENCE AND ARTIFICIAL INTELLIGENCE	<i>Chennai, India</i> 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	<i>New Delhi, India</i> Sep. 2018
Learning Deep Multimodal Features for Reliable Scene Understanding FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY	<i>Pittsburgh, USA</i> Jul. 2018
Adaptive Semantic Segmentation NVIDIA GPU TECHNOLOGY CONFERENCE EUROPE	<i>Amsterdam, Netherlands</i> Sep. 2016
Techniques for Reliable Robot Perception in Unstructured Environments IROS WORKSHOP ON STATE ESTIMATION AND TERRAIN PERCEPTION	<i>Daejeon, Korea</i> Oct. 2016
Robust and Real-Time Deep Scene Understanding of Unstructured Environments FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY	<i>Pittsburgh, USA</i> Jun. 2016
An Autonomous Robot for Manipulation and Mapping of NFT Installations FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY	<i>Pittsburgh, USA</i> Dec. 2013
Intelligent Irrigation using Wireless Sensor Networks INTERNATIONAL CONFERENCE OF AGRICULTURAL ENGINEERING	<i>Valencia, Spain</i> Jul. 2012
Intelligent Environmental Monitoring using Fleets of Autonomous Surface Crafts VIT ALUMNI LECTURE	<i>Vellore, India</i> Jun. 2012
Development of the Cooperative Robotic Watercraft THE INDIAN INSTITUTE OF TECHNOLOGY MADRAS	<i>Chennai, India</i> Jun. 2012
Development of a Multi-Hop Routing Protocol for Distributed Sensing Applications FIELD ROBOTICS CENTER SEMINAR, CARNEGIE MELLON UNIVERSITY	<i>Pittsburgh, USA</i> Sep. 2010
Probabilistic Planning for Mobile Robots GUEST LECTURE, IEEE RESONANCE, VIT UNIVERSITY	<i>Vellore, India</i> Jul. 2008

Teaching

Self-Supervised Learning UNIVERSITY OF FREIBURG • Seminar course on self-supervised learning.	<i>SS 2020</i>
Foundations of Deep Learning UNIVERSITY OF FREIBURG • Foundations of deep learning.	<i>WS 2019</i>
Deep Learning Laboratory UNIVERSITY OF FREIBURG • Introduction to Deep Learning, optimization, projects on robot learning.	<i>WS 2018, SS 2020</i>
Deep Learning for Autonomous Driving UNIVERSITY OF FREIBURG • Introduction to Deep Learning and ADAS, working with TensorFlow, projects on various self-driving car tasks.	<i>SS 2018</i>
Robot Navigation UNIVERSITY OF FREIBURG • Seminar course on advanced robot navigation research.	<i>WS 2015-17</i>
Robot Perception UNIVERSITY OF FREIBURG • Seminar course on advanced robot perception research.	<i>WS 2015</i>

Supervision

current Tim Welschehold,	<i>PostDoc</i>
current Daniele Cattaneo,	<i>PostDoc</i>
current Daniel Honerkamp,	<i>PhD</i>
current Juana Valeria Hurtado Rincon,	<i>PhD</i>
current Sambit Mohapatra,	<i>External PhD</i>

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

Academic Activities

EDITORIAL SERVICES

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

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 (GCPN), 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

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
- **Self-Supervised Visual Terrain Classification from Unsupervised Acoustic Feature Learning**
Jannik Zürn, Wolfram Burgard, Abhinav Valada
Under Review: IEEE Transactions on Robotics (T-RO), arXiv preprint arXiv:1912.03227 (DEC. 2019). 2019

- **Multimodal Interaction-aware Motion Prediction for Autonomous Street Crossing**
Noha Radwan, Wolfram Burgard, Abhinav Valada
Under Review: International Journal of Robotics Research (IJRR), arXiv preprint arXiv:1808.06887 (JULY 2020). 2020

REFEREED JOURNAL AND CONFERENCE PUBLICATIONS

- **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 Multimodel 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
Workshop on State Estimation and Terrain Perception for All Terrain Mobile Robots at IEEE International Conference on Intelligent Robots and Systems (IROS), 2016
- **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

SELECTED COMPETITIONS

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

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

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

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

eeneewsautomotive, 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

FOUNT² – Einsatz für die Wissenschaft

Technisches Hilfswerk, 2019

Robotic Crocodiles

Discovery Channel, 2015

Crocodile Robot Dodges Hippo ... for Science!

NBC News, 2014

Robots: A Fun Context for Learning

Grow a Generation, 2014

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

Environmental Monitor, 2014

Dirty and Dangerous

Cary Institute, 2014

Platypus Floats Idea of Affordable Environmental Robotics

Business Times, 2012

Cooperative Robotic Watercraft

Robots.net, 2012

CMU's Team Develops Environmental Robotics

Business Journal, 2012

CMU Startup Adds Robotics to Water

Pittsburgh Business Times, 2012