YONGYUN SONG

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Research Interests

- **3D Reconstruction**
- **Human Computer Interaction**
- **Segmentation**

- **SLAM**
- **Object Detection**
- **Motion Estimation**

- **Computer Vision**
- **Semi-supervised Learning**
- **Camera Calibration**

Education

Mar. 2016 – Current

Hanyang University *Ansan, Korea*

B.S in Electrical Engineering (Major)

B.S in Applied Mathematics (Dual Major)

- Expected graduation in February 2023

Sep. 2020 – June. 2021

Senior Project

Carried out an end-to-end project to detect turtlenecks for people's health.

- The model can operate in real time with 1,000 small pieces of data, using Transfer learning which is already learned with 60,000 pieces of COCO data. (link)
- Tuned hyperparameters and used an early stopping. (link)
- Data collection was done with MongoDB. (link)

Work Experiences

Sep. 2021 – Feb. 2022

Korea Electric Power Research Institute *Daejeon, Korea*

Intern (paid $1,394/Month)

Worked in the robotics department and participated in Development of Integrated Operation Technology for Anti-drone Protection of Electricity Facilities (R20IA03) and built drone detection system to prohibit a drone from coming to an electrical substation. Besides I made autonomous patrol robots using Turtlebot3, Jetson tx1, lidar,

and IMU sensor for the electrical substation in Korea Electric Power Research Institute where It is a national research institute established for electricity supply in South Korea.

- Cropped out a large video data one by one in 40 frames to prevent overfitting due to similar data and backgrounds. (link)
- Connected AI and robot with ROS programming. (link)
- Created an autonomous robot using SLAM algorithm to be mapping and localization, if a person falls, the topic is handed over and checked on the server computer. (link)
- Utilize camera calibration and pose estimation. (link)

Jan. 2021 – Feb. 2021

DeepInsight Corp. *Seongnam, Korea*

Intern (paid $1,255/Month)

Development of Intelligent Image Security System Technology Based on Integrated 2D/3D Image Analysis of Unmanaged Store Environment project at Deep Insight Corp., which creates artificial intelligence technology and 3D sensing technology.

- Researched 3D-vision with dissertations. (link)
- Designed 3d point cloud center-based detection using the abnormal behavior detection algorithm and kalman filter. (link)

Dec. 2019 – Dec. 2020

Hanyang University *Ansan, Korea*

Undergraduate Research Assistant (paid $209/Month)

Participated in projects such as a Whole-Scene 3D Video Reconstruction of General Environments Containing Dynamic Deformation, Reconstruction of Super Resolution 3D Shape Using Multi-Projector, Visual Memory Storage and Collection Networking in Professor Lee Min-sik's 3D computer vision laboratory. (Link)

- Created a hierarchical agglomerative clustering algorithm by Euclidean distance to understand PointNet++ dissertation. (link)
- Preprocessing data, converting the 3D point cloud to a 2D image using intrinsic and extrinsic matrix. (link)
- The converted 2D image's background acting as noise was removed using the Solov1 instance segmentation algorithm. (link)
- The data removed noise background was used to increase detection accuracy with both MMDetection and Detectron2 algorithms. (link)
- Visualized 3d embedding space to compare prediction to ground

truth. [(link)](link)

Jul. 2017 – Aug. 2017	**Hanyang University** *Ansan, Korea*

Undergraduate Research Assistant (paid $139/Month)

Studied and presented computer vision at the weekly seminar to lay the foundation for Professor Lee Min-sik's 3D computer vision courses.

- Studied how to operate Linux operating system.
- Programmed coin detection algorithms using Hough Transform and Canny edge on Matlab.

Major Courses Taken

- **Machine Learning**

  Prof. Dai-Gyoung Kim

- **Linear Algebra**

  Prof. Kyungyul Ryu

- **Matrix Analysis**

  Prof. Eunsang Kim

- **C programming**

  Prof. Scott Uk-Jin Lee

- **General Topology**

  Prof. Hyeyoung Jung

- **Probability & Stochastic Processes**

  Prof. Minsik Lee

- **Calculus 1,2**

  Prof. Joonwoo Bae, Eunsang Kim

- **Graph Theory**

  Prof. Seoung-Soo Kim

- **Optimization And Applications**

  Prof. Dai-Gyoung Kim

Technical Skills

Languages: Python, C++, Matlab, ROS

Technologies/ Frameworks: Linux, Pytorch, GitHub, Docker, Mongo DB, Open CV, CUDA

Services and Activities

Jun. 2022 - Current	• Taught students deep learning of multi-layer perceptron, loss, backpropagation.
Jan. 2022 - Apr. 2022	• Taught foreign students Korean of grammar and vocabulary.

Oct. 2020 - **Jan. 2022**	• Participated in the reading club at Reading Us Club and played a role in a MC to discuss smoothly a lot of agendas with morality, such as a frozen person, an AI, a gender issue, etc.
Apr. 2020 – **Sep. 2020**	• Donated regularly at Save the Children.
Sep. 2019	• Played guitar in an apartment festival, wishing to eradicate Covid-19.
Aug. 2019	• Played guitar in a police retirement ceremony when I served in an army as a police officer.
Oct. 2019	• Memorized 12 songs and played the guitar outside with a successor to the army.
Apr. 2017 – **Jun. 2018**	• Participated in the kendo club at the University and play a role in a kendo teacher to teach a freshman.

Certifications

Aug. 2022	3D Reconstruction Multiple Viewpoints - *Coursera*
Apr. 2022	IELTS OVERALL 6.5 (Listening 7.5, Reading 7.0, Writing 6.0, Speaking 6.0)
Sep. 2021	Chinese Character Qualification Test Level 3 - *Korea Association for the Promotion of Hanja Education*

References

Dr. Joon-Young Park

Robot & Drone Research Team

Korea Electric Power Research Institute

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