Wonjun Lee

MECHANICAL ENGINEERING PH.D. APPLICANT

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Personal Profile

An undergraduate student at the Seoul National University, undertaking a mechanical engineering course. Have research interest in the provision and utilization of a tool for the quantitative assessment of biological systems.

Education

Seoul National University(SNU) *Seoul, South Korea*

B.S. in Mechanical Engineering *Mar 2016 - Exp. Feb 2022*

- Cumulative GPA: 3.93/4.3 (Major: 3.95/4.3, Upper: 4.13/4.3)
- Two years of absence to fulfill military duty (Mar. 2018 - Feb. 2020)

Bucheon High School *Seoul, South Korea*

High School *Mar 2013 - Feb 2016*

- 1st Best Graduate

Publications

- **Machine learning-aided quantification of 3D angiogenic vasculature in multiculture microfluidic platform**, Wonjun Lee*, Byoungkwon Yoon*, Jungseub Lee, Sangmin Jung, Noo Li Jeon, *In progress*
- **Reconstituting Fundamentals of Bacteria Mediated Cancer Therapy on a Chip**, Wonjun Lee, Jiin Park, Dongil Kang, Seungbeum Suh, 36th International Conference on Micro Electro Mechanical Systems(MEMS), 2023 (Accepted)

Research Experience

Center for Healthcare Robotics, KIST *Seoul, South Korea*

Research Intern *Mar 2021 - Feb 2022*

Advised by Professor Seungbeum Suh

– **Project:** Variable Tumor Microenvironment-on-a-chip with Temporal Angiogenic Switching System by Diffusion Control
- Established a novel protocol to stabilize photopolymerized poly (ethylene) glycol diacrylate (PEGDA) microfluidic device for cell culture.
- Constructed a computationally automated diffusion switch system by controlling fluid inflow using a syringe pump and designed a low-pass filter system that can selectively filter lightweight molecules based on their diffusion coefficient.

– **Project:** Reconstituting Fundamentals of Bacteria Mediated Cancer Therapy on a Chip
- Designed a microfluidic device that leverages spontaneous capillary flow under hydrophilic conditions through rapid prototyping, allowing for selective patterning of hydrogels in specified regions and co-culture of two or more cell types.
- Demonstrated the effects of bacterial stimulation on tumor spheroid and corresponding pro-inflammatory response of macrophages experimentally, and therefore emulated the fundamental constituents of bacteria-colonized tumor-microenvironment *in vitro*.

Multiscale Biomedical Engineering Laboratory, SNU *Seoul, South Korea*

Undergraduate Intern *Feb 2021 - present*

Advised by Professor Noo Li Jeon

– **Project:** Machine learning-aided quantification of 3D angiogenic vasculature in multiculture microfluidic platform
- Developed a graph convolutional network consisting of edge convolution and cascaded attention module and improved the deep learning network's skeleton segmentation capacity.
- Proposed and implemented a point cloud base 3D analysis pipeline optimized for quantifying angiogenic vasculature in MV-IMPACT platform and achieved a 47.9% reduction of error over the conventional maximum intensity projection analysis method on average.

Award, Fellowships, & Grants

2016 **Bucheon Jang-hak Foundation Scholarship (2-semesters),** Bucheon Jang-hak Foundation *50% of tuition*

Jul 2016 **Merit-based Scholarship,** Seoul National University *30% of tuition*

Mar 2017 **Merit-based Scholarship,** Seoul National University *50% of tuition*

Mar 2018 **Merit-based Scholarship,** Seoul National University *50% of tuition*

Jul 2020 **Merit-based Scholarship,** Seoul National University *full-tuition*

Jul 2020 **Grand award in Mechanical Product Design Course Design Contest,** Seoul National University

- Led a team of six and developed the ball classifier machine that can assort balls based on their weight, up to three different types.
- Took 1st place among 16 teams composed of 112 students.

Mar 2021 **SNU Development Fund Scholarship,** Sangjin Jang-hak Foundation *50% of tuition*

Work Experience & Extracurricular Activities

MEMS in Mechanical Engineering *Seoul National University*

Peer Tutor *Jul 2021 - Feb 2022*

- Managed and advised modeling for 3D printing.
- Guided lab tour and explained fundamentals of different 3D printing methods and their application on research.

SNU Mentoring *SNU Social Responsibility*

Mentor *Jan 2020 - Jan 2021*

- Mentored high school students in a one-on-one relationship with a monthly conversation on topics in science and mechanical engineering.

Republic of Korea Air Force (ROKAF) *Seoul, South Korea*

Signal Intelligence Operator (SERGEANT, E-5) *Mar 2018 - Feb 2020*

- Analyzed and interpreted the collected signal intelligence and reported vital information to the higher command.
- **Excellence award** in military occupational specialty education.

Skills

Language	Python, MATLAB, Verilog, C/C++
Framework	PyTorch, Tensorflow, OpenCV, Open3D, Pandas
3D CAD and Printing Tools	SolidWorks, AutoCAD
Computational Simulation Tools	COMSOL Multiphysics, Acusolve
Bio Experiment	Cell culture & handling, Bacteria culture & handling, Confocal microscopy, ELISA
Microfluidic Device Fabrication	PEGDA Photopolymerization, 3D Printing, Laser cutting & engraving

References available upon request.