

SHAO-HSUAN HUNG

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Education

Eindhoven University of Technology

Sept. 2022 – Sept. 2024

MSc in Electrical Engineering, specialized in signal processing system

Eindhoven, the Netherland

- Overall GPA: 3.97/4.0, (8.6/10)
- Master thesis: *KeyStep: Key-Moment Aware Representation Learning and Temporal Modeling on Procedure Step Recognition in Assembly Procedures*; advisor: Prof. Fons van der Sommen, Prof. Peter de With

National Cheng Kung University, (NCKU)

Sept. 2016 – June 2021

BSc in Electrical Engineering, Mechanical Engineering (double degrees)

Tainan, Taiwan

- Overall GPA: 3.85/4.3
- Academic excellence award (top 5% academic performance of class in 2016-2017 & 2018-2019)
- 2019 Professor Ke-Rang Li Memorial Scholarship
- Undergraduate thesis: *The electromechanical system identification and the fault Characterizations of HCU solenoid valves in the anti-lock braking system module*; advisor: Prof. Kuo-Shen Chen

Experience

ASML Research

Nov. 2023 – Sept. 2024

Research Intern, Full-time, Diagnostics and Data Science Team

Eindhoven, the Netherlands

- Master thesis project co-supervised by Dr. Jacek Kustra (ASML Research) and Prof. Fons van der Sommen (Video Coding and Architecture laboratory, TU/e).
- Researched on video understanding AI model for robust assembly procedures recognition on mixed-reality device.
- Developed a two-stage learning framework, the model is trained in weakly-supervised contrastive learning framework to learn high-dimensional spatial representations and then learn temporal features of spatial representations.
- Achieved state-of-the-art performance on two public video datasets (IndustReal, and MECCANO).

Justin Dauwels's Lab

July. 2023 – Nov. 2023

Research Intern, Full-time, Depart. of EEMCS, Delft University of Technology

Delft, the Netherlands

- Researched on perception error models (PEMs), a hidden Markov Model based model that can enable the analysis of the impact of perception errors on autonomous driving safety, without the need to model sensors themselves. Supervised by Dr. Andrea Piazzoni and Dr. Justin Dauwels.
- Implemented an end to end automatic data processing pipeline, that automatic convert and process the nuScenes dataset on the Apollo Baidu docker platform through ROS API.

Texas Instruments

Feb. 2022 – Aug. 2022

Software Engineer Intern, Full-time, Product Test Department

New Taipei, Taiwan

- Developed and deployed Faster-RCNN based automatic visual inspection system of device interface board to inspect failure electrical components and fatigue footprints using Pytorch framework, and Tkinter framework as UI, estimated catch out 94% outlier in production line, increasing the procedure of the equipment inspection by 40%.
- Published 2 research papers about the integration of AI model into semiconductor final test process in the annually internal TI technical symposium.
- Maintained and debugged on test program of ISO1540D (bisectional I2C isolator IC) on general-purpose ATE tester, reduce the test time by 10%.

Army of Taiwan

Sept. 2021 – Oct. 2021

Private, mandatory military service

Kaohsiung, Taiwan

System Dynamics Laboratory for Mechatronics and Microsystems, NCKU

Feb. 2020 – Aug. 2021

Undergraduate Research Assistance with Prof. Kuo-Shen Chen

Tainan, Taiwan

- Researched on the system identification of electro-mechanical and the fault characterizations of the solenoid control unit valves in the Anti-lock Braking System (ABS) module.
- Parameterized the systems of ABS, and implemented parameter-adjustable ABS system based on the eletro-mechanical transducer model.
- Published an international conference paper on ICIAE, 2019 (DOI:10.12792/iciae2021.012.)

Syntec Technology Corporation

June 2019 – Aug. 2019

Robotics Engineer, R&D department, full-time summer intern

Hsinchu, Taiwan

- Designed path planning strategies of six-axis robot arm using inverse dynamics theory, human-machine interfaces of controller that monitors automatic metal straw production process using the PLC; enhanced productive efficiency by 20%.
- Presented project at 2019 Taipei International Machine Tool Show, the largest industrial exhibition in Taiwan attended by over 1,000 domestic and foreign exhibitors every year.

Publications

- **S. Hung***, T.J. Schoonbeek*, D. Lehman, J. Kustra, P. H. N. de With, and F. van der Sommen, "KeyStep: Procedure Step Recognition based on the Spatio-Temporal Features of Egocentric Assembly Videos", manuscript submitted to the IEEE/CVF Winter Conference on Applications of Computer Vision, 2025
- D. Lehman*, T.J. Schoonbeek*, **S. Hung**, J. Kustra, P. H. N. de With, and F. van der Sommen, "Find the Assembly Mistakes: Error Segmentation for Industrial Applications", In European Conference on Computer Vision workshop, 2024
- T.J. Schoonbeek, G. Balachandran, H. Onvlee, T. Houben, **S. Hung**, J. Kustra, P. H. N. de With, and F. van der Sommen, "Supervised representation learning towards generalizable assembly state recognition", In IEEE Robotics and Automation Letters, 2024. (DOI:10.1109/LRA.2024.3468157)

Selected Projects

Nonlinear Optimization final project on object classification | *MATLAB, Optimization theory* **Oct. 2022**

- Recognized, and fitting the ellipse in arbitrary digital image using the constrained optimization theory, and mix-integer linear optimization.
- Implemented the image processing algorithm on the MATLAB.

The 2021 Waymo Open Dataset Challenge | *Python, Pytorch, Deep learning* **July 2021**

- Trained a YOLOv4 model for real-time autonomous car's 2D object detection; the trained model runs faster than 70 ms/frame on a Tesla V100 GPU, and model's average precision (mAP) was over 50%.

Formula SAE Japan 2020 Electric Vehicle | *Electrical system design, PCB design, C/C++* **Sept. 2019 – Aug. 2020**

- Directed overall designs of electrical system; collaborated with other teams that designed car's other subsystems.
- Developed battery management system (BMS) firmware in C; built communication system between ECU, sensors, and motor controller via CAN bus protocol; designed the PCB layout of low voltage system using Altium Designer.

Graduation Team Project | *C/C++, Arduino, Inverse Dynamics, SolidWorks* **Jan. 2019 – June 2019**

- Won the gold medal in the Competition, got the highest grade of all department.
- Designed an object gripping robot arm with Omni wheels and an AGV to transport mechanical components.
- Implemented moving algorithms for palletizing robot arms and Omni wheels; applied the Dijkstra algorithm for route planning.

Awards & Certifications

- 2019 Gold Medal in graduation team project competition
- 2018 National Electric Vehicle Innovation Design and Construction Competition: Second Place in dynamic Section, Third Place in technical report section.

Leadership & Extracurricular Activities

National Cheng Kung University Formula Racing Student Team **Sept. 2017 – Aug. 2020**

Team member (first year) and Group Lead of Electrical System (second and third year)

Tainan, Taiwan

- A student team with over 50 students, designed and manufactured electric racing car.
- Lead 6 group members, designed the electrical subsystem.

National Cheng Kung University, Departmental Basketball Team **Sept. 2016 – Aug. 2019**

Team member, position: Power Forward

Tainan, Taiwan

- A student sport team with over 50 students, trained 10 hours per week, and participated in 6 tournaments.

Academic Team, Student Association of Mechanical Engineering Department **Sept. 2018 – Sept. 2019**

President

Tainan, Taiwan

- Arrange laboratory visiting, enterprise visiting, seminar for students to explore their career, research interests.

Technical Skills

Domain Knowledge: Computer vision, video understanding, machine learning & deep learning, signal processing algorithm

Languages: Mandarin (mother tongue), English

Programming Languages: Python, C/C++, MATLAB, Julia, L^AT_EX, PLC

Developer Software platform:

- AI framework: PyTorch, TensorFlow, Keras
- AI tool: Cursor, Github Copilot, Claude
- Electrical system design: PSpice, Altium Designer
- Modeling: Solidworks, Ansys, Labview, Simulink
- Other skills: Git, Docker, Bash scripting