Junhwa Hur

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RESEARCH INTEREST
3D Dynamic Scene Understanding: Semantic segmentation, Motion, Depth, 3D reconstruction
Learning with Limited Supervision: Self-supervised learning, Semi-supervised learning

PROFESSIONAL EXPERIENCE

Google, *Cambridge, MA, USA* — Oct. 2022 –
Research Scientist
- Research state-of-the-art computer vision algorithms

42dot, *Seoul, Korea* — Oct. 2021 – Jun. 2022
Research Internship at Autonomous Intelligence
- Researched a surround-view 3D depth estimation algorithm

Technische Universität Darmstadt, *Darmstadt, Germany* — Oct. 2015 – Oct. 2020
Doctoral Research Assistant (Supervised by Prof. Stefan Roth, Ph.D.)
- Researched multi-task learning for 3D dynamic scene understanding: motion, depth, occlusion, and semantic segmentation using (self-)supervised learning

Korea Institute of Science and Technology (KIST), *Seoul, South Korea* — Feb. 2014 – Aug. 2015
Internship at Imaging Media Research Center
- Researched and developed a pipeline for RGB-D-based 3D deformable object modeling

Seoul National University, *Seoul, South Korea* — Sep. 2011 – Dec. 2013
Research Assistant at Vehicle Intelligence Lab
- Researched computer vision algorithms for autonomous driving and deployed them on self-driving cars.

EDUCATION

Technische Universität Darmstadt, *Darmstadt, Germany* — 2015 – 2022
Ph.D. in Computer Science
- Dissertation: Joint Motion, Semantic Segmentation, Occlusion, and Depth Estimation

Seoul National University, *Seoul, South Korea* — 2011 – 2013
M.Sc. in Electrical and Computer Engineering
- Thesis: Multi-Lane Detection in Highway and Urban Driving Environment

Pohang University of Science and Technology, *Pohang, South Korea* — 2007 – 2011
B.Sc. in Electronics and Electrical Engineering, *Magna Cum Laude*

PUBLICATIONS (HYPERLINKED)

Saurabh Saxena, Charles Herrmann, **Junhwa Hur**, Abhishek Kar, Mohammad Norouzi, Deqing Sun, and David J. Fleet, "The Surprising Effectiveness of Diffusion Models for Optical Flow and Monocular Depth Estimation", **NeurIPS**, 2023, to appear

Junyi Zhang, Charles Herrmann, **Junhwa Hur**, Luisa Polania Cabrera, Varun Jampani, Deqing Sun, and Ming-Hsuan Yang, "A Tale of Two Features: Stable Diffusion Complements DINO for Zero-Shot Semantic Correspondence", **NeurIPS**, 2023, to appear

Hsin-Ping Huang, Charles Herrmann, **Junhwa Hur**, Erika Lu, Kyle Sargent, Austin Stone, Ming-Hsuan Yang, and Deqing Sun, "Self-supervised AutoFlow", **CVPR**, 2023

Bayram Bayramli, **Junhwa Hur**, and Hongtao Lu, "RAFT-MSF: Self-Supervised Monocular Scene Flow Using Recurrent Optimizer.", **IJCV**, 2023

Jung Hee Kim*, **Junhwa Hur***, Tien Phuoc Nguyen, and Seong-Gyun Jeong, "Self-Supervised Surround-View Depth Estimation with Volumetric Feature Fusion", **NeurIPS**, 2022

Junho Lee, **Junhwa Hur**, Inwoo Hwang, and Young Min Kim, "MasKGrasp: Mask-based Grasping for Scenes with Multiple General Real-world Objects", **IROS**, 2022

Junhwa Hur and Stefan Roth, "Self-Supervised Multi-Frame Monocular Scene Flow", **CVPR**, 2021

Junhwa Hur and Stefan Roth, "Self-Supervised Monocular Scene Flow Estimation", **CVPR**, 2020, **Oral Presentation**

Junhwa Hur and Stefan Roth, "Optical Flow Estimation in the Deep Learning Age", as a book chapter in Modelling Human Motion, Springer, 2020

Junhwa Hur and Stefan Roth, "Iterative Residual Refinement for Joint Optical Flow and Occlusion Estimation", **CVPR**, 2019

Simon Meister, **Junhwa Hur** and Stefan Roth, "UnFlow: Unsupervised Learning of Optical Flow with a Bidirectional Census Loss", **AAAI**, 2018, **Oral Presentation**

Junhwa Hur and Stefan Roth, "MirrorFlow: Exploiting Symmetries in Joint Optical Flow and Occlusion Estimation", **ICCV**, 2017

Junhwa Hur and Stefan Roth, "Joint Optical Flow and Temporally Consistent Semantic Segmentation", **ECCV Workshop** on CVRSUAD, 2016, **Best paper award**

Junhwa Hur, Hwasup Lim, Changsoo Park, Sang Chul Ahn, "Generalized Deformable Spatial Pyramid: Geometry-Preserving Dense Correspondence Estimation", **CVPR**, 2015

Junhwa Hur, Hwasup Lim, Sang Chul Ahn, "3D Deformable Spatial Pyramid for Dense 3D Motion Flow of Deformable Object", **ISVC**, 2014

Seung-Nam Kang, Soo-Mok Lee, **Junhwa Hur**, and Seung-Woo Seo, "Multi-lane Detection based on Accurate Geometric Lane Estimation in Highway Scenarios", **IV**, 2014

Junhwa Hur, Seung-Nam Kang, and Seung-Woo Seo, "Multi-lane Detection in Urban Driving Environments using Conditional Random Fields", **IV**, 2013.

Junhwa Hur, "Multi-lane Detection in Highway and Urban Driving Environment", Master's thesis, Seoul National University, 2013

Teaching Experience

Teaching Assistantship, *TU Darmstadt, Germany* 2015 – 2020

- Computer Vision I & II
- Advanced Topics in Computer Vision Machine Learning
- Project Lab Deep Learning for Computer Vision – supervised 4 team projects (Self-supervised learning, Semantic image inpainting using GAN, Monocular depth, Optical flow)
- B.Sc. & M.Sc. Thesis Supervision – supervised 5 students (Scene flow, Monocular depth, Dataset bias analysis, Moving object detection, Multi-task learning)

Awards and Honors

Outstanding Reviewer Award: CVPR (2018, 2019, 2020, 2022), ICCV (2021), ECCV (2020), ACCV (2020)
Doctoral Consortium, CVPR 2020
Best Paper Award, 21. Darmstädter Computer Graphik Abend 2019, Impact on Science
Best Paper Award, 20. Darmstädter Computer Graphik Abend 2018, Impact on Science
Best Paper Award, ECCV Workshops 2016 - Computer Vision for Road Scene Understanding and Autonomous Driving
2nd Place Prize, Korea Autonomous Vehicle Contest 2013
National Science and Engineering Scholarship (covering full tuitions), KFAS, 2007 – 2011
Merit-based Scholarship, POSTECH, 2007 – 2008

Reviewer Activity

Conference: ICLR, NeurIPS, CVPR, ICCV, ECCV, ACCV, WACV, ICRA, IROS
Journal: T-PAMI, T-IP, RA-L, PR, T-CSVT

Skill

C/C++, Python, Matlab, PyTorch, TensorFlow

Language

Korean (Native, Citizenship), English (Fluent), German (Intermediate, Permanent residency)