SeongHyeon Moon

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Research Interests

Keywords: *Crowd Analysis, Object Segmentation, Object Tracking, Computer Vision, Deep Learning*

- Detect groups or objects and predict future movement and density, and track them.
- 3D-point clouds, 2D-image and video based computer vision challenges

Education

Present – Sep 2018 | ***Doctor of Philosophy*** **- Computer Science** | **Piscataway, NJ, USA**
Rutgers, The State University of New Jersey **Adviser:** Mubbasir Kapadia

Feb 2017 – Mar 2015 | ***Master of Science*** **- Mechanical Engineering** | **Gwangju, KOR**
Gwangju Institute of Science and Technology (GIST) **Adviser:** Kwanghee Ko
Thesis: Parameterization of Cylindrical Unorganized 3D-Point Clouds for Surface Fitting

Feb 2015 – Mar 2009 | ***Bachelor of Science*** **- Industrial and Information System Engineering** | **Seoul, KOR**
Seoul National Univerisity of Science and Technology
Graduated with the highest honor (Rank 1/45)

Work Experience

Aug 2022 – May 2022 | ***NEC Laboratories America*** | **Princeton, NJ, USA**
Research Intern at Machine Learning Dept. **Mentor:** Alexandru Niculescu-Mizil, Iain Melvin
- Topic: Multi-camera Multiple People Tracking
- TBD

Aug 2020 – Jun 2020 | ***DeepMotion*** | **San Mateo, CA, USA**
Research Intern in Research Group. **Mentor:** Kevin He
- Participated in a project on controlling a humanoid model
- Hierarchical reinforcement learning was utilized and Trained a high-level policy to control a complex human agent to move a specific location

Aug 2019 – Jun 2019 | ***AutoDesk*** | **Toronto, ON, CAN**
Software Engineer Intern in Autodesk Research. **Mentor:** Rhys Goldstein
- Participated in a project on human behavior simulation in a building
- Combined the two frameworks (SyDEVS and SteerSuite) and Made an open-source C++ framework(SyDEVS-Building), generating human behaviors in an office building

May 2018 – Jan 2018 | ***Gwangju Institute of Science and Technology*** | **Gwangju, KOR**
Research Assistant in Modeling and Simulation Lab. **Adviser:** Kwanghee Ko
- Led a project on an IMU human tracking using a smartphone
- Implemented the Extended Kalman Filter algorithm for an IMU sensor and a new guideline concept for improving the accuracy of the tracking

Honors & Awards

- Korean Government Scholarship (Tuition waive and Stipend), Gwangju Institute of Science and Technology, 2015, 2016
- Graduated with the highest honor in the department of IISE, Seoul National Univerisity of Science and Technology, 2015
- High G.P.A., Seoul National Univerisity of Science and Technology, 2010

Skills

Python, C++, C, Java, Pytorch, OpenCV, OpenGL, Unity, Ubuntu, Solidity, MATLAB, etc.

Publications

Journal Articles *Equal contribution

[3] ***JOIN: an integrated platform for joint simulation of occupant-building interactions***
Architectural Science Review, 2019
*Seonghyeon Moon, *Davide Schaumann, Muhammad Usman, Rhys Goldstein, Simon Breslav, Azam Khan, Petros Faloutsos, and Mubbasir Kapadia

[2] ***Dynamic Correction of Image Distortions for a Kinect-Projector System***
Journal of WSCG, 2018
Jihoon Park, Seonghyeon Moon, and Kwanghee Ko

[1] ***A point projection approach for improving the accuracy of the multilevel B-spline approximation***
Journal of Computational Design and Engineering, 2018
Seonghyeon Moon and Kwanghee Ko

Conference Papers *Equal contribution

[8] ***HM: Hybrid Masking for Few-Shot Segmentation***
The 17th European Conference on Computer Vision (ECCV 2022)
Seonghyeon Moon, Samuel S Sohn, Honglu Zhou, Sejong Yoon, Vladimir Pavlovic, Muhammad Haris Khan, Mubbasir Kapadia

[7] ***Harnessing Fourier Isovists and Geodesic Interaction for Long-Term Crowd Flow Prediction***
The 31st International Joint Conference on Artificial Intelligence (IJCAI 2022)
Samuel S Sohn, Seonghyeon Moon, Honglu Zhou, Mihee Lee, Sejong Yoon, Vladimir Pavlovic, Mubbasir Kapadia

[6] ***MUSE-VAE: Multi-Scale VAE for Environment-Aware Long Term Trajectory Prediction***
Conference on Computer Vision and Pattern Recognition (CVPR 2022)
Mihee Lee, Samuel S Sohn, Seonghyeon Moon, Sejong Yoon, Mubbasir Kapadia, Vladimir Pavlovic

[5] ***A2X: An Agent and Environment Interaction Benchmark for Multimodal Human Trajectory Prediction***
Motion, Interaction and Games (MIG 2021)
Samuel S Sohn, Mihee Lee, Seonghyeon Moon, Gang Qiao, Usman Muhammad, Sejong Yoon, Mubbasir Kapadia

[4] ***Deep Integration of Physical Humanoid Control and Crowd Navigation***
Motion, Interaction and Games (MIG 2020)
Brandon Haworth, Glen Berseth, Seonghyeon Moon, Petros Faloutsos, Mubbasir Kapadia

[3] ***Laying the Foundations of Deep Long-Term Crowd Flow Prediction***
The 16th European Conference on Computer Vision (ECCV 2020)
Samuel S Sohn, Honglu Zhou, Seonghyeon Moon, Sejong Yoon, Vladimir Pavlovic, Mubbasir Kapadia

[2] ***Toward a Multi-Level and Multi-Paradigm Platform for Building Occupant Simulation***
Symposium on Simulation for Architecture and Urban Design (SimAUD 2019)
*Seonghyeon Moon, *Davide Schaumann, Muhammad Usman, Rhys Goldstein, Simon Breslav, Azam Khan, Petros Faloutsos, Mubbasir Kapadia

[1] ***Parameterization of unorganized cylindrical point clouds for least squares B-spline surface fitting***
25th Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG2017)
Seonghyeon Moon, Jin-Eon Park and Kwanghee Ko

Conference Workshop

[4] ***Multi-Agent Hierarchical Reinforcement Learning for Humanoid Navigation***
Deep Reinforcement Learning Workshop (NeurIPS 2019)
Glen Berseth, Brandon Haworth, Seonghyeon Moon, Mubbasir Kapadia, Petros Faloutsos

[3] ***Deep Crowd-Flow Prediction in Built Environments***
Artificial Intelligence for Humanitarian Assistance and Disaster Response Workshop (NeurIPS 2019)
Samuel S Sohn, Seonghyeon Moon, Honglu Zhou, Sejong Yoon, Vladimir Pavlovic, Mubbasir Kapadia

[2] ***Automatic Geometry Correction for a Kinect-Projector system in Dynamic Environment***
Workshop on Virtual Reality Interaction and Physical Simulation (VRIPHYS 2018)
Jihoon Park, Seonghyeon Moon and Kwanghee Ko

[1] ***Adaptive Method for 2.5D Scattered Point Approximation***
23rd ACM Symposium on Virtual Reality Software and Technology (VRST2017)
Seonghyeon Moon, Jihoon Park and Kwanghee Ko