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Tsung-Yuan Tseng

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Education

RWTH Aachen University Germany Oct. 2020 - Present
Master of Science in Robotic Systems Engineering

National Tsing Hua University Taiwan, R.O.C. Sept. 2014 - June 2018
Bachelor of Science in Power Mechanical Engineering

- **Department Ranking:** 7/97
- **GPA:** 3.90/4.3 (3.81/4.0)

Research Experience

Robot-Assisted Photo Reminiscence Advanced Control Lab July 2020 - Sept. 2020
Advisor: Prof. Li-Chen Fu

- Presented a novel implementation of a reminiscence companion robot, which uses Artificial Intelligence-based Image Understanding techniques to proactively drive the reminiscence process in social interactions with elderly users.
- Designed and trained the Image Understanding module based on All-Age-Faced Dataset to aim at Asian people as target users.

Intelligent Lower-Limb Exoskeleton Dynamic Systems and Control Lab Feb. 2017 - Jan. 2018
Advisor: Prof. Ting-Jen Yeh

- Pioneered an assistance device featuring with four-bar linkage prosthetic knee that fits the paths specified by the wearer. The robotic system can successfully visualize recorded motions in 3D space and provide gait training.
- Accomplished an observer-based sensor fusion algorithm that uses the outputs from a 6-axis inertial measurement unit to estimate the ground-truth joint angles.
- Successfully learned the relation between surface electromyography(sEMG) signals from lower-limb muscles and angular configurations of the knee joints by training Recurrent Neural Network, thus estimating the wearer's body's motions.

Project Experience

Machine Learning
Advisor: Prof. Da-Cheng Juan
Topic: A Deep Visual-Semantic Embedding Model Sept. 2017 - Jan. 2018

- Trained a linear transformation from pre-trained visual embedding to pre-trained text embedding.
- Used cifar100 as data set and implemented Convolution Neural Network and Residual Network as a visual model.
- Improved classification accuracy by **20.3%**.

Mechatronics Program Design
Advisor: Prof. Wei-Tai Lei
Topic: Computer Numerical Control Software for a three-axis robotic manipulator Sept. 2017 - Jan. 2018

- Successfully drived the robot arm to performed point-to-point positioning and linear/circular path motion.
- Designed program modules including Graphic User Interface(GUI), Interpolator(INTP), Decoder(DEC), Data Link Interface(LINK) and Kinematic Transformation(TRAFO).
- Accomplished a method of state machine to synchronize transition conditions and processes in difference modules.

Digital Control System
Advisor: Prof. Ting-Jen Yeh
Topic: Motor Position Control Sept. 2017 - Jan. 2018

- Achieved a position control system whose performance meets the requirement of specification.
- Implemented a PID controller and the hall sensor decoder in a FPGA hardware.

Robotics
Advisor: Prof. Ting-Jen Yeh
Topic: Mobile Soccer Robot Feb. 2017 - June 2017

- Designed the gripper mechanism with parallelogram linkages featuring with a larger workspace.
- Designed the route planning algorithm that drives the mobile robot to grip the ball to the goal.

Work Experience

Robotics Software Engineer Chieftek Precision Co., Ltd. Taiwan Sept. 2019 - June 2019

- Independently developed a motion simulator of robotic manipulators that can help detect collisions and visualize motions.
- Combined left-children right-sibling tree data structure and DH convention, and utilized preorder traversal algorithm to draw and display assemblies.
- Invented Single-Axis Dragging algorithm to operate joint space motion of a six-axis arm through simple click-and-drag.
- Invented the **patent-pending** 6 DoFs interactive marker and the build-in algorithm, allowing user to manipulate the end-effector position and orientation of a six-axis arm effectively and intuitively.
- Accomplished Damped-Least Squares method to solve the Inverse Kinematics problem numerically.

R&D Engineer LEISO Co., Ltd. Taiwan July 2018 - Jan. 2019

- Pioneered a patent-pending product called Ball Bar Box(BBB) with Dr. Wei-Tai Lei. BBB is a measurement system with an accuracy of +/-2 um and can be used to measure motions errors of multi-axis machine tools and robotic manipulators.
- Developed a measurement procedure that can decrease the measurement errors to the minimum.
- Designed the mechanical components, the detailed mechanisms, and the measurement software of BBB.

R&D Intern LEISO Co., Ltd. Taiwan Mar. 2018 - June 2018

- Independently achieved the software that schedules a measuring procedure of a robotic manipulator, helping users generate optimal test paths for the measurement of DH parameters of a robotic arm.
- Visualized the measurement procedure based on optimal test paths with OpenGL.
- Increased the efficiency of the measuring procedure by **fifteen times** with the help of the software.

Honors

- **Undergraduate Research Competition:** Won the first place out of 40 teams and prize money $1283 USD. R.O.C.
- **Academic Achievement Awards of National Tsing Hua University:** Ranked among top five percent. R.O.C.
- **Mobile Robot Contest:** Received 4th place out of 12 teams. R.O.C.
- **Great Academic Scholarship:** Hua-Yen scholarship $323 USD, Peng Wenmin scholarship $323 USD. R.O.C.

Skills

- **Programming Languages:** C, C++, C#, Python, Matlab, Verilog, LaTex.
- **Software:** Visual Studio, TensorFlow, OpenGL, Bullet Physics, AutoCAD, Autodesk Inventor, SolidWorks.
- **Others:** Computer Numerical Control(CNC), GUI Design, MCU, IMU, FPGA, Git, GitHub, ROS(Robot Operating System).
- **TOEFL MyBest Scores:** 104/120 (R:29/30, L:26/30, S:22/30, W:27/30)
- **GRE Test Scores:** 322/340 (Q:170/170, V:152/170, AW:3.0)

Additional Experience

- Member of Varsity Baseball Team: Won the 4th place out of 80 teams in the 2018 University Baseball League.
- Vice coordinator of ASME SPDC 2017 Contest: Scheduled the event.
- Volunteer of 2017 College Life Summer Camp: Organized the camp.
- Officer of Public Relations Department of Student Association: Planned the christmas party.