Tony Qin
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Education

- **The University of North Carolina at Chapel Hill** — Chapel Hill, NC
  PhD in Computer Science (Robotics) — *Aug. 2022 – May 2028 (expected)*
  - Advisor: Ron Alterovitz
  - Research Interests: Motion Planning, Design Optimization, Surgical Robots
- **Carnegie Mellon University** — Pittsburgh, PA
  B.S. in Artificial Intelligence, GPA: 4.0/4.0 — *Aug. 2018 – May 2022*

Experience

- **UNC Computational Robotics Lab** — Chapel Hill, NC
  PhD Candidate — *Aug. 2022 – Present*
  - **Reinforcement Learning**: Trained a GNN-based PPO agent for sampling-based motion planning, utilizing cost-effective remote training pipelines on RunPod cloud GPUs.
  - **Planning & Kinematic Modeling**: Engineered a high-performance C++ motion planner for a 6-DoF continuum robot, achieving 3k collision-free nodes/second per CPU core for complex anatomical environments.
  - **Design Optimization**: Optimized robot design to maximize end effector dexterity using multi-objective Bayesian optimization, achieving 36% higher dexterity compared with a generic design.
  - **Medical Image Pipeline**: Transformed colon CT scans using computationally efficient image processing algorithms to guide surgical robot design and motion planning across multiple patient anatomies.
- **CMU CyLab Biometrics Center** — Pittsburgh, PA
  Undergraduate Research Assistant — *May 2021 – Aug. 2021*
  - **Object Detection**: Trained computer vision models including Faster R-CNN, RetinaNet, and ATSS to detect people and objects from satellite images as part of a DARPA project.
- **PPG Industries** — Pittsburgh, PA
  Data Science Intern — *June 2020 – August 2020*
  - **Color Matching Model**: Trained a deep learning model using PyTorch to automate the generation of complex paint formulas, improving accuracy by 10% compared with the previously used linear regression model.
  - **PyQt GUI**: Developed and deployed a custom GUI via PyQt, enabling non-technical color scientists to interface with the deep learning model for color matching.
  - **Performance Recognition**: Received a return offer based on the novel application of deep learning methods to predict paint formulas at PPG Industries and its potential to significantly reduce manual laboratory trials.
- **U.S. Army Reserve** — Various Locations
  Military Intelligence Officer — *May 2022 – Present*
  - **Company Executive Officer**: Led an organizational turnaround of a 75-person company through data analytics and strategic planning, improving company standing from 17th/21st to 1st/21st within the brigade.
  - **Basic Officer Leader Course**: Graduated on the Commandant's List, top 20% of attending officers.
  - **French Linguist**: Third place (officer category) in the 2025 DoD Best Linguist competition; winning team in the 2024 competition.

Selected Publications

- **International Conference on Robotics and Automation (ICRA) 2026 (submitted)**: **Qin, T.** *et al.* "Anatomy-Aware Dexterity-Driven Design Optimization of Surgical Continuum Robots."
- **International Conference on Robotics and Automation (ICRA) 2025**: Connor, P., Hatch, C., Dang, K., **Qin, T.** *et al.* "A System for Endoscopic Submucosal Dissection Featuring Concentric Push-Pull Manipulators."
- **Hamlyn Symposium on Medical Robotics (HSMR) 2023**: **Qin, T.** *et al.* "Computational Analysis of Design Parameters for a Bimanual Concentric Push-Pull Robot."

Technical Skills

- **Languages**: C++, Python, C, JavaScript
- **Libraries**: PyTorch, Stable Baselines3, PyG, BoTorch, NumPy, Matplotlib, Eigen, VTK, ITK, ROS 2, OMPL
- **Tools**: Git, Docker, RunPod, CMake, Weights & Biases, Blender
- **Security Clearance**: Active DoD TS/SCI