Arkadeep Narayan Chaudhury

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Education

Carnegie Mellon University, Robotics Institute — Pittsburgh, PA, USA
PhD in Robotics — *Nov. 2019 – Oct. 2024*

Indian Institute of Science — Bangalore, Karnataka, India
Master of Science in Mechanical Engineering — *Aug. 2015 – Dec. 2017*

Research Experience

3D capture and reconstruction systems, sensor fusion, photometric stereo, prototyping low-level computer vision systems, computational photography, geometric and photometric camera calibration.

Experience

Epic Games, Inc. — Pittsburgh, PA
Research Scientist : Human Capture — *Nov. 2024 – present*

Responsibilities: Co-led development of a high-performance, multi-modal human capture system integrating 30+ heterogeneous cinema cameras, MOCAP, and an electromagnetic articulograph. Achieved $\sim$ 15% faster and higher-fidelity facial reconstruction (sub-0.5 mm RMSE) compared to internal and commercial baselines, enabling sub-millimeter accurate multi-modal tracking. Designed calibration pipelines to substitute internal and commercial systems by matching the accuracy. Developed a human-scale photometric stereo system for dense facial geometry and reflectance acquisition. Prototyped scalable pipelines for aggregating terabyte-scale, time-synchronized multi-modal datasets to support training of large ML models.

Toyota Research Institute — Los Altos, CA
Research Scientist Intern — *May 2023 – Aug. 2023*

Physically based 3D representations: Developed a robot-mounted, multi-flash stereo rig to capture physically based 3D assets of small objects. Enabled multimodal sensing under constrained capture environments. Filed a US Patent on novel capture hardware and pipeline.

The Robotics Institute, CMU — Pittsburgh, PA
Graduate Research Assistant — *Nov. 2019 – Oct 2024*
Doctoral thesis: Moving Lights and Cameras for Better 3D Perception of Indoor Scenes

Moving cameras: Developed one of the first co-located RGB-D-tactile sensor ensembles for visual servoing and object localization. ICRA & RA-L'22

Moving lights: Designed mm-accurate, real-time photometric stereo system for surface perception in robot workspaces.WACV'24

Moving lights and cameras: Created portable multi-flash stereo camera enabling geometry + appearance recovery with just 10 views. SIGGRAPH Asia Tech. Comm., 3DV'25.

Mechanical Engineering, CMU — Pittsburgh, PA
PhD candidate — *Aug. 2018 – Oct 2019*

Early-stage PhD work in vision for medical robotics (Hamlyn Symposium 2019). Transitioned to Robotics PhD program.

Robotics and Design Lab, IISc — Bangalore, India
Graduate Research Assistant — *Jul. 2015 - Jun. 2018*
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.

Motion planning for snake-like robots: Co-designed and implemented optimal formulations for planning motion of snake-like robots (e.g. endoscopes) through narrow paths. Elsevier CAD

Selected Publications. [Google Scholar Page]

[1] **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" *Proc. of the 3DV '25* Link, arXiv

[2] **Chaudhury, A. N.**, Vasiljevic I., Zakharov S., Guizilini V., Ambrus R., Narasimhan S., Atkeson C. (2024) "A Multi-flash Stereo Camera for Photo-realistic Capture of Small Scenes" *SIGGRAPH Asia 2024 Technical Communications* Link

[3] **Chaudhury, A. N.**, Keselman, L. & Atkeson, C. (2024) "Shape from Shading for Robotic Manipulation" *Proc. of the WACV '24* Link

[4] **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

Patents

[1] **Chaudhury, A. N.**, Vasiljevic I., Zakharov S., Guizilini V., Ambrus R., Narasimhan S., Atkeson C. (2024) "Multi-flash stereo camera for photorealistic capture of small scenes" US Patent Application no.: 19/042,629.

Skills

Programming Languages: Python, C++, CUDA

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

Camera platforms: PointGrey(FLIR), Arducam, V4L2 devices, EVT(Emergent Vision Tech.), Red Digital Cinema

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)

Awards and Service

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

Reviewer: WACV, 3DV, AAAI, ICRA, IEEE Sensors, IEEE-RA-L, Elsevier CAD, Elsevier MMT, and ASME JMR.