# Arpit Agarwal

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| **RESEARCH INTEREST** | Reinforcement Learning, Tactile sensing, robotic manipulation, robotics simulation and robotic control |

**INDUSTRIAL EXPERIENCE**

**Dexterity**, Accelerated Computing — Redwood City, California
Robotics Engineer III — Jul 2024 – Ongoing
- Focused on building GPU-first Reinforcement Learning pipelines for efficient robotic manipulation for product-focused robotics
- Part of Accelerated Computing and Motion Planning team, focused on developing GPU algorithms for efficient robotic manipulation for solving industrial applications
- Accelerated Deep Learning inference for robotic vision for real-time applications

**NVIDIA**, Project Isaac — Pittsburgh, Pennsylvania
AI/ Robotics Engineer — Jul 2018 – Aug 2019
- Part of Simulation technology Robotics team, focused on sim-to-real transfer using Reinforcement learning and optimal control
- Focused on developing dynamic control algorithms for legged locomotion and robotic manipulation.
- Contributed to early version of Isaac Gym, tool for accelerating robotic simulation for prototyping robotic algorithms.

**Intel**, Data Center AI — Santa Clara, California
Rendering Research Internship — May 2023 – Aug 2023
- Part of GPU research group on advanced graphics
- Focused on applying machine learning techniques to physics-based rendering

**EDUCATION**

**Carnegie Mellon University**, School of Computer Science — Pittsburgh, Pennsylvania
PhD in Robotics Engineering — 2019 – July 2024
- Focus : Robotic manipulation; tactile sensing; Computer Graphics
- **PhD Thesis**: A Modularized Approach to Vision-based Tactile Sensor Design Using Physics-based Rendering
- Build simulation pipeline for vision-based tactile sensors using physics-based light transport simulation
- Experience with Mitsuba (0.6, 2.0, 3.0) framework and cuda backend
- Have experience with Nvidia OptiX 7.0 raytracing API
- Have experience in modelling and characterizing appearance models (BRDF) of metal pigments in real world using computational imaging

**Carnegie Mellon University**, School of Computer Science — Pittsburgh, Pennsylvania
M.S. in Robotics Engineering — Aug 2016 – Jul 2018
- Cumulative GPA: 4.04 / 4.0
- **Masters Thesis**: Deep Reinforcement Learning with Skill Library: Exploring with Temporal Abstractions and coarse approximate Dynamics Models [pdf]
- Courses Taken: Planning, Reinforcement Learning, Computer vision, Machine learning(PhD), KDC.

**Indian Institute of Technology Kanpur** — Kanpur, India
B.Tech. in Electrical Engineering — Jun 2012 – May 2016

**PUBLICATIONS**

- Vision-based tactile sensor design using physically based rendering Journal Nature Communications Engineering
  **Arpit Agarwal**[1], Achu Wilson[1], Timothy Man[1], Edward Adelson[3], Ioannis Gkioulekas[1], Wenzhen Yuan[2]
  **Affiliations**: 1 - Carnegie Mellon University, 2 - UIUC, 3 - MIT

- A Modularized Design Approach for GelSight Family of Vision-based Tactile Sensors International Journal of Robotics Research
  **Arpit Agarwal**[1], Amin Mirzaee[2], Xiping Sun[2] and Wenzhen Yuan[2]
  **Affiliations**: 1 - Carnegie Mellon University, 2 - UIUC

- Scalable, Simulation-Guided Compliant Tactile Finger Design
  International Conference on Soft Robotics 2024
  Yuxiang Ma[3,*], **Arpit Agarwal**[1,*], Sandra Q. Liu[3,*], Wenzhen Yuan[2], Edward Adelson[3]
  **Affiliations**: 1 - Carnegie Mellon University, 2 - UIUC, 3 - MIT
  - Authors contributed equally

- Robotic Defect Inspection with Visual and Tactile Perception for Large-scale Components [Pre-print]
  International Conference on Intelligent Robots and Systems 2023
  **Arpit Agarwal**[1], Abhiroop Ajith[2], Chengtao Wen[2], Veniamin Stryzheus[3], Brian Miller[3], Matthew Chen[3], Micah K. Johnson[4], Jose Luis Susa Rincon[2], Justinian Rosca[2] and Wenzhen Yuan
  **Affiliations**: 1 - Carnegie Mellon University, 2 - Siemens Corporations, 3 - Boeing, 4 - GelSight Inc.

- Simulation of Vision-based Tactile Sensors using Physics based Rendering [IEEE Xplore]
  International Conference on Robotics and Automation 2021
  **Arpit Agarwal**, Timothy Man and Wenzhen Yuan

- Grasp Stability Prediction with Sim-to-Real Transfer from Tactile Sensing [Pre-print]
  International Conference on Intelligent Robots and Systems 2022
  Zilin Si, Zirui Zhu, **Arpit Agarwal**, Stuart Anderson and Wenzhen Yuan

- Improving Grasp Stability with Rotation Measurement from Tactile Sensing [Pre-print]
  International Conference on Intelligent Robots and Systems 2021
  Raj Kolamuri, Zilin Si, Yufan Zhang, **Arpit Agarwal** and Wenzhen Yuan

- Model Learning for Look-ahead Exploration in Continuous Control [Pre-print]
  AAAI Conference on Artificial Intelligence 2019 **(Oral Presentation)**
  **Arpit Agarwal**, Katharina Muelling and Katerina Fragkiadaki

- Reinforcement Learning of Active Vision for Manipulating Objects under Occlusions[PDF]
  Conference on Robot Learning, 2018
  Ricson Cheng, **Arpit Agarwal** and Katerina Fragkiadaki

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| **OTHER RESEARCH EXPERIENCE** | **Cornell University** |

- Graduate Research Scholar, Computer Science Department          May 2015 – Jul 2015
  - **Supervisor**: Ashutosh Saxena, Caspar.ai
  - Learning natural language grounding to robot instructions and user-context aware planning in home settings
  - Focus: Learning, Natural Language Processing, Planning
  - **RaQuel: Robot Query Language**, target robotic language using functional programming contructs for getting information from RoboBrain Demo
  - Focus: Functional programming, cloud robotics, database systems

**CONFERENCE REFEREEING**   IROS 2018, 2019, Humanoids 2018 and ICRA 2018, 2020, 2021, RAL 2022, 2023

**COMPUTING SKILLS**

**Robots**: Kinova **Jaco 2** (7 DoF robotic arm), Ghost Robotics **Minitaur** (4 Legged dynamic UGV), Rethink Robotics **Baxter** (7 DoF manipulator arm)
**Deep Learning Frameworks:** PyTorch
**Computing Languages:** C++, Python, ROS, Matlab, OpenCV, PCL
**Operating Systems** Windows, Linux(Ubuntu)
**Utilities** Git, LaTeX