CHANG-WEN (ERNIE) WANG

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Education

M.S., *Dept. of Electrical Engineering, National Cheng Kung University (NCKU), Taiwan* 2020-2022
B.S., *Dept. of Electrical Engineering, National Cheng Kung University (NCKU), Taiwan* 2016-2020
GPA 3.6/4.3

Research

Research interests: Robotics, System Engineering, Manipulator Trajectory Planning

Robot Grasping Estimation Using Attention Mechanism — Sep. 2021-Now
- Extracting basic geometries from point cloud to match target outline using attention mechanism
- Evaluating grasp position and validating with an 11 DoFs self-designed bio-hand with 5 fingers

A Collision-free Trajectory Planning Policy for Multiple DoFs Manipulators — Jan.-Jun. 2022
- Improved the Forward and Backward Repeat Inverse Kinematics into collision-free and orient considered algorithm
- Invented an online arm control algorithm that considers obstacles with linear complexity
- Proven workable on manipulators with DoFs from 5 to 7 in a real-world environment

SCARA Control System — Jan.-May 2021
- Programmed SCARA to move in a specific orientation and speed with Jacobian controller

Publications

[1] Y. -T. Su et al., "A Fully Automatic Calibration for Vision-Based Selective Compliance Assembly Robot Arm and Its Application to Intelligent Wafer Inspection Scheduling," in IEEE Access, vol. 10, pp. 50100-50113, 2022.

Relevant Coursework

Graduate	Introduction to Neural Network, Machine Learning, Principle of Robotics, Practical Linear Programing Theory and Applications, Visual Servoing System, Fundamental System Engineering, Image Processing
UnderGrad	Introduction of Computer Science, Linear Algebra, Operation System, Graph Theory, Single Chip System Design and Application, Introduction to Software Engineering, Computer Algorithm, Control Engineering

Skills

Advanced: C++ | *Intermediate* : Python, Robot Operating System | *Basic*: CMake, MatLab, SolidWork, JavaScript

Projects

Robot system design & arm control, Humanoid robot - John — Jan.-May 2022
- Designed the robot system structure based on Robot Operating System (ROS) on Nvidia Xavier NX
- Developed the collision-free manipulator controller for 5 DoFs arm

Robot control system developer, Rescue robot system - Debris Walker — Oct. 2019-Apr. 2020
- Built the robot to search and locate victims automatically in debris
- Designed an ad hoc network to notify rescuers and release network nodes if signal strength were weak
- Enabled real-time trajectory optimization on Nvidia Jetson nano

Robot system designer, Androsot, Federation of International Robot-Sport Association — Feb.-Aug. 2019
- Built a multi-robot system to play soccer games without human assistance
- Designed a low-cost communication system to reduce the communication time up to 80% of the wifi-based one
- Upgraded the robot control system to reduce robot response time with safe interrupts

System developer, Somatosensory musical instrument - Fising — May-Jul. 2019
- Built the sensory components to detect the action of the user.

Creator, Mock Wireless Ad Hoc Rescue Network — Nov. 2018-Jan. 2019
- Engineered network nodes to self-locate and pass data through other nodes to prevent signals from being blocked
- Designed the algorithm to detect and localize newly joined nodes freely to expand the covered area
- Assembled a system to justify the effectiveness with 5 concept prototypes

Front, backend developer, Tele Rehabilitation System - TRESY — Jun.-Nov. 2018
- Developed a system to construct human 3D motion from 2D images
- Integrated human joint mapping algorithm and designed the user frontend

Proposer, Quadcopter With Hand Motion Controller — Jan.-Aug. 2017
- Invented a somatosensory controller for the quadcopter to react to hand motions
- Improved the UX of the controller to be more ergonomic when controlling

Work Experience

Advisor of Physics Society, Tainan First Senior High School, Taiwan — Mar. 2020-Jun. 2022
- Advised content of courses and experiments to make the class more entertaining and inspiring
- Delivered an introductory course for beginners to control LEDs with Arduino and physic buttons
- Instructed a develop team of quadcopter flight control and power system

Leader Experience

Team leader, Debris Walker — Oct. 2019-Apr. 2020

- Organized and scheduled milestones in a team of 3 undergrads in electrical engineering and 1 in Engineer Science
- Coordinated and arbitrated between software and hardware designs

Organizer, Androsot, Federation of International Robot-Sport Association — Feb.-Aug. 2019

- Designed the system structure and schedule milestones in a team of 5 electoral engineering undergrads students

Awards and Honors

Second Place in Best Student Award
- International Conference on Advanced Robotics and Intelligent System — Aug. 2022

- Chosen among 91 papers called worldwide, mostly in Taiwan

Honorable Mention in Best Master's Thesis Award - Robotics Society of Taiwan — Aug. 2022

- Equivalent to third place, following two special awards

Three Champion in Androsot competition - Federation of International Robot Sport Association — Aug. 2019

- Competed with 11 other international teams, including Korea, Taiwan, and Mexico
- Outperformed other teams in all tournaments, namely 2 soccer challenges and a 3 vs 3 formal soccer game series

Honorable Mention in Arm Design Contest - Arm Taiwan — Nov. 2018

- Led a three-member team to construct human 3D motions from 2D images, which ranked top 10 among 150 teams

Interests

Badminton, Baseball, Playing Guitar, Watching Movies, and Being a Maker