PRATEEK VERMA

PHD. MACHINE LEARNING SCIENTIST.

CONTACT FORM
WWW.PRATEEKVERMA.COM
HIDDEN ONLINE

Machine learning scientist, especially for chemicals, materials, multi-omics, health, and environment. A creative at core, passionate about building elegant things and finding elegant solutions. Previous background in structure-property relationships in polymers, metamaterials, industrial formulations and processes.

15 papers published or submitted
12 first author papers
18 conference presentations
16 manuscripts reviewed

WORK EXPERIENCE

POSTDOCTORAL FELLOW, UNIVERSITY OF ARKANSAS

Nayani and Nakarmi groups, 2021 – present

- Built an end-to-end CNN ML pipeline for microscope images
- Building CNN, GNN, and GAN based algorithms for molecular discovery and finding hotspots (aka functional groups) on molecules and macromolecules.
- **Applications:** predicting onset of diseases, detecting heat-stress in organisms with >97% accuracy, sensors for airborne bacteria and viruses, discovering ligands for virus capture membranes.

POSTDOCTORAL FELLOW, GEORGIA INSTITUTE OF TECHNOLOGY

Shofner and Russo groups, 2018 – 2021

- Developed multivariable deep neural network regression to split, interpolate, and predict total signal into constituents.
- Developing noise detection and removal in instrument signals using regression and CNN approaches.
- **ML applications:** Extract pollution composition (expensive measurement) from total PM2.5 (inexpensive) data; noise detection in light scattering data.
- Fabricated metamaterial composites using tensegrity/auxetic approaches.
- Executive Director for OPALL (Open Polymer Active Learning Laboratory)

SENIOR COATING CHEMIST, KIMOTO TECH

2016 – 2018

- Team leader for 5 R&D chemists
- Led scale-up and production of several lab-to-market products
- Development of flexible & protective coatings exhibiting UV-blocking, scratch and chemical resistance, electrical conductivity, anti-glare, etc.
- Development of conductive coatings and pressure sensitive adhesives

PHD CANDIDATE, GEORGIA INSTITUTE OF TECHNOLOGY

Griffin and Shofner groups, 2011 – 2015

- Identification, characterization, and development of rare auxetic behavior in fiber networks and liquid crystal elastomers.

INTERNSHIPS

U Akron (2011), UMass Amherst (2010), U Minnesota (2009)

EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY

PhD, 2011 – 2015
Materials Science and Engineering
GPA 4.0/4.0

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

BS and MS, 2006 – 2011
Polymer Science and Technology
GPA 8.5/10.0

NEW SKILLS

- GNNS
- CHEMICAL INFORMATICS
- NETWORK VISUALIZATION
- DJANGO
- RDKIT
- ML PIPELINES
- RESNET
- SVMS
- ITC
- PANDAS
- TENSORFLOW

SELECT AWARDS

2021 – MSE 5 year mentorship award
2020 – Invited talk, IIT Roorkee
2019 – Hightower Fellow, OPALL
2017 – Chairman, Tech. Conference, Kimoto
2014 – Second prize, auxetic conference
2009 – Chairman for polymer conference

SKILLSETS

MACHINE LEARNING

- CNNS
- GNNS
- IMAGE PREPROCESSING
- K-MEANS CLUSTERING
- LINEAR REGRESSION
- LOGISTIC REGRESSION
- ML PIPELINES
- CHEMICAL INFORMATICS
- NETWORK VISUALIZATION
- RESNET
- SVMS

COMPUTATIONAL

- MATLAB
- AWS
- DJANGO
- LAMMPS
- MATPLOTLIB
- MYSQL
- NUMPY
- PANDAS
- RDKIT
- TENSORFLOW
- SCIKIT

COMPUTER LANGUAGES

- C/C++
- JAVASCRIPT
- MATLAB
- PHP
- PYTHON
- SQL

CHEMISTRY

- FREE RADICAL POLYMERIZATION
- LCE SYNTHESIS
- POLYURETHANE SYNTHESIS
- SILANES & SILICONES
- THERMAL & UV CURING

MATERIALS

- AUXETIC MATERIALS
- BIOPOLYMERS
- CHARACTERIZATION
- LIQUID CRYSTALS
- METAMATERIALS
- NANOTECHNOLOGY
- POLYMER PROCESSING
- STRUCTURE-PROPERTY RELATIONSHIPS
- THERMAL ANALYSIS
- VISCOELASTICITY

INDUSTRY

- ADHESIVE COATINGS
- PROCESS DEVELOPMENT
- CHEMICAL MIXING
- CHEMICAL FORMULATIONS
- PROTECTIVE COATINGS
- SCALE-UP OPERATIONS
- THERMAL & UV CURING

INTERPERSONAL

- DEI
- ILLUSTRATION
- LEADERSHIP
- MENTORING
- RESEARCH ADVISING
- TEACHING
- TEAM BUILDING

LAB TECHNIQUES

- AFM
- DSC TGA DMA
- ENVIRONMENTAL TESTING
- FTIR
- ITC
- MECHANICAL TESTING
- MICRO-CT
- SEM
- VISCOMETRY

SELECT PUBLICATIONS

- **P Verma**, E Adeogun, ES Greene, et al.; Machine-learning classification of heat-stress in organisms using CNN's*; ACS Sensors*; **2023**; (under review / submitted)
- **P Verma**, DN Ansari, TU Ansari; Deep learning algorithms for extraction of aerosol chemical composition from temporal variations of total PM mass*; Environmental Science and Technology*; **2023**; (submitting next)
- **P Verma**, U Nakarmi, K Nayani; A new deep-learning approach for drug-like molecular classification and regression*; Nature Communications*; **2023**; (submitting next)
- **P Verma**, U Nakarmi, K Nayani; Machine learning approaches to ligand discovery for viral purification*; The Journal of Chemical Information and Modeling*; **2023**; (submitting next)
- H Sun, X Fang, ..., **P Verma**, et al.; An ultra-sensitive and stretchable strain sensor based on micro-crack structure for motion monitoring*; Micro Nano (Nature)*; **2022**
- TU Ansari, DN Ansari, **P Verma**; Statistical and machine-learning approaches towards retrieving aerosol chemical composition from te...*; Earth and Space Science Open Archive*; **2022**
- **P Verma**, C Smith, AC Griffin, et al.; Towards textile metamaterials: A pathway to auxeticity and tensegrity in a needle-punched nonwoven stiff felt*; Materials Advances (RSC)*; **2022**
- CW Irvin, CC Satam, ..., **P Verma**, et al.; Tricomponent polymer aerogels containing cellulose nanocrystals and chitin nanofibers and their use...*; Journal of Applied Polymer Science*; **2022**
- **P Verma**, C He, AC Griffin; Implications for auxetic response in liquid crystalline polymers*; Physica Status Solidi B*; **2020**; (appeared in Wiley's 'Hot Topics: Liquid Crystals')
- N Jappar, **P Verma**, J Holmes; Development of functional films in roll-to-roll manufacturing*; RadTech*; **2018**; (conference paper)

SELECT PRESENTATIONS

- Nonwoven textile structures – commodity pathways to auxeticity; Chicago (USA); 2022
- Constructing out-of-plane auxetic response in paper; Denver (USA); 2020
- Career pathways for polymer science students: industry vs higher education; Roorkee (INDIA); 2020; Invited talk
- OPALL: The open polymer active learning laboratory at Georgia Tech; Orlando (USA); 2019
- X-ray scattering from LC polymers: Implications for auxetic response; Bedlewo (POLAND); 2019
- Auxetic liquid crystalline polymers; Crete (GREECE); 2017
- Reversibility of thickness change in nonwovens; Poznan (POLAND); 2016
- Elastic moduli of polymeric thin films of nanocomposites and blends via buckling on elastomeric substrates; Boston (USA); 2012

PROFESSIONAL SERVICE

PEER REVIEWING

Reviewed more than 15 manuscripts for journals such as:
Computational Materials Science (Elsevier), Industrial & Engineering Chemistry Research (ACS), Journal of Micromechanics and Microengineering (IOP), Materials Research Express (IOP), Physica Status Solidi (Wiley), Surface and Coatings Technology (Elsevier), etc.

MENTORING

Served as a mentor for Mentor Jackets, MSE Industry Mentoring and IITR's Alumni Mentorship Program since 2016 for:

9 Bachelor's students
7 Doctoral students
2 Master's students

RESEARCH ADVISING

Advised the research of 17 (direct supervisor for 14) industry members / graduates / undergraduates in the following broad areas:

- convolutional neural networks
- machine learning for molecules
- linear and logistic regression
- auxetics and metamaterials
- structure-property relationships

SELECT LEADERSHIP

- DEI council representative for MSE staff, Georgia Tech, 2019–2021
- Co-launched Postdoc Chats, Georgia Tech, 2019–present
- Advisor/mentor for OPALL members, Georgia Tech, 2019–2022
- Team leader, Kimoto Tech, 2016–2018
- Co-manager for thermal analysis lab, Georgia Tech, 2013–2015

REFERENCES

ANSELM C GRIFFIN

Professor Emeritus, Georgia Tech
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MEISHA L SHOFNER

Associate Professor, Georgia Tech
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PAUL S RUSSO

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BIN LI

Senior Research Chemist, Koppers
binli415@gmail.com

KARTHIK NAYANI

Assistant Professor, U Arkansas
knayani@uark.edu

EXTRACURRICULARS

- Gets way too excited about graphics design and web development
- Is the best table tennis player in the break room
- Paints and draws