Jen-Wei Wang

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EDUCATION

National Taiwan University, Taipei, Taiwan Sep 2017 - Dec 2019
Master of Science in Mechanical Engineering
Thesis Topic: Robot Grasping in Clutter using Instance Segmentation and Representation Learning [Video]
Research areas: perception for grasping and manipulation, deep learning in robotics and automation
Overall GPA: 4.0/4.0, Thesis Defense: A+
Relevant Coursework: Digital Visual Effects (A+), Machine Learning and Having It Deep and Structured (A+), Machine Learning (A+), Algorithms (A), Computer Networks (A+), Advanced Kinematics (A+)

National Taiwan University, Taipei, Taiwan Sep 2013 - June 2017
Bachelor of Science in Mechanical Engineering
Overall GPA: 3.79/4.0, Upper-division GPA: 3.89/4.0
Relevant Coursework: Introduction to Robotics, Intermediate Dynamics, System Dynamics, Digital Control System, Automatic Control, Applied Electronics, Data Structure and Programming, Scientific Computing

PUBLICATIONS

T.-I. Chen, **J.-W. Wang**, W. H. Hsu, "Towards Automatic Adaption for Object Detection by Interactive Perception," in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021. **Under Review.** [PDF] [Video]

K.-J. Wang, Y.-H. Liu, H.-T. Su, **J.-W. Wang**, Y.-S. Wang, W. H. Hsu, W.-C. Chen, "OCID-Ref: A 3D Robotic Dataset With Embodied Language For Clutter Scene Grounding," in Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL), 2021. [Video]

J.-W. Wang, C.-L. Li, J.-L. Chen, J.-J. Lee, "Robot Grasping in Dense Clutter via View-Based Experience Transfer," in International Journal of Intelligent Robotics and Applications, 2021. [PDF] [Video]

K.-Y. Jeng, Y.-C. Liu, Z. Y. Liu, **J.-W. Wang**, Y.-L. Chang, H.-T. Su, W. H. Hsu, "GDN: A Coarse-To-Fine (C2F) Representation for End-To-End 6-DoF Grasp Detection," in Conference on Robot Learning (CoRL), 2020. [arXiv] [Video]

J.-W. Wang, Y.-S. Chiang, J. Chen, H.-H. Hsu, "Development of a Dung Beetle Robot and Investigation of Its Dung-Rolling Behavior," in MDPI Inventions, no. 3, p. 22, 2018. [PDF] [Video]

J. Chen, **J.-W. Wang**, H.-H. Hsu, Y.-S. Chiang, "Design and implementation of a dung beetle robot," in IEEE International Conference on Advanced Robotics and Intelligent Systems (ARIS), p. 24, 2017. [PDF]

RESEARCH EXPERIENCE

Learning 6-DoF Task-Oriented Grasping for Manipulation Tasks July 2020 – Present
Communications and Multimedia Laboratory, CSIE Dept., National Taiwan University

- Achieved robotic assembly tasks by developing an algorithm that can detect 6-DoF grasps and planned a series of actions, such as grasping and re-grasping, based on the subsequent task
- Built a novel end-to-end 6-DoF grasp detector that is twenty times faster and more accurate than previous end-to-end learning-based approaches on unseen cluttered objects [Video]
- Demonstrated online few-shot learning in 2020 Taiwan Innotech Expo where a robotic arm firstly picks up an unseen object in front of a camera and an object detector can be improved according to the new captured image [Video]
- Proposed a referring algorithm that can reason about spatial information in human's instructions and help robotic arm grasp the correct object [Video]

Robot Grasping in Dense Clutter via View-Based Experience Transfer [Video] Sep 2017 – Dec 2019
Machine and Mechatronics Design Laboratory, ME Dept., National Taiwan University

- Proposed a novel learning-based approach that can detect precise and accurate grasps on dense clutter scene based on noisy RGB-D image and outperformed previous end-to-end learning-based approaches on bin-picking tasks

- Determined the best grasp that can avoid collision and resist any unexpected interference during the grasping process
- Led a team of 3 people to implement the algorithm on a system consisted of the robot arm with a two-jaw parallel gripper and Kinect V2
- Collaborated with LNC Technology, an automation company in Taiwan, for demonstrating random bin picking at 2019 Taiwan Automation Intelligence and Robot Show

Development of Dung Beetle Robot [Video] and Inchworm Robot [Video] Jan 2016 – Aug 2017
Bio-inspired Robotics Laboratory, ME Dept., National Taiwan University

- Led a team of 4 people to model the dung-rolling behavior of dung beetle and developed corresponding dung beetle robot that can reliably roll a ball
- Discovered that the critical function of dung beetle's middle legs is to avoid the dung to spin and move sideways during the rolling process and ensured the synchronization of the rolling force on both sides of a dung
- Designed trajectories and gait of each leg by observing how dung beetles synchronize their legs during the dung-rolling motion
- Optimized the execution time of inchworm robot for wall-climbing and enhanced the speed of the movement by 60%

HONORS AND AWARDS

Gold Medal (First Place) in HIWIN Master's Thesis Award, HIWIN

- Presented the research in robot grasping at the competition held by HIWIN
- Ranked 1st out of 100 researches and awarded 35K USD

Best Presentation Paper Award, IEEE International Conference on Advanced Robotics and Intelligent Systems (ARIS)

- Presented research about dung beetle robot on ARIS and received compliments from the committee members

Gold Medal (First Place) in SPINTECH Technology Thesis Award, SPINTECH

- Presented the research in dung beetle robot and ranked 1st out of 22 teams at the competition held by SPINTECH

WORKING EXPERIENCE

Industrial Technology Research Institute (ITRI), Hsinchu, Taiwan July 2018 – Sep 2018
Internship, Department of Intelligent Machinery & Robot

- Designed an image processing algorithm that can detect black and white stones on the chessboard
- Helped robot play five-in-a-row with human by adopting minimax algorithm and alpha-beta pruning

Test Research, Inc. (TRI), Taipei, Taiwan July 2016 – Aug 2016
Internship, Department of Optical Mechanism

- Developed a pick-and-place system that can help robot arm place chips onto different plates after AOI machine defined the chips as either normal or defective ones
- Designed a system consisted of robotic arm and CCD that can detect defects on laptop

COURSE PROJECTS

Reinforcement Learning for Playing Pong and Breakout Game Feb 2018 – June 2018
Machine Learning and having it deep and structured (MLDS), National Taiwan University

- Discovered that Actor-Critic (AC) model is more stable than Policy Gradient (PG) model and Deep Q Network (DQN) during the training process and can score high in both Pong and Breakout game

3D Stereo Reconstruction Feb 2018 – June 2018
Digital Visual Effects (VFX), National Taiwan University

- Reconstructed depth map from two RGB images by implementing stereo matching algorithm

SKILLS

Programing: C/C++, Python, MATLAB, Lua
Toolkit: ROS, Tensorflow, Pytorch, Keras, OpenCV, Git, Solidworks, AutoCad, Microsoft Office
Languages: Mandarin (Native Speaker), English (Fluent)