

Purnendu

<https://purnendu.me/>

ATLAS Institute, University of Colorado, Boulder

purnendu@colorado.edu

Interests	Personal Fabrication, Human-centered programmable materials, Soft Robotics, Haptics, Graphene and its derivatives	
Education	PhD (Creative Technology and Design)	2018-2023 (expected)
	ATLAS INSTITUTE, UNIVERSITY OF COLORADO BOULDER	
	Interdisciplinary research at the intersection of Design, Material Science and Computation.	
	Integrated M. Sc. (Physics)	2013-2018
Experience	INDIAN INSTITUTE OF TECHNOLOGY (IIT), ROORKEE	
	Specialization in Material Science (Condensed Matter Physics) and Nanofabrication. Pursued an interdisciplinary master's thesis in collaboration with Max Planck Institute for Informatics, Germany	
	Master's Thesis	2017-2018
	MAX PLANCK INSTITUTE FOR INFORMATICS	
Experience	Worked on Acoustic Metamaterials at the Human-Computer Interaction Group in Saarland Informatics Campus, Saarbrücken, Germany.	
	Graduate Research Assistant	2018- (present)
	ATLAS INSTITUTE, UNIVERSITY OF COLORADO BOULDER	
	Interdisciplinary research with the Laboratory for Emergent Nanomaterials (with Carson Bruns), BEEM Lab (with Gregory Whiting) and THING Lab (with Daniel Leithinger)	
Experience	Research Intern	MAY 2017-JULY 2017
	BAUHAUS UNIVERSITY, WEIMAR, GERMANY	
	Advised by Prof. Eva Hornecker, Human-Computer Interaction chair at Bauhaus-Universität Weimar. Worked on shape-changing soft robotic TUIs (Tangible User Interfaces) and ultrasonic sensing.	
	Co-founder and President	SEPT. 2016-APR. 2017
Experience	DESIGN STUDIO, IIT ROORKEE	
	Design Studio, IIT Roorkee is a multidisciplinary studio managed by students at Indian Institute of Technology, Roorkee dedicated to design-oriented research and product development with a stronghold in Human-Computer Interaction, Augmented Reality, Product Design, Game development, Animation and Graphics etc. (http://www.designstudioiitr.in/). I co-founded the group and lead it from its inception as the Founding President.	
	Co-founder and Tech Lead	Sept. 2015-Oct.2016
	LOG 9 MATERIALS	
Experience	Log 9 Materials is an Indian startup aiming at the commercial applications of lab-scale graphene nanotechnology and manufacturing high-quality nano-materials (primarily graphene). (www.log9materials.com). As Tech Lead my responsibilities were to look after the overall Research and Development, Innovation, Device Design Fabrication. Designed and fabricated a Graphene Quantum Dots (GQD) based LED and graphene-based multi-action water purification system. Designed and developed PPuF - a graphene-ceramic composite based cigarette filter which lowers the carcinogens in cigarette smoke by 50-60 % (www.ppuF.co.in).	
	Undergraduate Researcher	May 2015-Nov.2017 (With an interim break for startup)
	SATAPATHI LAB, IIT ROORKEE	
	Worked on a variety of projects in instrumentation, nanofabrication, microfluidics, additive manufacturing, organic electronics and Biomaterials under the supervision of Dr. Soumitra Satapathi, Asst. Professor, Dept. Of Physics, IIT Roorkee. (http://satapathilab.com/)	

Managed a wide variety of cross-media projects involving branding, illustrations, animations, products, UI-UX design, and development for startups (Inst-E-Shop, AAYUU.com, to name a few) as well as industry leaders.

Publications

Electriflow: Augmenting Books With Tangible Animation Using Soft Electrohydraulic Actuators

Purnendu, Sasha Novack, Eric Acome, Mirela Alistar, Christoph Keplinger, Mark D. Gross, Carson Bruns, and Daniel Leithinger. In Special Interest Group on Computer Graphics and Interactive Techniques Conference Labs (SIGGRAPH '21 Labs), August 09-13, 2021. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3450616.3464523>

Electriflow: Soft Electrohydraulic Building Blocks for Prototyping Shape-changing Interfaces

Purnendu, Sasha Novack, Eric Acome, Christoph Keplinger, Mirela Alistar, Mark D. Gross, Carson Bruns, and Daniel Leithinger. In Designing Interactive Systems Conference 2021 (DIS '21), June 28-July 2, 2021, Virtual Event, USA. ACM, New York, NY, USA, 10 pages. <https://doi.org/10.1145/3461778.3462093>

Soft Electrohydraulic Actuators for Origami Inspired Shape-Changing Interfaces.

Purnendu, Eric Acome, Christoph Keplinger, Mark D. Gross, Carson Bruns, and Daniel Leithinger. In CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI '21 Extended Abstracts), May 8–13, 2021, Yokohama, Japan. ACM, New York, NY, USA

Graphene-Based 3D Xerogel as Adsorbent for Removal of Heavy Metal Ions from Industrial Wastewater

Purnendu, Soumitra Satapathi, 5, 2, 96-102,2017, Journal of Renewable Materials.

Patents

[2020] Method and apparatus for multi-material variable resolution Palmtop 3D printing

Purnendu, Carson Bruns, Mark D Gross [Provisional Patent Application No 63/061,653 (pending)]

[2017] A graphene based tobacco smoke filter and a method for synthesizing graphene composition

Akshay V. Singhal, Purnendu [WO 2017187453 A1]

[2016] Device and method for real-time thickness controlled spin-coating

Nipun Sawhney, Purnendu, Soumitra Satapathi [E-106/43/2016/DEL/201611039173 - (pending)]

Posters

Graphene-Chitosan Xerogel for Heavy Metal Ion Removal

Purnendu, Soumitra Satapathi, International Conference On Nanoscience and Technology (ICONSAT), 2016, IISER PUNE

Selected Press

TechExplore

Origami comes to life with new shape-changing materials

Hackster.io

New Shape-Changing Materials Come to Life Using Artificial Muscles

The Institution of Engineering and Technology (IET)

Paper-thin origami-like artworks wriggle, flutter and bend

Science Daily

Origami comes to life with new shape-changing materials

Archinect

Electriflow taps advancements in soft robotics to create mechanisms that operate without traditional machine parts

The Times of India

IIT-R researcher develops cigarette filter that eliminates most chemicals from smoke, gets 15L funding from institute

Graduate Coursework

CU Boulder:

Haptic Interfaces, Design and Analysis of Algorithms, Natural Language Processing, Applied Machine Learning, Theory of Computation, Metamaterial Design Principles, Partial Differential Equations, Bio-inspired Multi-Agent Systems, Quantum Information and Computing

IIT Roorkee:

Advanced Condensed Matter Physics, Physics of Nanosystems, Physics and Technology of Thin Films, Advanced Characterization Techniques, Molecular Spectroscopy and Lasers

Awards

INSPIRE Scholarship for Higher Education (SHE)

Department of Science and Technology (DST), Govt. of India (2013-18).

Invitations and Talks

Manipulating Shape of Things to come: Folding and Self Assembly

ATLAS Seminar, University of Colorado Boulder, 14 April 2020.

The mathematical secrets of Computational Origami

Statistics, Optimization and Machine Learning Seminar, University of Colorado Boulder, 15 Oct. 2019.

Future of Graphene in manufacturing

Short-term program on Make-In-India-Issues and Challenges, NITTTR Chandigarh, 10 Nov. 2017

Special Invitee at Make-In-India Week, Mumbai, 13-18 Feb. 2016.

Services

Reviewer

CHI 2019, 2020, 2021; DIS 2021

Mentoring

Teis Hart

Undergraduate student (Senior/4th Year) in Mechanical Engineering, University of Colorado Boulder;
Project: Designing a miniature 3D Printer

Maya Ledvina

Creative Industries Master's Student in Creative Technology and Design, University of Colorado Boulder

Aniket Agarwal

Creative Industries Master's Student in Creative Technology and Design, University of Colorado Boulder

Marian Baldonado

Social Impact Master's student in Creative Technology and Design, University of Colorado Boulder

Cassidy Jensen

Undergraduate student in Creative Technology and Design, University of Colorado Boulder; Project:
Acoustic Metamaterials

Vishal Shenoy

Master's student in Mechanical Engineering, University of Colorado Boulder

Skills

ADVANCE SKILLS in Design thinking, Design software in both 2D and 3D

(Adobe Creative Suite, Autodesk Softwares, Rhino with Grasshopper, Cinema-4D, Blender).

ADVANCE SKILLS in Nano-material fabrication and experimentation

Including microfluidic control and study, soft-lithography, photolithography, thin film deposition, nanofabrication, chemical fabrication, wet-lab techniques, different types of spectroscopy (Fluorescence, UV-Visible, FTIR), X-Ray Diffraction, Atomic Force Microscopy and Electron Microscopy (SEM, TEM, STM) and instrumentation.

ADVANCE SKILLS in macro-scale instrumentation, prototyping, and digital fabrication

3D printing, cutting, molding, casting; instrumentation of most digital machines to handle plastic/composite/metal/wood.

MEDIUM SKILLS in software development and scientific computing

Graphics, Animation, Interface and Machine Learning in Python, MATLAB, Javascript, FORTRAN.

MEDIUM SKILLS in electronic hardware design and assembly

Digital and analog circuit design, signal processing, microprocessors, fast-prototyping as well as machine building

Fluent in spoken and written English, Hindi, and Maithili-eastern Indian-subcontinent language (mother tongue)

References

Carson Bruns

Assistant Professor, Department of Mechanical Engineering and ATLAS Institute, University of Colorado Boulder; E-Mail: carson.bruns@colorado.edu; Homepage: <https://www.colorado.edu/atlas/carson-bruns>

Mark D Gross

Director, ATLAS Institute Professor, Department of Computer Science and ATLAS Institute, University of Colorado Boulder; E-Mail: mdgross@colorado.edu; Homepage: <http://mdgross.net/>

Gregory Whiting

Associate Professor, Department of Mechanical Engineering, University of Colorado Boulder; E-Mail: gregory.whiting@colorado.edu; Homepage: <https://www.colorado.edu/lab/whiting/gregory-whiting>