

Arkadeep Narayan Chaudhury

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4225 Newell-Simon Hall, 5000 Forbes Avenue
Carnegie Mellon University, Pittsburgh, PA, ZIP: 15232

EDUCATION

Carnegie Mellon University

MS + PhD in Robotics

Pittsburgh, PA

Aug. 2020 – Mar. 2024 (expected)

Carnegie Mellon University

PhD in Mechanical Engineering

Pittsburgh, PA

Aug. 2018 – Aug 2020 (transferred to the RI)

Indian Institute of Science

Master of Science in Mechanical Engineering

Bangalore, India

Aug. 2015 – Dec. 2017

Indian Institute of Engineering Science and Technology

Bachelor of Engineering in Mechanical Engineering

Shibpur, India

Jul. 2011 – May 2015

EXPERIENCE

Toyota Research Institute

Research Scientist Intern

Los Altos, CA

May. 2023 – Aug. 2023

Team:

ML @ TRI

Physically based 3D representations: Researched algorithms on physically based capture of 3D assets for robotics. Designed and deployed a robot mounted multi-flash camera rig to capture multi-modal data from small objects in bounded scenes.

Atkeson Lab, CMU RI

Graduate Research Assistant

Pittsburgh, PA

Nov. 2019 – Present

Advisor:

[Prof. Christopher Atkeson](#)

Thesis topic:

Active Sensing for Manipulation

Moving cameras: Developed an ensemble of collocated vision, depth and touch sensors and a set of algorithms to visually servo robots to workspace goals and localize objects through vision and touch. [IEEE RA-L '22 Link](#)

Moving lights: Designed and implemented a robot workspace scale photometric stereo setup for object agnostic, surface texture, surface orientation, and surface deformation perception. [In sub. WACV'24](#)

Moving lights and camera: Designed and implemented a robot mounted multi-flash camera for object agnostic, surface texture, geometry perception. In prep. for CVPR'24

CI2CV Lab, CMU RI

Graduate Research Assistant

Pittsburgh, PA

July. 2019 – Nov. 2019

Advisor:

[Prof. Simon Lucey](#)

Learning-Based Registration: Researched learning-based pose estimation algorithms – insights on why it works, what are the open problems.: [Short report](#).

Biorobotics Lab, CMU RI

Graduate Research Assistant

Pittsburgh, PA

Aug. 2018 - Jul. 2019

Advisor:

[Prof. Howie Choset](#)

Medical device prototype: Co-developed and prototyped a hand held soft tissue investigation device for low-cost tumor diagnosis. [Link](#)

Non-rigid registration: Surveyed algorithms for human organ registration and proposed and implemented faster algorithms with comparable accuracy to handle larger volumes of data. [Link](#)

Robotics and Design Lab, IISc

Research Staff

Bangalore, India

Jan. 2018 - Jul. 2018

Advisor:

[Prof. Ashitava Ghosal](#)

Optimal Motion Planning: Derived optimal, polynomial time motion plans for snake-like robots in confined spaces such as endoscopes, pipe inspection robots and in cluttered search and rescue scenarios. [Link](#)

Advisor:

Prof. Ashitava Ghosal

Design of Parallel Robots: Designed Monte Carlo simulations to model workspaces of parallel robots. Modeled the human 3-fingered grasp and proposed techniques for optimal design of parallel robots. [Thesis](#), [paper 1](#), [paper 2](#).

SELECTED COURSE PROJECTS

Planning on Manifolds: Devised algorithms for path planning of collaborative robot arms to manipulate ultra-sound probes on a human body phantom. This algorithm was later used to research automatic femoral artery catheterization. [\[Video\]](#)

SLAM for Legged Robots: Used GTSAM and OpenCV to co-develop a framework for visual state estimation in legged robots using their gait information. [\[Report\]](#)

PUBLICATIONS. [\[GOOGLE SCHOLAR PAGE\]](#)

- [1] **Chaudhury, A. N.**, Man, T. Yuan, W. & Atkeson, C. (2022) "Using Collocated Vision and Tactile Sensors for Visual Servoing and Localization." *IEEE RA-L 2022* [Link](#)
- [2] Ashwin K.P., **Chaudhury A.N.**, and Ashitava Ghosal. (2020) "Efficient representation of ducts and cluttered spaces for realistic motion planning of hyper-redundant robots through confined paths." *J. Computer-Aided Design*, 119, 102777. [Link](#)
- [3] **Chaudhury, A. N.**, & Ghosal, A. (2017). "Optimum design of multi-degree-of-freedom closed-loop mechanisms and parallel manipulators for a prescribed workspace using Monte Carlo method". *Mechanism and Machine Theory*, 118, 115-138. [Link](#)
- [4] **Chaudhury, A. N.**, & Ghosal, A. (2018). "Workspace of Multi-fingered Hands Using Monte Carlo Method". *Journal of Mechanisms and Robotics*, 10(4), 041003. [Link](#)
- [5] **Chaudhury, A. N.**, & Datta, D. (2017). "Analysis of prismatic springs of non-circular coil shape and non-prismatic springs of circular coil shape by analytical and finite element methods". *Journal of Computational Design and Engineering*, 4(3), 178-191. [Link](#)

SKILLS

Programming Languages: Python, C++, CUDA, Cython

Modelling Tools: Matlab, Maple (Symbolic Mathematics)

Computing Environments: Linux [Ubuntu]

Machine Learning Toolboxes: PyTorch, TensorFlow, SciKit-Learn

Software Libraries: ROS, OpenCV, PCL, GTSAM

Languages: English (full proficiency), Bengali (native proficiency) and Hindi (bi-lingual proficiency)

RELEVANT COURSES

At CMU: Computer Vision (16-720), Advanced Nonlinear Control Theory (16-748), Robot Localization (16-833), Geometric Methods in Computer Vision (16-822), Linear Systems (18-771), Statistical Techniques in Robotics (16-831), Deep Reinforcement Learning (10-703), Machine Learning (10-701)

At IISc: Robotics (Kinematics, Dynamics and Control), Numerical Linear Algebra, Geometric Modelling, Linear and Non-Linear Optimization,

AWARDS

DST-SERB Overseas PhD fellowship [Declined]	08/2018 – 08/2023
Graduate Research Fellowship (CMU)	08/2018 – 08/2019
DST Graduate Scholarship (at IISc)	08/2015 – 12/2017

RESEARCH INTERESTS

3D sensing for manipulation, tactile sensing, active perception, computer vision for robot learning and manipulation.

REFERENCES

Prof. Christopher G. Atkeson Professor, CMU, cga@cmu.edu [advisor]

Prof. Ashitava Ghosal Professor, IISc Bangalore. asitava@iisc.ac.in [ex. advisor]

Prof. Wenzhen Yuan Assistant Professor, CMU RI, yuanwz@cmu.edu [collaborator]