Dr. Taeyeong Choi *Curriculum vitae*

CONTACT INFORMATION

Kennesaw State University
Department of Information Technology
Atrium J358, 1100 South Marietta Pkwy
Marietta, GA 30060 USA

: tchoi3@kennesaw.edu
: taeyeongchoi.com
: ssuty

INTERESTS

Novel learning methods for real-world applications—applied AI/machine learning, agri-food system automation, robot vision, active sensing, anomaly detection, reinforcement learning, representation learning, and Bayesian learning

CURRENT ACADEMIC APPOINTMENTS

Kennesaw State University (KSU), Marietta, GA, USA
Assistant Professor **Aug 2023 – Present**

- Affiliations:
  - Department of Information Technology

PREVIOUS ACADEMIC APPOINTMENTS

University of California, Davis (UCD), Davis, CA, USA
Postdoctoral Scholar **Aug 2022 – Jul 2023**

- Supervisor: Dr. Xin Liu
- Affiliations:
  - Department of Computer Science
  - AI Institute for Food Systems (AIFS)

University of Lincoln (UoL), Lincoln, UK
Postdoctoral Research Associate **Oct 2020 – Jul 2022**

- Supervisor: Dr. Grzegorz Cielniak
- Affiliations:
  - Lincoln Agri-Robotics (LAR)
  - Lincoln Institute for Agri-food Technology (LIAT)
  - Lincoln Centre for Autonomous Systems (L-CAS)

EDUCATION

Arizona State University (ASU), Tempe, AZ, USA
M.S. & Ph.D., Computer Science **Dec 2020**

- Advisor: Dr. Theodore (Ted) P. Pavlic
- Ph.D. Dissertation: "Deep Learning Approaches for Inferring Collective Macrostates from Individual Observations in Natural and Artificial Multi-Agent Systems Under Realistic Constraints". ISBN: 9798557031004

Soongsil University (SSU), Seoul, South Korea
B.S.E., Computer Science and Engineering **Aug 2015**

PUBLICATIONS

(Workshop)

[1] **Choi T.**, D. Guevara, G. Bandodkar, Z. Cheng, C. Wang, B. N. Bailey, M. Earles, and X. Liu. DAVIS-Ag: A Synthetic Plant Dataset for Developing Domain-Inspired Active Vision in Agricultural Robots. To: *IROS2023 Workshop on Agricultural Robotics for a Sustainable Future (WARS2023)*. Oct 1, 2023. Detroit, USA.

[2] **Choi T.** and X. Liu. Exploiting Unlabeled Data to Improve Detection of Visual Anomalies in Soft Fruits. In: *AAAI-23 Workshop on AI for Agriculture and Food Systems (AIAFS 2023)*. Feb 14, 2023. Washington DC, USA. OpenReview.net.

[3] Liu Y., **T. Choi**, and X. Liu. Constrained Reinforcement Learning for Autonomous Farming: Challenges and Opportunities. In: *AAAI-23 Workshop on AI for Agriculture and Food Systems (AIAFS 2023)*. Feb 14, 2023. Washington DC, USA. OpenReview.net.

[4] **Choi T.** and G. Cielniak. Channel Randomisation with Domain Control for Effective Representation Learning of Visual Anomalies in Strawberries. In: *AAAI-22 Workshop on AI for Agriculture and Food Systems (AIAFS 2022)*. Feb 28, 2022. Virtual event. OpenReview.net.

(Conference & Journal)

[5] Goyal, S., K. Sasikumar, R. Sheth, A. Seelam, **T. Choi**, and X. Liu. EnColor: Improving Visual Accessibility with a Deep Encoder-Decoder Image Corrector for Color Vision Deficient Individuals. In: *Proceedings of the 38th AAAI Conference on Artificial Intelligence (AAAI-24)*, Feb 20–27, 2024. Vancouver, Canada. doi:10.1609/aaai.v38i21.30382

[6] Bandodkar, G., S. Agarwal, A. K. Sughosh, S. Singh, and **T. Choi**. "Allot?" Is "A Lot!" Towards Developing More Generalized Speech Recognition System for Accessible Communication. In: *Proceedings of the 38th AAAI Conference on Artificial Intelligence (AAAI-24)*, Feb 20–27, 2024. Vancouver, Canada. doi:10.1609/aaai.v38i21.30381

[7] **Choi, T.**, O. Would, A. Salazar-Gomez, and G. Cielniak. Self-supervised Representation Learning for Reliable Robotic Monitoring of Fruit Anomalies. In: *Proceedings of the 2022 IEEE International Conference on Robotics and Automation (ICRA 2022)*. May 23–27, 2022. Philadelphia, USA. doi:10.1109/ICRA46639.2022.9811954.

[8] **Choi, T.**, B. Pyenson, J. Liebig, and T. P. Pavlic. Beyond Tracking: Using Deep Learning to Discover Novel Interactions in Biological Swarms. *Journal of Artificial Life and Robotics (AROB)*, Mar 2022. doi:10.1007/s10015-022-00753-y
— Extension of the *Best Paper Award* winner at *the 4th International Symposium on Swarm Behavior and Bio-Inspired Robotics 2021 (SWARM 2021)*, Jun 1–4, 2021. Kyoto, Japan. Virtual event.

[9] **Choi, T.** and G. Cielniak. Adaptive Selection of Informative Path Planning Strategies via Reinforcement Learning. In: *Proceedings of the 10th European Conference on Mobile Robots (ECMR 2021)*, Aug 31–Sep 3, 2021. Bonn, Germany. Virtual event. doi:10.1109/ECMR50962.2021.9568796

[10] **Choi, T.**, B. Pyenson, J. Liebig, and T. P. Pavlic. Identification of Abnormal States in Videos of Ants Undergoing Social Phase Change. In: *Proceedings of the 35th AAAI Conference on Artificial Intelligence (AAAI-21)*, Feb 2–9, 2021. Virtual event. doi:10.1609/aaai.v35i17.17794

[11] **Choi, T.** and T. P. Pavlic. Automatic Discovery of Motion Patterns that Improve Learning Rate in Communication-Limited Multi-Robot Systems. In: *Proceedings of the 2020 IEEE International Conference on Multisensor Fusion and Integration (MFI 2020)*, Sep 14–16, 2020. Karlsruhe, Germany. Virtual event. doi:10.1109/MFI49285.2020.9235218

[12] Kang, S., **T. Choi** and T. P. Pavlic. How Far Should I Watch? Quantifying the Effect of Various Observational Capabilities on Long-range Situational Awareness in Multi-robot Teams. In: *Proceedings of the 1st IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS 2020)*, Aug 17–21, 2020. Washington, DC, USA. Virtual event. doi:10.1109/ACSOS49614.2020.00036

[13] **Choi, T.**, S. Kang, and T. P. Pavlic. Learning Local Behavioral Sequences to Better Infer Non-local Properties in Real Multi-robot Systems. In: *Proceedings of the 2020 IEEE International Conference on Robotics and Automation (ICRA 2020)*, May 31–June 4, 2020. Paris, France. Virtual event. doi:10.1109/ICRA40945.2020.9196728

[14] **Choi, T.**, T. P. Pavlic, and A. W. Richa. Automated Synthesis of Scalable Algorithms for Inferring Non-Local Properties to Assist in Multi-Robot Teaming. In: *Proceedings of the 2017 IEEE International Conference on Automation Science and Engineering (CASE 2017)*, Aug 20–23, 2017. Xi'an, China. doi:10.1109/COASE.2017.8256320

[15] **Choi, T.** and H. Na. Stealthy Behavior Simulations based on Cognitive Data. *Journal of Korea Game Society (JKGS)*, 16(2):27–40, Apr 2016. doi:10.7583/JKGS.2016.16.2.27

[16] **Choi, T.** and H. Na. Making Levels More Challenging with a Cooperative Strategy of Ghosts in Pac-Man. *Journal of Korea Game Society (JKGS)*, 15(5):89–98, Oct 2015. doi:10.7583/JKGS.2015.15.5.89

[17] **Choi, T.** and H. Na. Stealthy Behavior Simulations based on Cognitive Data. In: *Proceedings of the 2015 IEEE International Conference on Machine Learning and Cybernetics (ICMLC 2015)*, 16(2):27–40, Jul 12–15 2015. Guangzhou, China. doi:10.1109/ICMLC.2015.7340900

Invited Talks

[18] Self-supervised Learning of Visual Anomalies in Strawberries. In: *International Conference on Digital Technologies for Sustainable Crop Production (DIGICROP)*, Mar 2022. Virtual event.

[19] AI Research in Agriculture and Beyond – Successful Machine Learning under Limited Resources. In: *Hankyong National University, School of Computer Engineering & Applied Mathematics Seminar*, Dec 2021. Anseong, South Korea.

[20] Local Behavior Learning for Social Temperature Prediction without Individual Ant Tracking. In: Oral Session at *Collective Information Processing*, Mar 2020. Berlin, Germany.

[21] Machine Learning Applications for Video Game Development. In: *Hankyong National University, School of Computer Engineering & Applied Mathematics Seminar*, Jul 2015. Anseong, South Korea.

Teaching Experience

KSU, Marietta, GA, USA

Instructor

- IT 7143: Cloud Analytics — **Spring 2024, Spring 2025**
- IT 7103: Practical Data Analytics — **Fall 2023, Fall 2024**
- IT 4773: Machine Learning for Enterprise — **Fall 2023, Fall 2024**

UCD, Davis, CA, USA

Guest Lecturer

- ECS 293A: Research in Computer Science — **Nov 2022**
  - Graduate-level course in computer science
  - Instructor: Dr. Xin Liu
  - Lecture: "How to Read Academic Papers for You Now"

UoL, Lincoln, UK

Guest Lecturer

- CMP 9766M: Frontiers of Robotics Research Seminar: — **May 2021**
  - Graduate-level course in robotics and autonomous systems
  - Instructor: Dr. Grzegorz Cielniak
  - Lecture: "Identifying Anomalies for Better Decision-Making"

ASU, Tempe, AZ, USA

Teaching Assistant

- CSE 450/551: Design Analysis of Algorithms/Foundations of Algorithms: — **Jan 2018 – May 2018**
  - Instructor: Dr. Andréa Richa
  - Graded exams, and held office hours (2 hours/week) for tutoring students.

- CSE 310: Data Structures and Algorithms: **Aug 2017 – Dec 2017**
  - Instructor: Dr. Andréa Richa
  - Taught recitation sessions (4 hours/week), graded exams, and provided instructions for C++ programming assignments.
- CSE 205: Object-Oriented Programming & Data Structures **Jan 2016 – May 2016**
  - Instructor: Dr. Xuerong Feng
  - Graded exams, and tutored students for Java programming (4 hours/week).
- CSE 100: Prin. of Programming with C ++ **Jan 2016 – May 2016**
  - Instructor: Dr. Phillip Miller
  - Supervised C++ programming laboratories (5 hours/week), and held tutoring hours (4 hours/week).
- CSE 424: Capstone Project II **Aug 2015 – Dec 2015**
  - Instructor: Dr. Debra Calliss
  - Supervised each project group with their short-term and long-term goals, and graded IT ethics essays.

MENTORING

KSU, Marietta, GA, USA

- Sahith Vardhan Reddy Vancha (M.S. in Information Technology) **Aug 2023 – Present**
  - Directing to extend the DAVIS-Ag dataset with novel features and labels
- Nafisa Anjum (M.S. in Information Technology) **Aug 2023 – Present**
  - Serving on the Master's thesis committee

UCD, Davis, CA, USA

- (Team 1) Satyam Goyal, Rohan Sheth, Akash Seelam, and Kavya Sasikumar
  (Team 2) Grisha Bandodkar, Athul Krishna Sughosh, Sahil Singh, and Shyam Agarwal (B.S. in Computer Science) **Jun 2023 – Present**
  - Serving as a mentor for the EAAI-24 Mentored Undergraduate Research Challenge
  - Advising in designing a problem, producing a solution and evaluation results, and writing a paper to submit.
- Grisha Bandodkar, Zifei Cheng, Chonghan Wang, and Satyam Goyal (B.S. in Computer Science) **Jan 2023 – Aug 2022**
  - Directing to generate and extend DAVIS-Ag—a public image dataset of simulated plants—with labels, such as instance segmentation, bounding box, camera pose, etc., in a desirable format.
  - Advising in designing reasonable heuristic methods for active vision in agricultural environments and in training a fruit detector for validation of the DAVIS-Ag dataset.
  - Guiding while exploring embedded AI platforms like AI Habitat and AI2-THOR
- Avishai Halev (Ph.D. in Applied Mathematics) **Sep 2022 – Dec 2022**
  - Working with food scientists on efficient parameter search to build a realistic oxidation model fitting empirical datasets.

UoL, Lincoln, UK

- Owen Would (M.Sc. in Robotics & Autonomous Systems) **Mar 2021 – Sep 2021**
  - Advised in studying on deep neural network-based visual anomaly detection of strawberry images particularly while designing a GAN-based method for occluding environments.

ASU, Tempe, AZ, USA

- Sehyeok Kang (M.S. in Computer Engineering) **Mar 2019 – May 2020**
  - Mentored to implement Remote Teammate Localization on a physical robot platform, *Thymio*, while he was working on his thesis on correlation between prediction accuracy and observational information.
- Ricardo Weir (B.S. in Computer Science) **Mar 2018 – Dec 2018**
  - Guided to develop a YOLO-based object-detection pipeline—from data annotation to model validation—to perform automated tracking of individual *Harpegnathos* ants from high-quality video recordings.

Professional Service

Workshop Organizer

- ICRA2023: "TIG-IV: Agri-Food Robotics From Farm To Fork" Jun 2023
  - Full-day workshop on robotic innovations for agri-food systems—from farming to post-harvest processing, cooking, delivery, serving, and legislation

Conference/Journal Reviewer

- IJRR, RAM, RA-L, Biosystm. Eng., Comput. Electron Agric., IROS 2023, ICRA 2023, ICRA 2022, IROS 2022, ICRA 2020

Grant Reviewer

- Research Grant at ASU GPSA Aug 2017 – May 2018
- Travel Grant at ASU GPSA Aug 2016 – Jul 2017

Conference Session Chair

- TAROS 2021 Sep 2021
- CASE 2017 Aug 2017

Research Projects

ASU, Tempe, AZ

- NSF: "CRISP: Type 2/Collaborative Research: Design and Control of Coordinated Green and Gray Water Infrastructure to Improve Resiliency in Chemical and Agricultural Sectors" **Aug 2018 – Dec 2019**
  - PI: Dr. John Sabo
  - Combinatorial optimization for placement of green infrastructures (wetlands) along with gray infrastructures (reservoirs) to minimize risks of natural disasters in areas of interest.
- DARPA I20: "BioSwarm: Bio-Inspired Swarming" **Aug 2017 – Jul 2018**
  - Supervisor (co-PI): Dr. Theodore (Ted) P. Pavlic
  - PI: Dr. Stephen C. Pratt
  - Designed a deep neural network to identify informative behaviors of *Harpegnathos* ants for classification of colonial states.

SSU, Seoul, South Korea

- Reinforcement Learning for Video Game Design **Oct 2014 – Aug 2015**
  - Supervisor: Dr. Hyeon-Suk Na
  - Designed a model-free reinforcement learning framework to predict the actions of human players at the stage of video game development.
  - Proposed novel team strategies of enemies in the video game of Pac-Man using A* algorithm to significantly increase the overall level of difficulty.
- Development of a Cognitive Planning and Learning Model for Mobile Platforms **Dec 2012 – Sep 2014**
  - Supervisor: Dr. Young-Tack Park
  - Contributed to refining noisy GPS data from Android phones and creating modules on Android for reliable communication with a remote server.
  - Implemented ontology-based temporal reasoning models integrated with SPAQL.

GRANTS & AWARDS

Georgia Peanut Commission

- PI, "Night Owl: A Low-Cost Smart Drone System for Defending Peanut Farms from Night-time Wildlife Intrusion", $25,000, Jul 2025–Jun 2026.

Southern Sustainable Agriculture Research and Education

- PI, "MoCoBot: Developing a Low-Cost Night-time Mollusk Control Robot for Strawberry Growers", Graduate Student Grants, $21,964, Sep 2024–Aug 2026.

KSU Office of Research

- Co-PI, "Enhancing Student Engagement with Peer Questioning in Immersive Virtual Classroom Using Large Language Models", Interdisciplinary Initiatives Seed Grants, $10,000, May 2024–Apr 2025.

SWARM 2021

- Best Paper Award Jun 2021

ASU Graduate College

- Completion Fellowship ($8,550 plus tuition for 1 credit hour) Aug 2020

ASU Ira A. Fulton Schools of Engineering

- Engineering Graduate Fellowship ($700) May 2020

ASU School of Computing, Informatics, and Decision Systems Engineering

- Doctoral Fellowship ($4,000) Mar 2020

ASU Social Insect Research Group

- Student Research Grants ($1,550) Nov 2018
  - Project: Deep Features for Generalizable Insect-behavior Learning.

SSU College of Information Technology

- Bronze Award at Software Development Competition Oct 2012
  - Social Alarm: Smart Android Alarm Application (Photos & Demo)

Work Experience

Atlassian, Mountain View, CA

Data Scientist Intern **May 2018 – Aug 2018**

- Jira Duplicate Ticket Detection
  - Designed a deep learning pipeline for human natural language to classify semantically similar tickets from customers.
  - Gathered >124K examples to implement, train, fine-tune, and validate specialized LSTM models.
  - Demonstrated 1) significantly higher accuracy than traditional machine learning models, 2) generalizability to the data from different sources of ticket, and 3) feasibility of similarity-based ranking scenarios.

Hardware and Software Skills

Data Science & Machine Learning:

- PyTorch, TensorFlow, TensorBoard, OpenAI Gym, OpenCV, Scikit-learn, SciPy, NumPy, Pandas, Matplotlib, etc.

Programming Languages:

- Python, Java, C, C++, UNIX shell scripting, GNU make, MySQL, etc.

Operating Systems:

- Microsoft Windows family, Apple OS X, Linux, and other UNIX variants

Others:

- Unity 3D, MATLAB, LaTeX, Git, Android, and TCP/IP programming