Sangmin Lim

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Research Interests

- Computational Mechanics, Soft Robotics, Bioinspired Robots, Physics-based Machine Learning, Bacterial Motility

Professional Experience

- Research Program Manager, Aerospace Research Center, KOREA AIR FORCE (Jan 2026 - current)
- Chairman of the Review Committee for Graduate Division, Future Aerospace Conference, ROKAFA-KAIST (2024,2025)
- Assistant Professor, Department of Mechanical Engineering, ROKAFA (Aug 2023 - current)
- Department Head, Department of Mechanical Engineering, ROKAFA (Dec 2024 - Dec 2025)
- Principal Investigator, Aerospace Machine Learning Lab, Republic of Korea Air Force Academy (Dec 2024 - Dec 2025)
- Guest Scientist, Max Planck Institute for Intelligent Systems

Education

- **University of California, Los Angeles** — Los Angeles, CA
  Ph.D. , Mechanical Engineering — *Dec 2019 - June 2023*
  Master of Science, Mechanical Engineering — *Aug 2018 - Dec 2019*
- **United States Air Force Academy** — Colorado Springs, CO
  Bachelor of Science, Aeronautical Engineering — *Aug 2012 - May 2016*

R&D Projects

1. Development of a threat analysis and weapon recommendation process for multi-layer defense systems, LIG Nex1, 2025.2.1 - 2026.1.31.
2. Development of an automatic recommendation system for aircraft complex-threat evasion, Korea Research Foundation, Future-Defense-Bridge Technology Development Program, 2024.11 - 2026.12.
3. Development of multi-video integration/interpretation system, Agency for Defense Development, 2025.9 - 2026.4.30.
4. Study on methodologies for evaluating the effectiveness of advanced air weapon systems, (Air Weapon Systems), Korea Institute for Defense Analyses, 2025.3.4 - 2025.9.4.

Publications

1. Alejandra Hernandez Escobar, **Sangmin Lim**, Leixin Ma (2025) Fluid-structure interaction aspects of the shape-morphing structures and robots *Smart Materials and Structures*
2. **Sangmin Lim** (2024) Intelligent materials and structural mechanics for defense application of soft robots *Korean Journal of Military Arts and Science*
3. Suitu Wang, **Sangmin Lim**, Seelay Tasmim, Manivannan Sivaperuman Kalairaj, Laura K Rivera-Tarazona, Mustafa K Abdelrahman, Mahjabeen Javed, Sasha M George, Yoo Jin Lee, M Khalid Jawed, Taylor H Ware (2024) Reconfigurable growth of engineered living materials. *Advanced Materials*
4. **Sangmin Lim**, Achyuta Yadunandan, M. Khalid Jawed (2023): Bacteria-inspired Robotic Propulsion from Bundling of Soft Helical Filaments at Low Reynolds Number. *Soft Matter*
5. **Lim, S.**, Habchi, C., Jawed, M. K. (2023). Machine learning assisted resistive force theory for helical structures at low Reynolds number. *Journal of Fluids and Structures*
6. Zhuonan Hao, **Sangmin Lim**, Jawed, M. K. (2023). Modeling, Characterization, and Control of Bacteria-inspired Bi-flagellated Mechanism with Tumbling. *IROS* 2023
7. **Sangmin Lim**, Yayun Du, Yongkyu Lee, Shivam Kumar Panda, Dezhong Tong, M. Khalid Jawed (2022): Modeling, Control, and Fabrication of Robots Inspired by Flagella and Cilia. *Bioinspiration & Biomimetics*
8. Timothy M. Siefers, Randy J. Frost, **Sangmin Lim**, and Thomas E. McLaughlin (2017): Wind Induced Forces on a Hemispherical Observatory Dome with Open Shutter Doors. *AIAA* 2017-1216

Presentations & Invited Talks

1. **Sangmin Lim**, Development of ferromagnetic soft robot simulation in multiple environment,*International Symposium on Robotic Fucntional Skin and Enhanced Sensor Research Center, Feb 11, 2026*
2. **Sangmin Lim**, Robot-based AI Edu Plan for non-rated AFSC appliacations,*Military Robotics Society, Dec 12, 2025*
3. **Sangmin Lim**, Intelligent materials & novel opportunities in robotics,*Kyungpook National University, Aug 14, 2025*
4. **Sangmin Lim**, Ferromagnetic soft robots and simulations, *Agency for Defense Development, Nov 13, 2024*
5. **Sangmin Lim**, Intelligent materials and novel opportunities in robotics,*GOLE Robotics*, Aug 7, 2024
6. Zhuonan Hao, **Sangmin Lim**, Siddharth Zalavadia, Darren Chin, Sumukh Johri, Vinay Nagappala, Khalid Jawed (2024) Mechanical characterization of bio-inspired flagella interaction *American Physical Society March Meeting*
7. M. Khalid Jawed, **Sangmin Lim**, Zhuonan Hao (2023) Modeling and Characterization of Bi-flagellated Robot with Tumbling *American Physical Society March Meeting*
8. M. Khalid Jawed, **Sangmin Lim**, Zhuonan Hao (2022): Resistive Force Theory vs. Slender Body Theory as Hydrodynamic Models in Simulation of Bacterial Flagella. *American Physical Society March Meeting*
9. M. Khalid Jawed, Zhuonan Hao, **Sangmin Lim** (2022): Bacteria-inspired Bi-flagellated Soft Robot with Bundling and Tumbling Behavior. *American Physical Society March Meeting*
10. **Sangmin Lim**, Achyuta Yadunandan, and M. Khalid Jawed (2020): Bacteria Inspired Multi-Flagella Propelled Soft Robot at Low Reynolds Number *IROS 2020, Robotics-Inspired Biology Workshop* (Poster)

Software & Programming Skills

- **Programming**: C++, Python
- **Software**: Matlab, Mathematica, SolidWorks, Inventor, ABAQUS, ANSYS, OpenSim, ROS, PyTorch, TensorFlow

Teaching Experience

- ROKAFA - Computer Aided Manufacturing
- ROKAFA - Numerical Analysis
- ROKAFA - Thermodynamics
- ROKAFA - Automation system research
- ROKAFA - MicroUAV design and manufacturing
- RROKAFA - Bionics and Biomimetics
- UCLA - LS30A/LS30B: Mathematics for Life Scientist (Winter, Fall, Spring 2020)
- UCLA - MAE156A: Advanced Strength of Materials (Winter 22)
- UCLA - MAE259B: Physics and ML-based Modeling of Structures and Robots (Spring, Fall 2022)

Mentorship

- Sumukh Johri, Applied Materials
- Vinay Nagappala, UCLA
- Saptarshi Joshi, UIUC graduate student
- Achyuta Yadunandan, Space X
- Changdae Kim, MS, Ph.D student @ Purdue

Review service

- RA-L
- IROS
- Journal of Military Robotics Society (JMRS)
- Journal of Defense Quality Society(JDQS)
- Bioinspiration & Biomimetics
- Machine Learning: Engineering