

Arkadeep Narayan Chaudhury

<https://arkadeepnc.github.io>

[LinkedIn](#), [GitHub](#)

[ResearchGate](#)

Email: arkadeepnc@cmu.edu

Cell: +1 412-626-4231

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

EDUCATION

Carnegie Mellon University, Robotics Institute

MS + PhD in Robotics

Pittsburgh, PA

Aug. 2020 – Aug 2024 (expected)

Carnegie Mellon University, CIT

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

RESEARCH EXPERIENCE

Neural 3D representations, 3D reconstruction, sensor fusion, photometric stereo, 3D capture systems, prototyping low-level computer vision systems, CV accelerators, and tactile sensing.

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. Developed a robot mounted multi-flash stereo camera rig to capture multi-modal data from small objects in bounded scenes. [Patent filed 2/15/24. App. no.: 63/553727]

Atkeson Lab, CMU RI

Graduate Research Assistant

Pittsburgh, PA

Nov. 2019 – Present

Advisor:

[Prof. Christopher Atkeson](#)

Thesis topic:

Moving lights and cameras for better 3D vision

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. [ICRA & RA-L'22](#)

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

Moving lights and cameras: Designed and implemented a portable multi-flash stereo camera for appearance and geometry perception of small scenes. [Project](#)

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. [Hamlyn '19](#)

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 in GI tract, pipe inspection robots and in cluttered search and rescue scenarios. [CAD](#)

Robotics and Design Lab, IISc

Graduate Research Assistant

Bangalore, India

Jul. 2015 - Dec. 2017

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](#), [MMT](#), [JMR](#).

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

- [.] **Chaudhury, A. N.**, Vasiljevic I., Zakharov S., Guizilini V., Ambrus R., Narasimhan S., Atkeson C. (2024) “Incorporating dense depth into neural 3D representations for view synthesis and relighting” *Under Review* [Link](#), [arXiv](#)
- [1] **Chaudhury, A. N.**, Keselman, L. & Atkeson, C. (2024) “Shape from Shading for Robotic Manipulation” *Proc. of the WACV ‘24* [Link](#)
- [2] **Chaudhury, A. N.**, Man, T. Yuan, W. & Atkeson, C. (2022) “Using Collocated Vision and Tactile Sensors for Visual Servoing and Localization.” *IEEE RA-L & ICRA 2022* [Link](#)
- [3] 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](#)
- [4] **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](#)
- [5] **Chaudhury, A. N.**, & Ghosal, A. (2018). “Workspace of Multi-fingered Hands Using Monte Carlo Method”. *Journal of Mechanisms and Robotics*, 10(4), 041003. [Link](#)
- [6] **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

Robot platforms: Universal Robots UR5, Franka Emika FR3, XArm-7

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, Geometric Methods in Computer Vision, Advanced Nonlinear Control Theory, Robot Mapping and Localization, Linear Systems, Statistical Techniques in Robotics, Deep Reinforcement Learning, Machine Learning

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

AWARDS

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

REFERENCES

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

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

Dr. Igor Vasiljevic Research Scientist, Toyota Research Inst., igor.vasiljevic@tri.global [Internship Mentor]