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 Autonomous Shuttle/Taxi Solutions
- Development of Automated Parking Path Planning Solutions
- Design of Issues and Evaluation Scenarios for Multiple Autonomous Driving Systems
- Development of Risk Assessment and Safe Driving Solutions for Hazardous Areas
- Development of Trajectory Optimization Solutions for Autonomous Driving
- Development of a Logistics Automation Solution Using Tow Tractors at Incheon Airport (with Korean Air)
- Development of Automation Solutions Utilizing Mobile Robots in Warehouses

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 Automation Solutions Utilizing Mobile Robots in Warehouses
  - Period: 2024.01 - now
  - Result: a multi-agent system embedded in FMS
  - Skills: standard (VDA5050), task allocation (auction), MAPF (CBS, SIPP, ADG), robust execution and replanning (ADG), MQTT, SW testing/verification, CI/CD
  - Tools used: ROS, simulator (MVSim, Isaac Sim), Eclipse Mosquitto, static & dynamic analysis (clang-tidy, gtest, Valgrind, code coverage), CI/CD (Azure pipeline, Git, Docker)

Autonomous Vehicles (ThorDrive)   *2020.11 - Present*

- Development of Autonomous Shuttle/Taxi Solutions
  - Period: 1+ years (2020.11 - 2022.04)
  - Result: a jerk-minimized velocity planning module
  - Skills: ST map, MPC, QP, LQR

- Tools used: ROS, Carla simulator, optimization solver (OSQP), OpenCV

○ Development of Automated Parking Path Planning Solutions

  - Period: 6 months (2022.04 - 2022.10)
  - Result: a path planning module for parking service
  - Skills: Reeds-Shepp, Kinodynamic-RRT*, Hybrid A*, QP
  - Tools used: ROS, Carla simulator, OMPL (Open Motion Planning Library)

○ Design of Issues and Evaluation Scenarios for Multiple Autonomous Driving Systems

  - 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 Risk Assessment and Safe Driving Solutions for Hazardous Areas

  - Period: 10 months (2023.01 - 2023.10)
  - Result: an occlusion-aware risk assessment module, a paper published in RA-L (SCI)
  - Skills: uniform distribution, reachability set
  - Tools used: ROS, Carla simulator, OMPL (Open Motion Planning Library)

○ Development of Trajectory Optimization Solutions for Autonomous Driving

  - Period: 1 year (2022.12 - 2023.11)
  - Result: a trajectory optimization module, a paper submitted in T-ITS (SCI, accepted in Oct 2024)
  - 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

○ Development of a Logistics Automation Solution Using Tow Tractors at Incheon Airport (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 using machine learning

  - Period: 1 year (2019.09 - 2020.08)
  - Result: Lane-change prediction module, master thesis
  - 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 15+ Products, including SMK, BCM, MDPS, etc.
  - Skills: CAN, circuit analysis, ASIC swap test
  - Tools used: VECTOR Tools (CANoe, CANape, etc)

○ 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

2024

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

IEEE Transactions on Intelligent Transportation Systems ↗ DOI: 10.1109/TITS.2024.3493060 ↗

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 Testing/Verification: static analysis (clang-tidy, cppcheck), dynamic analysis (gtest, Valgrind, code coverage), 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