

Teawon Han | Curriculum Vitae

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Work Experience

- **Control & Automated System Dept., Research& Adv. Engineering Div.** **Ford Motor Company USA**
Research Engineer *January 2021–Current*
 - Project: Automated Vehicle Control - Driving Policy
 - Research and develop optimal decision-making algorithms for safe automated vehicle control system.
 - Demonstrate the developed algorithms in the simulation and vehicle levels.
 - Participate in OSU-Ford Project (extension of my Ph.D. thesis).
- **Robot Development Group, New Business Division,** **HANWHA AEROSPACE**
Research Engineer *July 2015–May 2017*

Hanwha Group acquired Samsung Techwin to expand their defense & security business. Indeed, Hanwha Group became the top ranked defense company in South Korea.

 - Project: Unmanned Aerial Vehicle (UAV) Autonomous Flight System
 - Researched a framework of UAV control system for cognition of environmental conditions and optimal controls given missions (e.g., searching and tracking target objects, creating an aerial map).
 - Designed the system configuration for UAV's autonomous flight (using Pixhawk and Raspberry Pi).
 - Developed a system to create an aerial map by using UAV and a single camera.
 - Demonstration of prototype UAV control system [\[link\]](#)
- **Robot Technology Group, Advanced Technology Institute** **SAMSUNG TECHWIN**
Research Engineer (Unmanned Autonomous Driving System Team) *August 2012–June 2015*
 - Project: Autonomous Driving Car (platform: QM5 made by Renault Samsung Motors)
 - Developed lane and curb detection systems: the Artificial Neural Networks is trained to detect *lane features* under various conditions (camera and laser sensors are used for collecting data).
 - Developed the localization system which can revise GPS positions in real time by detecting sensor's errors.
 - The errors are measured by analyzing detected lanes and given map.
 - Publications:
 - Lane detection & localization for UGV in urban environment, ITSC 2014
 - Demonstrated by using developed autonomous driving car [\[link\]](#)
 - A New Quadtree Data Structure for Mobile Robot Mapping Problem in a Large Scale Area, ICROS 2013
 - Project: Off-Road Unmanned Ground Vehicle (UGV) [\[link\]](#) for surveillance and reconnaissance operations.
 - Developed the object detection system and the traversability mapper by using 3D LIDAR and IMU sensors.
 - [Demonstration 1 \[link\]](#), [Demonstration 2 \[link\]](#)
 - Project: Indoor UGV for factory automation
 - Developed the indoor localization system which recognizes accurate positions without GPS by using stereo camera. (Advanced version), [Demonstration \[link\]](#)
 - Developed a line-tracing system by using a single camera (Standard version), [Demonstration \[link\]](#)
 - Other Experiences
 - Developed device drivers for sensors under the necessity using Serial and Ethernet protocols.
 - Development Environment: ROS and C++ on Linux
 - Sensors: GPS/INS (Span-CPT, VN-200), camera (Flea), laser sensor (LMS-151, LMS-511, LD-MRS), LIDAR (Velodyne 64E, 16), Kinect, Tigereyes
 - Designed and created robot's mechanism parts by using Solidworks and 3D printer.

Education

Academic Qualifications.....

- **Ohio State University** **Columbus, OH, United States**
Ph.D., Electrical and Computer Engineering, Research Assistant
August 2017– Dec. 2020
 - Advisor: Prof. Umit Ozguner
 - Evolving Intelligent Control System for Automated Vehicle Controls
- **Ohio State University** **Columbus, OH, United States**
Master of Science, Electrical and Computer Engineering
August 2017– Dec. 2019
 - Advisor: Prof. Umit Ozguner
 - Driver's Intention Recognition and Behavior Prediction
- **University of Southern California (USC)** **Los Angeles, CA, United States**
Master of Science, Computer Science
August 2010–May 2012
 - Advisor: Prof. Paul Rosenbloom and Prof. Wei-Min Shen
 - Artificial Intelligence and Robotics
- **Hallym University** **Chuncheon-si, Gangwon-do, South Korea**
Bachelor of Engineering, Computer Engineering
March 2002–February 2006
 - Advisor: Prof. Young-Woong Ko
 - Embedded System

Research Experiences in Academic Projects.....

- **Controls and Intelligent Transportation Research Lab** **Center for Automotive Research, OSU**
Graduate Research Associate
August 2017–December 2020
 - Advisor: Professor Umit Ozguner
 - Developed an online evolving method which makes optimal decisions under unexpected situations via own or shared experiences.
 - Studying an online evolving framework to obtain an optimal driving policy in an iterative manner for Automated Vehicle (AV).
 - The study is funded by the Ford Motor Company's University Research Program (August 2019 - March 2020)
 - The research project (2 years) is organized by OSU and the Ford Motor Company based on the preliminary results and ongoing (March 2020 - March 2022).
 - Publication1: Driving Intention Recognition and Lane Change Prediction on the Highway, IV 2019
 - Publication2: An Online Evolving Framework for Advancing Reinforcement-Learning based Automated Vehicle Control, IFAC 2020 21th World Congress
 - Posted Paper: An Online Evolving Framework for Modeling the Safe Autonomous Vehicle Control System via Online Recognition of Latent Risks, arXiv preprint arXiv:1908.10823
- **Polymorphic Robotics Laboratory** **Information Sciences Institute (ISI) of USC**
Directed Research Student
January 2012–July 2012
 - Advisor: Professor Wei-Min Shen
 - Researched and developed an optimal algorithm that makes a reconfigurable robot (called SuperBot) to choose the best shape and gait autonomously based on different environments [\[link\]](#).
 - Publication: An online gait adaptation with SuperBot in sloped terrain, ROBIO 2012
- **Cognitive Architecture Lab** **Institute for Creative Technologies (ICT) of USC**
Directed Research Student
May 2011–January 2012
 - Advisor: Professor Paul S. Rosenbloom
 - Contributed to improve the Graphical Cognitive Architecture (GCA)'s learning and reasoning systems.
 - Developed a logical GCA structure for mobile robot's localization and navigation.
 - Publications:
 - Fusing Symbolic and Decision-Theoretic Problem Solving+Perception in a Graphical Cognitive Architecture, BICA 2011.
 - Learning via gradient descent in Sigma, ICCM 2013.

Computational Neuro-Rehabilitation & Learning Lab

USC

Directed Research Student

January 2011–May 2011

- Advisor: Professor Scheweighofer Nicolas
- Researched and developed the learning and reasoning system to improve efficiency of rehabilitation processes.
- Developed an intelligent system by using the Bayesian Logistic Regression model, which can recognize and predict patient's current and future rehabilitation statuses.

Publications

- Han, T., Nagesh Rao, S., Filev, D. P., & Ozguner, U. (2020). An online evolving framework for advancing reinforcement-learning based automated vehicle control. 21st International Federation of Automatic Control World Congress.
- Han, T., Filev, D., & Ozguner, U. (2019). An Online Evolving Framework for Modeling the Safe Autonomous Vehicle Control System via Online Recognition of Latent Risks. arXiv preprint arXiv:1908.10823.
- Han, T., Jing, J., & Özgüner, Ü. (2019, June). Driving Intention Recognition and Lane Change Prediction on the Highway. In 2019 IEEE Intelligent Vehicles Symposium (IV) (pp. 957-962). IEEE.
- Han, T., Kim, Y., & Kim, K. (2014, October). "Lane detection & localization for UGV in urban environment". In 17th International IEEE Conference on Intelligent Transportation Systems (ITSC) (pp. 590-596). IEEE.
- Kim, D., & Han, T. (2013). "A New Quadtree Data Structure for Mobile Robot Mapping Problem in a Large Scale Area". Institute of Control, Robotics, and System 2013, 294-295.
- Rosenbloom, P. S., Demski, A., Han, T., & Ustun, V. (2013). "Learning via gradient descent in Sigma". In Proceedings of the 12th International Conference on Cognitive Modeling (Vol. 94).
- Han, T., Ranasinghe, N., Barrios, L., & Shen, W. M. (2012, December). "An online gait adaptation with superbot in sloped terrains". In 2012 IEEE International Conference on Robotics and Biomimetics (ROBIO) (pp. 1256-1261). IEEE.
- Chen, J., Demski, A., Han, T., Morency, L. P., Pynadath, D. V., Rafidi, N., & Rosenbloom, P. S. (2011, October). "Fusing Symbolic and Decision-Theoretic Problem Solving+ Perception in a Graphical Cognitive Architecture". In BICA (pp. 64-72).

Patents

- Device and method for correcting vehicle position, system for correcting vehicle position by using lane and vehicle capable of manless operation (PCT/KR2014/004299).
- Lane detection system and method (US 9245188 B2).

Other Experiences

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The Republic of Korea Army

First Lieutenant, Secure Information Officer and Platoon Leader

March 2006–June 2008

- Led and counseled 40 soldiers for training combat-strategies and executing missions.
- Operated the "military tactic-command and information system".
- Managed confidential documents.

Reserved Officers' Training Corps (ROTC)

Hallym University

Staff member of cadets

March 2005–Nov. 2005

- Managed and counseled 24 cadets in military classes and training.
- Prepared military training and made an annual plan.

Technical and Personal skills

Programming Languages:

- Proficient in: C, PHP, C++, Matlab, Python, Tensorflow, TeX, ROS, OpenAI Gym, Sumo, Git.

○ **Industry Software Skills:** SolidWorks (Advanced), Most Microsoft Office products (Advanced).

○ **General Business Skills:** Good presentation skills, Works well within a team.

Interests:

- Artificial Intelligence, Machine Learning, Robotics, Computer Vision, Multi-agents System (Intelligent Collaboration), Unmanned Ground/Aerial Vehicle System.