

SMART LAB BY THE NUMBERS IN 2024

* Emoticons from <http://lancastergeneralhealth.org/>



13

LAB MEMBERS



31

LAB MEETINGS



20

HONORS/AWARDS



8, \$6.9M

GRANTS PROPOSED



3, \$2.7M

GRANTS AWARDED



1, \$200K

GRANTS PENDING



6

JOURNAL PAPERS PUBLISHED



5

CONFERENCE PAPERS PUBLISHED



15

PAPERS CURRENTLY UNDER REVIEW



10

POSTERS & TALKS PRESENTED



5

INVITED TALKS



540

PAPER CITATIONS



4,964

WEBSITE UNIQUE VISITS



7,752

YOUTUBE VIEWS



Narrative version available at
<https://tinyurl.com/PurdueSMARTLab2024>



Purdue SMART Lab 2024 Year in Review

January 2025



Lab Overview

The Smart Machine and Assistive Robotics Technology (SMART) Lab, founded in 2015 by Dr. Byung-Cheol (“B.C.”) Min, is an interdisciplinary research lab composed of members with diverse academic backgrounds. The lab is currently focused on designing and developing algorithms and systems for human-robot interaction, robot learning, and multi-robot systems. By integrating both theoretical and practical approaches, the SMART Lab addresses complex, real-world challenges in robotics, particularly in the areas of planning, control, and learning. Since its establishment, 4 Postdocs, 7 PhD students, 5 MS students, 10 Undergrad students, 5 Visiting scholars and students have completed their research programs. In 2024, the lab comprised 1 Director, 7 PhD students, 1 MS student, 2 Undergrad students, and 1 Visiting student.

Key Records

- Number of published IEEE Transactions and Letters: 6 in 2024 (previous record: 2 in 2021 and 2020).
- Number of submitted papers to ICRA/IROS/RA-L/IEEE Transactions and Letters: 20 in 2024 (previous record: 13 in 2023).
- Number of citations according to Google Scholar: 540 in 2024 (previous record: 292 in 2023).
- Total funding of current research projects: \$4.5M across 6 projects in 2024 (previous record: \$3.1M across 7 projects in 2019).
- Number of Dr. Min’s invited talks: 5 in 2024 (previous record: 3 in 2023, 2022, and 2018).
- Unique visits to our lab website: 4,964 in 2024 (previous record: 3,654 in 2023).
- YouTube video views: 7,752 in 2024 (previous record: 5,455 in 2023).

Lab Members

Current Members (11)

- **Byung-Cheol Min** (Director) was appointed as the inaugural director of the Purdue Applied AI Research Center (AARC) and served on the executive committee for Purdue’s Center of Operation and Research for Industrial Advancement (CORIA). He was interviewed by the Purdue Exponent. Dr. Min delivered 5 invited talks at international universities including those in Korea and at TTIC in Chicago.
- **Vishnunandan Venkatesh** (PhD Student) served as a TA for Prof. Salem. He published 2 IROS papers: 1 as a first author and 1 as a co-first author, submitted 2 ICRA papers: 1 as a first author and 1 as a co-author, and presented 3 posters and talks: 1 as a first author and 2 as a co-author. He served as a lab committee member during the spring semester, and co-mentored 1 undergrad student. Vishnu successfully passed his PhD proposal defense during the spring semester. He received the Employee Recognition Award and the Bravo Award from the University and was awarded travel grants from the Purdue Polytechnic Dean’s Office and Office of Globalization, Purdue Graduate Student Government (PGSG), and the CIT Graduate Students Association (CGSA). He was also recognized as the Member of the Year for 2023-24 by a vote of all SMART Lab members.
- **Ruiqi Wang** (PhD Student) served as a TA for Dr. Min for Prof. Salem. He published 4 IEEE journal papers: 3 as a co-first author and 1 as a co-author, 1 ICRA paper as a co-author, submitted 2 IEEE journals as a co-first author and 5 ICRA papers; 4 as a co-first author and 1 as a co-author, and presented 3 posters and talks: 1 as a first author and 2 as a co-author. He also published 1 open-source programming repository via GitHub. Ruiqi successfully passed his PhD prelim exam in the spring semester and his proposal defense in the fall semester. He received the 2nd Place Student Poster Presentation Award from Purdue Polytechnic’s Realizing the Digital Enterprise Research Impact Area. Ruiqi also served as a lab committee chair during the fall semester and co-mentored one undergraduate student.

- **Weizheng Wang** (PhD Student) served as a TA for Dr. Min. He published 1 IEEE journal as a co-author and 1 ICRA paper as a first author, submitted 1 IEEE journal as a first author, 2 ICRA papers as a first author, and 1 CoRL paper as a first author, and presented 1 poster and talk as a first author. He received travel grants from the Purdue Polytechnic Dean's Office and Office of Globalization, and the Dept of Computer and Information Technology.
- **Taehyeon Kim** (PhD Student) served as a RA for Dr. Min and as a TA for Prof. Kao in the spring semester. He published 1 IROS paper as a first author, submitted 3 ICRA papers as a co-author, and presented 2 posters and talks: 1 as a first author and 2 as a co-author. He also published 1 open-source programming repository via GitHub. Taehyeon served as a lab committee member during both the spring and fall semesters. He was awarded travel grants from the Purdue Polytechnic Dean's Office and Office of Globalization, Purdue Graduate Student Government (PGSG), and the CIT Graduate Students Association (CGSA).
- **Ikechukwu Obi** (PhD Student) served as an instructor for CGT in the spring semester and as RA in the fall semester. He published 1 NeurIPS paper as a first author, submitted 1 IEEE journal as a co-author and 2 ICRA papers; 1 as a first author and 1 as a co-author, and presented 1 poster and talk as a first author. He served as a lab committee member during the fall semester. He was awarded travel grants from the Purdue Polytechnic Office of Globalization and the CIT Graduate Students Association (CGSA).
- **Ziqin "Larry" Yuan** (PhD Student) started his PhD studies in August 2024. He served as a grader for Dr. Min. He submitted 2 IEEE journals as a co-author and 3 ICRA papers; 1 as a first author and 2 as co-author.
- **Jeremy Pan** (MS Student) is currently pursuing his MS degree while working for Boeing.
- **Arjun Gupte** (Undergrad Student) published 1 IEEE journal as a co-author, submitted 1 ICRA paper as a co-first author, and presented 2 posters and talks as a first author. Arjun won First Place at the Purdue University 2024 Fall Undergraduate Research Expo and received the 2nd Place Student Poster Presentation Award from Purdue Polytechnic's Realizing the Digital Enterprise Research Impact Area.
- **Dayoon Suh** (Undergrad Student) submitted 2 ICRA papers as co-author and presented 1 poster and talk as a first author. She was awarded the Mary-Ann Neel Computer Science Scholarship from Purdue's CS Department.
- **Soyun Choi** (Visiting Student) joined the lab as a visiting student in September 2024. Her research was multimodal sensing for human-robot interaction.

Lab Alumni (2)

- **Shyam Kannan** (PhD Student) completed his PhD in December 2024 and began his career at Hitachi Astemo, Ltd, in Detroit. He published 1 IROS paper as a co-first author and 1 RA-L paper as a first author, submitted 1 ICRA paper as a first author and 1 RA-L paper as a first author, and presented 1 poster as a first author. Shyam received the Best Student Poster Presentation Award from Purdue Polytechnic's Realizing the Digital Enterprise Research Impact Area. He served as a lab committee chair during the spring semester, and co-mentored 1 undergrad student.
- **Go-Eum Cha** (PhD Student) transferred to the CS department to switch her research advisor. She published 2 journal papers as a co-author.

New Lab Members (3)

- **Ikechukwu Obi** (PhD Student) joined the lab in February 2024 as a PhD student. He obtained his BS in Human-Computer Interaction from University of Nigeria in 2013, and MS degrees in Human-Computer Interaction from Ball State University in 2019. Ike's main research interests include human-robot interaction, explainability and trust, moral reasoning for robotic and AI systems, and computational ethics in AI and robotics.
- **Ziqin "Larry" Yuan** (PhD Student) joined the lab in August 2024 as a PhD student. He obtained his BS in Robotics Engineering from Beijing University of Chemical Technology in 2020, and MS degrees in Mechatronics and Robotics Engineering from New York University in 2023. Ike's main research interests are in robotics, specifically in human-robot interaction, multi-human multi-robot teaming, and socially-aware navigation.

- **Soyun Choi** (Visiting Student) joined the lab in September 2024. She is a PhD student at Sungkyunkwan University. Soyun's research interests include semantic/instance segmentation, multimodal learning, prompt learning, and amodal segmentation.

Faculty Accomplishments & Awards (2)

- Dr. Min was appointed as the inaugural director of the Purdue Applied AI Research Center (AARC), August 2024.
- Dr. Min was interviewed by the Purdue Exponent, where he discussed his academic and professional journey, as well as the research projects conducted in the SMART lab, February 2024.

Student Accomplishments & Awards (20)

- Arjun Gupte won First Place at the Purdue University 2024 Fall Undergraduate Research Expo, December 2024.
- Ike Obi's paper was selected as a Spotlight presentation in the NeurIPS 2024 Datasets and Benchmarks track, November 2024.
- Vishnunandan Venkatesh received the Purdue Graduate Student Government (PGSG) Travel Grant Award, September 2024.
- Vishnunandan Venkatesh received the Purdue Polytechnic Dean's Graduate Student Travel Grant Award, September 2024.
- Vishnunandan Venkatesh received the Purdue Polytechnic's Office of Globalization Travel Grant Award, September 2024.
- Vishnunandan Venkatesh received the Purdue CIT Graduate Students Association (CGSA) Travel Grant Award, September 2024.
- Vishnunandan Venkatesh received the Employee Recognition Award and the Bravo Award from the University, March 2024.
- Weizheng Wang received the Purdue Polytechnic Dean's Graduate Student Travel Grant Award, April 2024.
- Weizheng Wang received the Purdue Polytechnic's Office of Globalization Travel Grant Award, April 2024.
- Weizheng Wang received the Purdue Computer and Information Technology Graduate Student Travel Grant Award, April 2024.
- Taehyeon Kim received the Purdue Graduate Student Government (PGSG) Travel Grant Award, September 2024.
- Taehyeon Kim received the Purdue Polytechnic Dean's Graduate Student Travel Grant Award, September 2024.
- Taehyeon Kim received the Purdue Polytechnic's Office of Globalization Travel Grant Award, September 2024.
- Taehyeon Kim received the Purdue CIT Graduate Students Association (CGSA) Travel Grant Award, September 2024.
- Ike Obi received the Purdue Graduate Student Government (PGSG) Travel Grant Award, December 2024.
- Ike Obi received the Purdue Polytechnic's Office of Globalization Travel Grant Award, November 2024.
- Ike Obi received the Purdue CIT Graduate Students Association (CGSA) Travel Grant Award, November 2024.
- Shyam Kannan received the Best Student Poster Presentation Award from Purdue Polytechnic's Realizing the Digital Enterprise Research Impact Area, May 2024.
- Ruiqi Wang and Arjun Gupte received the 2nd Place Student Poster Presentation Award from Purdue Polytechnic's Realizing the Digital Enterprise Research Impact Area, May 2024.
- Dayoon Suh was awarded the Mary-Ann Neel Computer Science Scholarship from Purdue's CS Department, April 2024.

Grant Proposals (8 submitted, 3 awarded, 1 pending, 7 declined)*Submitted* (8, \$6.9M)

- Planning: AI-Ready Test Bed to Embrace Creativity of Generative AI in Realizing Reliable and Collaborative Manufacturing, Role: Co-PI (PI: Xingyu Li), Sponsor: National Science Foundation, Amount: \$200,000 (09/01/2025 – 08/31/2027).
- Autonomous Driving and Control Systems for AI-Based Aviation Baggage Transport Vehicles, Role: PI, Sponsor: Hyundai KEFICO Corporation, Amount: \$2,357,143 (08/01/2024 – 07/31/2027).
- Enabling Next-Generation HyFlex Field Laboratories through an Innovative Learner-In-The-Loop Multi-Robot System, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: National Science Foundation, Amount: \$900,000 (09/01/2024 – 08/31/2027).
- PFI-RP: Reliable and Trustworthy Multi-Remote-Operator-Multi-Autonomous-Aircraft Interface and Communication Solution for Advanced Air Mobility, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: National Science Foundation, Amount: \$1,000,000 (12/01/2024 – 1/30/2027).
- Center of Operation and Research for Industrial Advancement (CORIA) at Purdue as one of the Global Industrial Technology Cooperation Center (GITCC) of KIAT, Role: Co-PI (PI: Martin Byung-Guk Jun), Sponsor: Korea Institute for Advancement of Technology, Amount: \$1,815,000 (05/01/2024 – 04/30/2029).
- Development of Reliable, Secure, and Safe Human-AI Alignment Techniques, Role: PI, Sponsor: Sungkyunkwan University, Amount: \$29,226 (04/01/2024 – 12/31/2026).
- IRES: Hands-on Research Experiences in South Korea on AI and Robotics for Smart Construction, Role: PI, Sponsor: National Science Foundation, Amount: \$450,000 (10/01/2024 – 09/30/2027).
- Collaborative Research: EAGER: TaskDCL: Towards Adaptive Human-Reconfigurable Supernumerary Robotic Limbs Interaction, Role: PI, Sponsor: National Science Foundation, Amount: \$150,000 (07/01/2024 – 06/30/2026).

Awarded (3, \$2.7M)

- Enabling Next-Generation HyFlex Field Laboratories through an Innovative Learner-In-The-Loop Multi-Robot System, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: National Science Foundation, Amount: \$900,000 (09/01/2024 – 08/31/2027).
- Center of Operation and Research for Industrial Advancement (CORIA) at Purdue as one of the Global Industrial Technology Cooperation Center (GITCC) of KIAT, Role: Co-PI (PI: Martin Byung-Guk Jun), Sponsor: Korea Institute for Advancement of Technology, Amount: \$1,815,000 (05/01/2024 – 04/30/2029).
- Development of Reliable, Secure, and Safe Human-AI Alignment Techniques, Role: PI, Sponsor: Sungkyunkwan University, Amount: \$29,226 (04/01/2024 – 12/31/2026).

Pending (1, \$200K)

- Planning: AI-Ready Test Bed to Embrace Creativity of Generative AI in Realizing Reliable and Collaborative Manufacturing, Role: Co-PI (PI: Xingyu Li), Sponsor: National Science Foundation, Amount: \$200,000 (09/01/2025 – 08/31/2027).

Declined (7, \$7.2M)

- Autonomous Driving and Control Systems for AI-Based Aviation Baggage Transport Vehicles, Role: PI, Sponsor: Hyundai KEFICO Corporation, Amount: \$2,357,143 (08/01/2024 – 07/31/2027).
- PFI-RP: Reliable and Trustworthy Multi-Remote-Operator-Multi-Autonomous-Aircraft Interface and Communication Solution for Advanced Air Mobility, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: National Science Foundation, Amount: \$1,000,000 (12/01/2024 – 1/30/2027).
- IRES: Hands-on Research Experiences in South Korea on AI and Robotics for Smart Construction, Role: PI, Sponsor: National Science Foundation, Amount: \$450,000 (10/01/2024 – 09/30/2027).
- Collaborative Research: EAGER: TaskDCL: Towards Adaptive Human-Reconfigurable Supernumerary Robotic Limbs Interaction, Role: PI, Sponsor: National Science Foundation, Amount: \$150,000 (07/01/2024 – 06/30/2026).
- Human Modelling and Task Allocation for Multi-human Multi-robot Teams, Role: PI, Sponsor: U.S. Army Research Lab, Amount: \$550,000 (06/01/2024 – 05/31/2026).

- LCMM: Enable Transformative Field Laboratory Hub for Engineering and Technology Education Through a Learner-Centered Multi-Remote-Learner Multi-Robot System, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: Institute of Education Sciences, Amount: \$2,000,000 (07/01/2024 – 06/30/2028).
- Counterinterventions: disrupting ableist research norms in HRI, Role: Co-PI (PI: Rua Williams), Sponsor: National Science Foundation, Amount: \$696,786 (08/01/2024 – 07/31/2027).

Current Funded Research Projects (6, \$4.5M)

- Enabling Next-Generation HyFlex Field Laboratories through an Innovative Learner-In-The-Loop Multi-Robot System, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: National Science Foundation, Amount: \$900,000 (09/01/2024 – 08/31/2027).
- Center of Operation and Research for Industrial Advancement (CORIA) at Purdue as one of the Global Industrial Technology Cooperation Center (GITCC) of KIAT, Role: Co-PI (PI: Martin Byung-Guk Jun), Sponsor: Korea Institute for Advancement of Technology, Amount: \$1,815,000 (05/01/2024 – 04/30/2029).
- Development of Reliable, Secure, and Safe Human-AI Alignment Techniques, Role: PI, Sponsor: Sungkyunkwan University, Amount: \$29,226 (04/01/2024 – 12/31/2026).
- FW-HTF-P: Interactive Multi-Human Multi-Remote-Robot Operations for the Future of Construction Work, Role: Co-PI (PI: Jin Wei-Kocsis), Sponsor: National Science Foundation, Amount: \$150,000 (10/01/2022 – 05/31/2025).
- CAREER: Adaptive Human Multi-Robot Systems, Role: PI, Sponsor: National Science Foundation, Amount: \$500,000 (02/15/2019 – 01/31/2025).
- PFI-RP: Partnerships for Innovation in Interoperable Building Information Modeling Technology for Applications in Automated Building Code Compliance Checking and Modular Construction Automation, Role: Co-PI (Jiansong Zhang), Sponsor: National Science Foundation, Amount: \$1,108,003 (09/15/2018 – 08/31/2024).

Publications (6 journals, 5 conferences, & 15 papers under review)

Journals (6)

- Wonse Jo, Ruiqi Wang, Baijian Yang, Dan Foti, Mo Rastgaar, and Byung-Cheol Min, “Cognitive Load-based Affective Workload Allocation for Multi-Human Multi-Robot Teams”, *IEEE Transactions on Human-Machine Systems*, Early Access, 2024.
- Wonse Jo*, Ruiqi Wang*, Go-Eum Cha, Su Sun, Revanth Senthilkumaran, Daniel Foti, and Byung-Cheol Min (* equal contribution), “MOCAS: A Multimodal Dataset for Objective Cognitive Workload Assessment on Simultaneous Tasks”, *IEEE Transactions on Affective Computing*, Early Access, 2024.
- Shyam Sundar Kannan and Byung-Cheol Min, “PlaceFormer: Transformer-based Visual Place Recognition using Multi-Scale Patch Selection and Fusion”, *IEEE Robotics and Automation Letters*, Vol. 9, No. 7, pp. 6552-6559, July 2024.
- Wonse Jo, Go-Eum Cha, Dan Foti, and Byung-Cheol Min, “SMART-TeleLoad: A New Graphic User Interface to Generate Affective Loads for Teleoperation”, *SoftwareX*, Vol. 26, 101757, May 2024.
- Ruiqi Wang*, Wonse Jo*, Dezhong Zhao, Weizheng Wang, Baijian Yang, Guohua Chen, and Byung-Cheol Min (* equal contribution), “Husformer: A Multi-Modal Transformer for Multi-Modal Human State Recognition”, *IEEE Transactions on Cognitive and Developmental Systems*, Vol. 16, No. 4, pp. 1374-1390, August 2024.
- Ruiqi Wang*, Dezhong Zhao*, Arjun Gupte, and Byung-Cheol Min (* equal contribution), “Initial Task Assignment in Multi-Human Multi-Robot Teams: An Attention-enhanced Hierarchical Reinforcement Learning Approach”, *IEEE Robotics and Automation Letters*, Vol. 9, No. 4, pp. 3451-3458, April 2024.

Conferences (5)

- Ike Obi, Rohan Pant, Srishti Shekhar Agrawal, Maham Ghazanfar, Aaron Basiletti, “Value Imprint: A Technique for Auditing the Human Values Embedded in RLHF Datasets”, *Neural Information Processing Systems (NeurIPS 2024) Datasets and Benchmarks Track - Spotlight*. Vancouver, BC, Canada, December 10-15, 2024.

- L. N. Vishnunandan Venkatesh and Byung-Cheol Min, “Learning from Demonstration Framework for Multi-Robot Systems Using Interaction Keypoints and Soft Actor-Critic Methods”, 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Abu Dhabi, UAE, October 13-17, 2024.
- Shyam Sundar Kannan*, L. N. Vishnunandan Venkatesh*, and Byung-Cheol Min (*equal contribution), “SMARTLLM: Smart Multi-Agent Robot Task Planning using Large Language Models”, 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Abu Dhabi, UAE, October 13-17, 2024.
- Taehyeon Kim and Byung-Cheol Min, “Semantic Layering in Room Segmentation via LLMs”, 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Abu Dhabi, UAE, October 13-17, 2024.
- Weizheng Wang, Le Mao, Ruiqi Wang, and Byung-Cheol Min, “Multi-Robot Cooperative Socially-Aware Navigation using Multi-Agent Reinforcement Learning”, International Conference on Robotics and Automation (ICRA), Yokohama, Japan, May 13-17, 2024.

Papers Currently Under Review (15)

- Ruiqi Wang*, Dezhong Zhao*, Dayoon Suh, Ziqin Yuan, Guohua Chen, and Byung-Cheol Min (*equal contribution), “Personalization in Human-Robot Interaction through Preference-based Action Representation Learning”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Dezhong Zhao*, Ruiqi Wang*, Dayoon Suh, Taehyeon Kim, Ziqin Yuan, Byung-Cheol Min, and Guohua Chen (*equal contribution), “PrefMMT: Modeling Human Preferences in Preference-based Reinforcement Learning with Multimodal Transformers”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- L. N. Vishnunandan Venkatesh and Byung-Cheol Min, “ZeroCAP: Zero-Shot Multi-Robot Context Aware Pattern Formation via Large Language Models”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Weizheng Wang, Chao Yu, Yu Wang, and Byung-Cheol Min, “Human-Robot Cooperative Distribution Coupling for Hamiltonian-Constrained Social Navigation”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Weizheng Wang, Aniket Bera, and Byung-Cheol Min, “Hyper-SAMARL: Hypergraph-based Coordinated Task Allocation and Socially-aware Navigation for Multi-Robot Systems”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Ziqin Yuan*, Ruiqi Wang*, Taehyeon Kim, Dezhong Zhao, Ike Obi, and Byung-Cheol Min (*equal contribution), “Adaptive Task Allocation in Multi-Human Multi-Robot Teams under Team Heterogeneity and Dynamic Information Uncertainty”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Shyam Sundar Kannan and Byung-Cheol Min, “ZeroSCD: Zero-Shot Street Scene Change Detection”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Arjun Gupte*, Ruiqi Wang*, L. N. Vishnunandan Venkatesh, Taehyeon Kim, Dezhong Zhao, and Byung-Cheol Min (*equal contribution), “REBEL: Rule-based and Experience-enhanced Learning with LLMs for Initial Task Allocation in Multi-Human Multi-Robot Teams”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Ike Obi, Ruiqi Wang, Wonse Jo, and Byung-Cheol Min, “Investigating the Impact of Trust in Multi-Human Multi-Robot Task Allocation”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Kai Cheng*, Zhengyuan Li*, Xingpeng Sun, Byung-Cheol Min, Amrit Singh Bedi, and Aniket Bera (*equal contribution), “EfficientEQA: An Efficient Approach for Open Vocabulary Embodied Question Answering”, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA, 19-23 May, 2025.
- Ruiqi Wang*, Dezhong Zhao*, Ziqin Yuan, Ike Obi, and Byung-Cheol Min (* equal contribution), “PrefCLM: Enhancing Preference-based Reinforcement Learning with Crowdsourced Large Language Models”, IEEE Robotics and Automation Letters.

- Jinjin Cai*, Ruiqi Wang*, Dezhong Zhao, Ziqin Yuan, Victoria McKenna, Aaron Friedman, Rachel Foot, Susan Storey, Ryan Boente, Sudip Vhaduri, and Byung-Cheol Min (*equal contribution), “AuD-Former: A Hierarchical Transformer Network for Multimodal Audio-Based Disease Prediction”, IEEE/ACM Transactions on Audio, Speech, and Language Processing.
- Weizheng Wang*, Le Mao*, Baijian Yang, Guohua Chen, and Byung-Cheol Min (* equal contribution), “Hyper- STTN: Social Group-aware Spatial-Temporal Transformer Network for Human Trajectory Prediction with Hypergraph Reasoning”, IEEE Robotics and Automation Letters.
- Jun Han Bae, Pou Hei Chan, Yongho Kim, Richard M. Voyles, Sara K. Mcmillan, Bumjoo Lee, Mauricio Postigo-Malaga, Edgard Gonzales Zenteno, Jose Garcia-Bravo, Brittany Newell, J. Eric Dietz, and Byung-Cheol Min, “Uncrewed Remote Underwater Robotic Sediment Core Sampler”, IEEE Journal of Oceanic Engineering.
- Tamzidul Mina, Shyam Sundar Kannan, Wonse Jo, Shaocheng Luo, Galen B. King, and Byung-Cheol Min, “Distributed Multi-robot Arbitrary Object Transportation with Pushing Surface Identification and Model-based Pushing Effort Regulation”, IEEE Transactions on Systems, Man and Cybernetics: Systems.

Poster Presentations & Talks (10)

- Arjun Gupte, Ruiqi Wang, Vishnunandan L.N. Venkatesh, Taehyeon Kim, Dezhong Zhao, and Byung-Cheol Min, “REBEL: Rule-based and Experience-enhanced Learning with LLMs for Initial Task Allocation in Multi-Human Multi-Robot Teams”, 2024 Purdue Fall Undergraduate Research Expo, Purdue University, November 2024.
- Byung-Cheol Min, “SMART Lab and Applied AI Research Center”, 2024 Purdue Polytechnic Institute Research Day, Purdue University, November 2024.
- Ike Obi and Byung-Cheol Min, “Situational Awareness & Communication in Human Multi-Robot Teams”, 2024 Purdue Polytechnic Research Impact Area Student Poster Symposium, Purdue University, April 2024.
- Weizheng Wang and Byung-Cheol Min, “Multi-Robot Socially-Aware Navigation with Multi-Agent Reinforcement Learning”, 2024 Purdue Polytechnic Research Impact Area Student Poster Symposium, Purdue University, April 2024.
- Ruiqi Wang, Arjun Gupte, and Byung-Cheol Min, “Initial Task Allocation in Multi-Human Multi-Robot Teams: An Attention-Enhanced Hierarchical RL Approach”, 2024 Purdue Polytechnic Research Impact Area Student Poster Symposium, Purdue University, April 2024.
- Shyam Sundar Kannan and Byung-Cheol Min, “PlaceFormer: Transformer-Based Visual Place Recognition Using Multi-Scale Patch Selection and Fusion”, 2024 Purdue Polytechnic Research Impact Area Student Poster Symposium, Purdue University, April 2024.
- Taehyeon Kim and Byung-Cheol Min, “SeLRoS: Semantic Layering in Room Segmentation via LLMs”, 2024 Purdue Polytechnic Research Impact Area Student Poster Symposium, Purdue University, April 2024.
- Vishnunandan LN Venkatesh and Byung-Cheol Min, “ZeroCAP: Zero-Shot Multi-Robot Context-Aware Pattern Formation via Large Language Models”, 2024 Purdue Polytechnic Research Impact Area Student Poster Symposium, Purdue University, April 2024.
- Dayoon Suh, Go-Eum Cha, and Byung-Cheol Min, “Activity-Based Behavioral Cooking Proficiency Estimation with Graph Neural Networks and Transformer”, 2024 Purdue Spring Undergraduate Research Expo, Purdue University, April 2024.
- Arjun Gupte, Ruiqi Wang, Vishnunandan LN Venkatesh, and Byung-Cheol Min, “Self-Evolutionary Large Language Models for Team Design and Task Allocation in Multi-Human Multi-Robot Teams”, 2024 Purdue Spring Undergraduate Research Expo, Purdue University, April 2024.

GitHub Repositories (3)

- Ruiqi Wang, Dezhong Zhao, and Byung-Cheol Min, “PrefMMT”, GitHub, September 2024.
- Wonse Jo and Byung-Cheol Min, “SMART-TeleLoad”, May 2024.
- Taehyeon and Byung-Cheol Min, “SeLRoS”, April 2024.

Invited Talks (5)

- Byung-Cheol Min, “Semantic Room Segmentation Using Large Language Models”, TTIC Summer Workshop on Multimodal Artificial Intelligence, Chicago, IL USA, August 2024.
- Byung-Cheol Min, “Integrating Human Intelligence into Robot Learning”, Hanyang University, Ansan, Korea, June 2024.
- Byung-Cheol Min, “Adaptive Workload Allocation in Multi-Human Multi-Robot Teams”, KAIST ME Seminar, KAIST, Daejeon, Korea, June 2024.
- Byung-Cheol Min, “User Study-based Approaches for Human-Robot Interaction Research”, Kyung Hee University, Yongin, Korea, June 2024.
- Byung-Cheol Min, “Socially Aware Robot Navigation”, DGIST-Purdue Bilateral Symposium, DGIST, Daegu, Korea, June 2024.

Lab Media Appearances (6)

- Dr. Min’s collaborative research project, titled “Enabling Next-Generation HyFlex Field Laboratories through an Innovative Learner-In-The-Loop Multi-Robot System” was featured in the Purdue Polytechnic’s Newsroom in the article titled “Purdue Polytechnic research team receives \$900,000 NSF award to research engineering, technology students’ problem solving, collaboration skills”.
- Dr. Min’s appointment as the director of the Applied AI Research Center was featured in the Purdue Polytechnic’s Newsroom in the article titled “Polytechnic founds new Applied AI Research Center, appoints founding directors”.
- Dr. Min’s elevation to IEEE Senior Member Status was featured in the Purdue Polytechnic’s Newsroom in the article titled “Polytechnic faculty elevated to IEEE senior member status”.
- Our lab was featured in the Purdue Exponent, including interviews with some of our students and Dr. Min. The article covered their academic and professional journey, as well as the research projects conducted in the lab.
- Dr. Min’s hosting of a delegation from two South Korean organizations was featured in the Purdue Polytechnic’s Newsroom in the article titled “Polytechnic department hosts delegation from South Korea, plans 2024 symposium”.
- Our lab’s publication on the development of a new type of transformer that can better track the state of human operators as they interact with robots was featured in the Purdue Polytechnic’s Newsroom in the article titled “SMART Lab proposes new system to improve interactions between humans, robots”.

Outreaches & Partnerships (1)

- Arjun Gupte and Dr. Min conducted a virtual outreach event for Springwoods Elementary School in VA as part of the NSF CAREER project, December 2024.

Lab Meetings/Seminars

Lab Meetings

- In 2024, the lab conducted a total of 31 group meetings. During the spring semester, these meetings took place every Monday from 4:30pm to 6:30pm in the KNOY and POTR facility, and during the fall semester, they occurred from 3:00pm to 5:00pm in the POTR facility.

Lab Seminars

- During the spring semester, PhD students conducted 12 technical seminars in which they reviewed and discussed the latest robotics papers published in journals/conferences such as RA-L, ICRA, IROS, CoRL from 2022 to the present. Additionally, undergraduate students delivered 2 research update presentations.
- During the fall semester, both PhD and undergraduate students conducted 7 paper review seminars featuring the latest research. Additionally, Shyam shared his PhD journey with the other lab members. Over the course of a month, all lab members worked on technical, real-world demos related to their research, which they presented to the group in December.

Lab Website & Social Media

Lab Website

- 15,209 Page views
- 4,964 Unique visits
- 2,857 First time visits
- 2,107 Returning visits

YouTube Channel (15 new videos publicly published, 7,752 views, 55 new subscribers)

- “Cognitive Load-based Affective Workload Allocation for Multi-human Multi-robot Teams”, November 2024.
- “PrefCLM: Enhancing Preference-based Reinforcement Learning with Crowdsourced Large Language Models”, November 2024.
- “[Presentation] Smart Multi-Agent Robot Task Planning using Large Language Models”, October 2024.
- “[Presentation] Learning from Demonstration Framework for Multi-Robot Systems”, October 2024.
- “REBEL: Rule-based & Experience-enhanced Learning with LLMs for Initial Task Allocation in MHMR Teams”, September 2024.
- “Investigating the Impact of Trust in Multi-Human Multi-Robot Task Allocation”, September 2024.
- “Adaptive Task Allocation in MH-MR Teams under Team Heterogeneity and Dynamic Information Uncertainty”, September 2024.
- “Personalization in Human-Robot Interaction through Preference-based Action Representation Learning”, September 2024.
- “PrefMMT: Modeling Human Preferences in Preference-based RL with Multimodal Transformers”, September 2024.
- “ZeroCAP: Zero-Shot Multi-Robot Context Aware Pattern Formation via Large Language Models”, September 2024.
- “Smart Multi-Agent Robot Task Planning using Large Language Models”, July 2024.
- “MOCAS: A Multimodal Dataset for Objective Cognitive Workload Assessment on Simultaneous Tasks”, July 2024.
- “SMART-TeleLoad: A New Graphic User Interface to Generate Affective Loads for Teleoperation”, May 2024.
- “Learning from Demonstration Framework for Multi-Robot Systems Using Interaction Keypoints & SAC”, April 2024.
- “Semantic Layering in Room Segmentation via LLMs”, April 2024.

Paper Citations

- Total Citations: 2,100 across all years (h-index: 25; i10-index: 59)
- Citations in 2024: 540

Visit us at <http://www.smart-laboratory.org>