

# YUNZHI LIN

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## SUMMARY

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I am an ECE Ph.D. candidate at Georgia Tech, specializing in integrating computer vision with robotics to address real-world challenges. My expertise includes 6-DoF object pose estimation, object grasping, and human-robot interaction, enriched by collaborations with NVIDIA Research and Meta FAIR.

## RESEARCH INTEREST

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- Computer Vision: Object Pose Estimation, Object Pose Tracking, Keypoint Tracking, Neural Radiance Field
- Robotics: Object Grasping, Robot Manipulation, Robot Simulation, Human-Robot Interaction

## ACADEMIC EXPERIENCE

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- **Georgia Institute of Technology** *Atlanta, USA 08/2018 - Present*  
*Ph.D. Candidate & M.S. in ECE*
- **University of Alberta** *Edmonton, Canada 09/2017 - 12/2017*  
*Research Intern in Applied Nonlinear Control Lab*
- **Southeast University** *Nanjing, China 09/2014 - 06/2018*  
*B.E. in Automation, Overall GPA: 3.86/4.0 (Rank: 3/104)*

## INDUSTRY EXPERIENCE

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- **Meta AI** *Menlo Park, USA 05/2023 - 11/2023*  
*Research Intern, Advisor: Kevin Liang, Yipu Zhao, Fu-Jen Chu, Matt Feiszli*  
*Ego-HowTo Team, FAIR Accel*
  - ◇ **Generalized Object Pose Tracking**
    - Developed a streamlined pipeline combining video segmentation, uncertainty-aware keypoint refinement, and structure from motion, effectively tracking 6-DoF poses from short-term monocular RGB video
    - Generated a large-scale photo-realistic synthetic dataset of 40K clips (4M frames) using BlenderProc2, including RGB/depth/mask/normal/pose annotations, facilitating object pose tracking in dynamic settings
- **NVIDIA Research** *Atlanta, USA 05/2022 - 12/2022*  
*Research Intern, Advisor: Thomas Müller, Jonathan Tremblay, Stan Birchfield*  
*Learning and Perception Research Group*
  - ◇ **Neural Radiance Fields for Robust Pose Estimation (ICRA 2023)**
    - Developed a parallelized, momentum-based optimization method using NeRF models to estimate 6-DoF poses from monocular RGB input
    - Achieved improved generalization and robustness on both synthetic and real-world benchmarks, improving the percentage of pose error less than 5 degrees or 0.05 units threshold over 40%
- **NVIDIA Research** *Atlanta, USA 05/2020 - 05/2021*  
*Research Intern, Advisor: Jonathan Tremblay, Stephen Tyree, Stan Birchfield*  
*Learning and Perception Research Group*
  - ◇ **Category-level Object Pose Estimation (ICRA 2022 & Patent US20220277472A1)**

- Developed a keypoint-based RGB-only 6-DoF and size pose estimator for category-level objects
- Integrated into [NVIDIA Isaac Robot Operating System (ROS)]
- ◇ **Category-level Object Pose Tracking (ICRA 2022 & Patent US20240005547A1)**
  - Extended to support robust object pose tracking with uncertainty estimation
  - SOTA results on the Objectron benchmark, improving average precision at 0.5 3D IoU from 72% to 80%
- ◇ **Multi-level Scene Understanding (IROS 2021 & Patent US20220068024A1)**
  - Proposed a multi-level robotic scene understanding system, including dense 3D reconstruction, shape estimation and fitting of objects with primitive shapes, and full 6-DoF pose estimation of known object instances

## RESEARCH EXPERIENCE

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- **Georgia Institute of Technology** *Atlanta, USA 06/2021 - 12/2022 & 02/2019 - 05/2020*  
*Research Assistant, Advisor: Patricio A. Vela*  
*Intelligent Vision and Automation Laboratory*
  - ◇ **Human-Robot Interaction: Playing Jigsaw Puzzles with A Robot (NSF Funding [#2026611])**
    - Developed a human-robot system that allows a robot to interact and play jigsaw puzzles with human players
    - Created a cost-effective robot platform (\$1K) with RealSense D415 and Dynamixel servomotor
  - ◇ **Object Grasping via Primitive Shapes (ICRA 2020)**
    - Developed an automated strategy to generate primitive shape data in the V-REP simulation
    - Designed a grasping pipeline that segments objects from depth input, identifies optimal shape parameters through shape fitting, and selects and executes the most feasible grasp
    - Achieved over 93% success rate on static grasping task using a 7-DoF robotic arm

## HONORS AND AWARDS

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- NVIDIA Patent Award (3x), NVIDIA Corp. *04/2021-03/2022*
- Outstanding Graduates (top 5%), Southeast University *06/2018*
- National Undergraduate Exchange Scholarship, China Scholarship Council *06/2017*
- National Scholarship (top 3%), Southeast University *09/2015*

## SKILLS

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- **Programming Languages:** C/C++, Python, Matlab
- **Softwares & Tools:** OpenCV, V-REP, ROS, Caffe, TensorFlow, PyTorch