Jongseo Choi

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Education

Technical University of Chemnitz (Germany) *Oct 2018 – Sep 2020*
M.Sc. Automotive Software Engineering

- Implementation of a communication system with Raspberry Pi and Arduino
- **Courses:** Design SW for Embedded Systems, machine learning, multi-core system, Real-time system, Dependable system, AUTOSAR, etc.

Chungbuk National University (S.Korea) *Mar 2008 – Jan 2015*
B.Sc. Electronic Engineering *(including 2 years military service)*

- Development of a line tracer robot using an infrared sensor, a DC motor, and an Atmega microcontroller
- Development of a mini-wheelchair controlled by a wireless helmet using an accelerometer and gyro sensor

Experience

Senior SW Engineer (ThorDrive, S.Korea) *Nov 2020 – Present*

- Development of a jerk-minimized velocity planning module using a spatial-temporal map for autonomous vehicles
- Development of an open-space planner for autonomous vehicles in a parking lot
- Development of Multi-Agent Evaluation System in Simulation (Carla) and Publication of Research Paper
- Development of an occlusion-aware risk assessment system for autonomous vehicles which is published in RA-L (SCI, 2nd author)
- Development of a trajectory optimization module for autonomous vehicles which is submitted in T-ITS (SCI, 1st author, Paper under first review)
- Autonomous Driving POC Project within the Incheon Airport Using Tow Tractor with Korean Air
- Development of a multi-agent Pickup & Delivery (MAPD) module for autonomous mobile robot (AMR)

Intern, Autonomous Driving Department (IAV GmbH, Germany) *Sep 2019 – Aug 2020*

- Development of Lane-change intention detection module using machine learning

QC/QA Engineer (Hyundai Mobis, S.Korea) *Jan 2015 – Mar 2018*

- Analysis of ADAS Electronic Components Failures and Derivation of Improvement Measures
- Field Defect Management of ADAS Components in Korea and Europe

Projects

Autonomous Mobile Robot (ThorDrive) *2024.01 - Present*

- Development of a multi-agent Pickup & Delivery (MAPD) module for autonomous mobile robot (AMR)
  - Period: 2024.01 - now
  - Result: multi-agent system embedded in FMS
  - Skills: standard (VDA5050), task allocation (auction), MAPF (CBS, SIPP, ADG), robust execution and replanning (ADG), MQTT, Unit Test, Test-Driven Development (TDD), static analysis, dynamic testing, memory management
  - Tools Used: ROS, simulator (MVSim, Isaac Sim), Eclipse Mosquitto, SW verification (GoogleTest, Valgrind, clang-tidy), CI/CD (Azure pipeline, Git, Docker)

Autonomous Vehicles (ThorDrive) *2020.11 - Present*

- Development of a jerk-minimized velocity planning module using a spatial-temporal map for autonomous

vehicles

- Period: 1+ years (2020.11 - 2022.04)
- Result: autonomous Driving Service launched for Korean Navy in Jinhae
- Skills: ST map, MPC, QP, LQR
- Tools Used: ROS, Carla simulator, optimization solver (OSQP), OpenCV

◦ Development of an open-space planner using Hybrid A* and Kinodynamic-RRT

- Period: 6 months (2022.04 - 2022.10)
- Result: used for parking service in free space for autonomous vehicles
- Skills: Reeds-Shepp, Kinodynamic-RRT*, Hybrid A*, QP
- Tools Used: ROS, Carla simulator, OMPL (Open Motion Planning Library)

◦ Development of Multi-Agent Evaluation System in Simulation (Carla) and Publication of Research Paper

- Period: 4 months (2022.07 - 2022.11)
- Result: a paper published in Autumn Annual Conference of IEIE
- Skills: deadlock scenario generation (double merge scenario, double overtake)
- Tools Used: ROS, Carla simulator

◦ Development of an occlusion-aware risk assessment system for autonomous vehicles

- Period: 10 months (2023.01 - 2023.10)
- Result: A paper published in RA-L (SCI, 2nd author)
- Skills: uniform distribution, reachability set
- Tools Used: ROS, Carla simulator, OMPL (Open Motion Planning Library)

◦ Development of a trajectory optimization module for autonomous vehicles

- Period: 1 year (2022.12 - 2023.11)
- Result: a paper submitted in T-ITS (SCI, 1st author)
- Skills: B-spline, swept volume, gradient-based planner, MPC, OCP, QP, L-BFGS
- Tools Used: ROS, Carla simulator, optimization solvers (IPOPT, OSQP, L-BFGS, ACADOS), CasADi

◦ Autonomous Driving POC Project within the Incheon Airport Using Tow Tractor with Korean Air

- Period: 1 year (2024.01 - now)
- Result: successfully completed approximately 10 km of autonomous driving within the airport, carrying the President of Korean Air
- Skills: car-like tractor kinematics, collision avoidance, intersection handling (signals, unprotected turns)
- Tools Used: ROS, Carla simulator

Autonomous Vehicle (IAV GmbH) *2019.09 - 2020.08*

◦ Development of Lane-change prediction module

- Period: 1 year (2019.09 - 2020.08)
- Result: master thesis of TUC
- Skills: HMM, potential field, deep learning (SVM, MLP, LSTM)
- Tools Used: Python (TensorFlow, PyTorch, Scikit-learn), C++ (Eigen, Boost), ADTF

QC/QA (Hyundai Mobis) *2015.01 - 2018.03*

◦ Analysis of ADAS Electronic Components Failures and Derivation of Improvement Measures

- Period: 7 months (2015.03 - 2015.12)
- Result: failure Analysis of 20+ Products, including SMK, BCM, MDPS, etc.
- Skills: circuit analysis, ASIC swap test
- Tools Used: CAN

- Field Defect Management of ADAS Components in Korea and Europe
  - Period: 2+ years (2016.01 - 2018.03)
  - Result: field monitoring of 30+ components and analysis and improvement of field defect causes for 10+ components
  - Skills: FMEA, 6 sigma

Publications

Safe and Efficient Trajectory Optimization for Autonomous Vehicles using B-spline with Incremental Path Flattening 2023

Jongseo Choi, Hyuntai Chin, Hyunwoo Park, Daehyeok Kwon, Sanghyun Lee, Doosan Baek

arXiv:2311.02957

Occlusion-aware Risk Assessment and Driving Strategy for Autonomous Vehicles Using Simplified Reachability Quantification 2023

Hyunwoo Park, **Jongseo Choi**, Hyuntai Chin, Sang-Hyun Lee, Doosan Baek

IEEE Robotics and Automation Letters DOI: 10.1109/LRA.2023.3329627

The Design of a Test Scenario for Verifying Multi-agent based Edge Connected Urban Autonomous Driving Service 2022

Daehyeok Kwon, **Jongseo Choi**, Hyuntai Chin, Doosan Baek

Autumn Annual Conference of IEIE

Lane Change Intention Detection (LCID) of other vehicles using interactive relationships of surrounding multiple objects 2020

Jongseo Choi

Technical University of Chemnitz & IAV GmbH

Development and Evaluation of Lane Change Intention Detection module in ADTF with real-time capability 2019

Jongseo Choi

Technical University of Chemnitz & IAV GmbH

Development of a mini-wheelchair controlled by a wireless helmet using an accelerometer and gyro sensor 2014

Jongseo Choi

Chungbuk National University

Technologies

Programming Languages

- C, C++, Python, Java

Technologies

- SW Development Process: Agile, Waterfall, V-Model
- SW Verification/Testing: GoogleTest, Valgrind, clang, clang-tidy, MIL, SIL, PIL, HIL
- CI/CD: Azure DevOps pipeline, Git, Docker
- Modularization and OOP: design patterns (e.g., Singleton, Factory, Observer, etc)
- Communication Protocols: MQTT, TCP/UDP, Bluetooth, CAN

Miscellaneous Experience

Languages

- Korean (native), English (Professional working proficiency), German (Elementary proficiency)

Awards and Achievements

- Merit scholarship (2019): 3,600 Euro from the committee of the Faculty of Computer Science, the president of Chemnitz University of Technology.
- Merit scholarship (2014): 5,000,000 won from scholarship foundation of Taekwang.
- Merit scholarship (2012): 1,000,000 won from Chungbuk National Univercity.

Certificate

- Driver's license 1st class; Regular