Purnendu (Curriculum Vitae)

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Interests

Personal Fabrication, Human-centered programmable materials, Nano-materials and Nanofabrication, Soft Robotics, Microfluidics, Graphene and its derivatives.

Education

UNIVERSITY OF COLORADO BOULDER (ATLAS Institute) | PhD (Creative Technologies and Design) | 2018-2023 (expected)

Interdisciplinary research at the intersection of Computer Science and Nanotechnology. Designing interactions with programmable matter.
Advisors: ***Carson Bruns*** (Mechanical Engineering and ATLAS) and ***Daniel Leithinger*** (Computer Science and ATLAS)

INDIAN INSTITUTE OF TECHNOLOGY (IIT), ROORKEE | INTEGRATED M. Sc. (Physics) | 2013-2018

Specialization in *Material Science (Condensed Matter Physics)* and *Nanofabrication.* Pursued an interdisciplinary master's thesis in collaboration with Max Planck Institute for Informatics, Saarbrücken, Germany:
Advisors: *Prof. Jürgen Steimle*, (Saarland University) and *Dr. Soumitra Satapathi* (IIT Roorkee).

MAX PLANCK INSTITUTE FOR INFORMATICS | MASTER'S THESIS | DEC 2017-APR 2018

Advised by Prof. Jürgen Steimle, at the Human-Computer Interaction Group in Saarland Informatics Campus, Saarbrücken, Germany.
Title: Acoustic Metamaterials: Towards Next Generation Programmable Matter

Professional & Research Experience

UNIVERSITY OF COLORADO BOULDER (ATLAS Institute) | Graduate Research Assistant | 2018- (present)

Interdisciplinary research with the Laboratory for Emergent Nanomaterials (with ***Carson Bruns)*** and THING Lab (with ***Daniel Leithinger***)

BAUHAUS UNIVERSITY, WEIMAR, GERMANY | RESEARCH INTERNSHIP | MAY 2017-JULY 2017

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 & PRESIDENT | DESIGN STUDIO, IIT ROORKEE | SEPT. 2016-APR. 2017

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. (https://designstudio.cc/). I co-founded the group and lead it from its inception as the Founding President.
Personal projects on soft pneumatic valves, mechanics of origami patterns and shape-changing interfaces (details on online portfolio).

CO-FOUNDER & TECH LEAD | LOG 9 MATERIALS | SEPT. 2015-OCT.2016

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 | SATAPATHI LAB, IIT ROORKEE | MAY. 2015-NOV. 2017 (With an interim break for startup)

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/)

FREELANCE USER INTERFACE & EXPERIENCE DESIGNER | DEC. 2013-MAY. 2015

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

[P1] *"HASEL-UI: A toolkit for electrostatically driven Shape-Changing Interfaces "*, **Purnendu**, Eric Acome, Daniel Leithinger, Christoph Keplinger, Carson Bruns [Under submission for **CHI 2021**]

[P2] *"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.*(Link)*

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 *(Link)*]

[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*

Awards and Scholarships

INSPIRE Scholarship for Higher Education (SHE), Department of Science and Technology (DST), Govt. of India (2013-18).

Invitations and Talks

Talk: **"The mathematical secrets of Computational Origami"** at Statistics, Optimization and Machine Learning Seminar, University of Colorado Boulder *15 Oct. 2019*.
Talk: **"Future of Graphene in manufacturing"** at the 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.*

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 digital and analog circuit design, **signal processing, microprocessors, fast-prototyping** as well as machine building: **hardware design and assembly.**

Basic skills in biological engineering, **bacteria culture.**

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

Extra-Curricular Activities

Associate Member, Fine Arts Section, IIT Roorkee (2013-present).

Lead Design Manager, Cognizance- The Annual Technical Festival of IIT Roorkee (2015-16).

Designer, Cognizance- The Annual Technical Festival of IIT Roorkee (2013-15).

Design Head & Additional Secretary, Kshitij- The Official Literary Magazine of IIT Roorkee (2015-16).

References

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