Arkadeep Narayan Chaudhury

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Homepage
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EDUCATION

Carnegie Mellon University   Pittsburg, PA
PhD in Computer Science (Robotics)   *Aug. 2018 – Now*

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

Indian Institute of Engineering Science and Technology   Shibpur, India
Bachelor of Engineering in Mechanical Engineering   *Jul. 2011 – May 2015*

EXPERIENCE

Atkeson Lab & Robotouch Lab, CMU RI   Pittsburgh, PA
Graduate Research Assistant   *Nov. 2019 – Present*
Advisor: Prof. Christopher Atkeson

> **FingerVision II:** Developing FingerVision II – an ensemble of collocated vision, depth and touch sensors and a set of algorithms to viually servo robots to workspace goals and localize objects through vision and touch. Link
>
> **Active Lighting:** Developing a robot workspace scale shape-from-shading setup for object scale and articulation agnostic depth, normal and motion perception.

CI2CV Lab, CMU RI   Pittsburgh, PA
Graduate Research Assistant   *July. 2019 – Nov. 2019*
Advisor: Prof. Simon Lucey

> **Learning Based Registration:** Researched learning based algorithms for registration of human organ models. A summary my work: Link.

Biorobotics Lab, CMU RI   Pittsburgh, PA
Graduate Research Assistant   *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.
>
> **Non-rigid registration:** Surveyed algorithms for human organ registration and proposed faster algorithms with comparable accuracy to handle larger volumes of data. Link

Robotics and Design Lab, IISc   Bangalore, India
Research Staff   *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 robots in cluttered search and rescue scenarios.

Robotics and Design Lab, IISc   Bangalore, India
Graduate Research Assistant   *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.

Solid Mechanics Lab, IIEST   Shibpur, India
Undergraduate Researcher   *Jul. 2014 - Apr. 2015*
Advisor: Prof. Debasis Datta

> **Computational Design of Springs:** Formulated closed form expressions for design of springs of un-conventional shapes to estimate their stresses, natural frequencies, buckling loads etc.

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. The algorithm may be used to automate 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. (2021) "Using Collocated Vision and Tactile Sensors for Visual Servoing and Localization." *In Submission to IEEE RA-L* 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++ and CUDA

Modelling Tools: Matlab, Maple (Symbolic Mathematics)

Computing Environments: Windows, Ubuntu

Machine Learning Toolboxes: PyTorch, TensorFlow, SciKit-Learn

Software Libraries: ROS, OpenCV, PCL, GTSAM

Languages: English (full proficiency), Bengali (native profiiciency) 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)	$08/2015 - 12/2017$