ADITYA TIWARI

TECHNICAL RESEARCH AND PRODUCT BUILDER | Applied AI | Scientific Computing | Industrial Systems

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PROFILE

Independent technical research and product builder with paid delivery for Quanscient and MultiFluidX, a flood-model collaboration publicly highlighted by IIT Delhi, a working industrial video-management baseline, and software used across more than 700 fleet vehicles. Enters unfamiliar problem rooms, turns research and customer requirements into working systems, and checks whether the result can be trusted. Uses AI extensively for research and implementation while remaining responsible for sources, experiments, failure analysis, and handover. Also brings customer acquisition, partnerships, and founder-led execution.

SELECTED EVIDENCE

- Converted an 11-item industrial procurement brief into HookVision: a versioned architecture, acceptance plan, and working video-management baseline with 16 automated checks across macOS and Linux.
- Corrected a humidity-physics implementation in an OpenFOAM workflow after tracing a mismatch between client data and solver output; the MultiFluidX engagement continued into Phase 2 following positive technical review.
- Delivered EUR 9,800 of paid multiphysics-AI consulting to Quanscient, combining active learning, surrogate modelling, Pareto analysis, solver validation, and reproducible handover.
- Built a 2D Yamuna flood hindcast from IIT Delhi HydroSense SAR data in two days and validated it at approximately 77% IoU before presenting the work to a national disaster-management adviser.

INDEPENDENT TECHNICAL RESEARCH AND PRODUCT CONSULTING

HookVision | Technical Product and Systems Consultant **Sep 2026-Present**

Industrial video-management project for a Jindal Steel operating environment

- Translated requirements for a target 72-camera, 36-stand, three-crane system into a traceable specification, system architecture, acceptance criteria, security model, delivery plan, and clearly separated open decisions.
- Built the current four-camera working baseline with position-driven camera selection, synchronized split views, independent original-codec recording, playback and clip export, health monitoring, role-based access, and traceability.
- Integrated Django, SQLite, MediaMTX, GStreamer, WebRTC, H.264 and H.265 paths; established reproducible macOS and Linux ARM64 environments and 16 automated functional, recovery, security, and media checks.
- Measured later software-path p95 latency at 99.8-115.6 ms and improved pair-alignment p95 from a failed 439 ms run to 16-30 ms. Full site, hardware, 72-camera capacity, endurance, and production acceptance remain open gates.

MultiFluidX | CFD and Scientific Computing Engineer, Contract **Jun 2026-Present**

Remote

- Designed and launched a reproducible 48-case OpenFOAM v2306 campaign across three facade geometries, 16 environmental conditions, and meshes of approximately 0.87-1.53 million cells.
- Deployed the solver on an ARM64 AWS EC2 worker using Docker and eight-rank MPI; automated case generation, mesh checks, convergence assessment, reconstruction, validated VTK export, checksums, and restart-safe execution.
- Investigated a mismatch between supplied humidity data and solver output, identified an incorrect conversion from mass-based moisture to vapour pressure, and rebuilt the calculation from published meteorological relationships for review and acceptance.
- Produced verified temperature, humidity, and source-field outputs for downstream machine-learning data development while preserving the client's supplied solver physics and recording explicit acceptance boundaries.

  External validation Scientific adviser Kostas Lyras credited the physics review with finding a data-corrupting issue that had remained unresolved during prior developer work; the engagement continued into Phase 2.

INDEPENDENT TECHNICAL RESEARCH AND PRODUCT CONSULTING CONTINUED

Quanscient | Scientific Machine Learning and Multiphysics Consultant, Contract **Mar-May 2026**

Finland | Remote

- Built Gaussian-process surrogate workflows, feasibility-aware active learning, and Pareto-front reconstruction for a commercial multiphysics platform.
- Designed solver-in-the-loop evaluation across dimensionality, solver budget, calibration, and failure regions, with explicit boundaries on where a surrogate could be trusted.
- Delivered reproducible notebooks and evidence packages for staged technical review and independent reruns; completed EUR 9,800 of paid work.

  External validation Co-Founder and Co-CTO Andrew Tweedie publicly credited the solver-validated approach as a useful practical AI workflow for engineering teams and separately offered to provide a reference.

IIT Delhi HydroSense | Research Collaboration **2025**

Remote

- Built a 2D diffusive-wave finite-volume hindcast of the 3 September 2025 Yamuna flood using SAR-based inundation truth supplied by the lab.
- Validated the model at approximately 77% IoU, explored drainage placement through Bayesian optimisation, and presented the work to the Adviser for Mitigation at India's National Disaster Management Authority.

  External validation Prof. Manabendra Saharia publicly highlighted the advanced flood model built in two days from SAR data shared by his lab.

PRODUCT OPERATING AND COMMERCIAL EXPERIENCE

PhyLoop and Culturiq | Founder and Product Builder **Dec 2024-Aug 2026**

- Built and coordinated a six-month multidisciplinary internship programme for more than 20 participants from IITs, Princeton, XIM University, and engineering colleges in Kerala, working alongside a former ISRO professional and industry advisers.
- Formalised a proposed research and training collaboration with SR University through a signed memorandum of understanding.
- Built PhyStudio, a private-alpha workspace for governed engineering-AI work: CAD and dataset intake, design exploration, Pareto analysis, applicability checks, verification queues, human review, immutable revisions, and audit records.
- Developed the product rule that AI and surrogates may explore and propose, while solver evidence, acceptance checks, and accountable human review determine what can be trusted. Took the work from product thesis to private alpha before concluding the company chapter in August 2026.

GoatAI Solutions | Software and Product Developer **May 2020-Dec 2024**

- Built and architected two-way driver-to-control-room communication for OpenCV fatigue monitoring used across more than 700 industrial fleet vehicles.
- Worked across field and customer requirements, product decisions, software implementation, deployment support, customer delivery, and go-to-market activity.

Ashley Furniture HomeStore Franchise | Commercial Growth and Partnerships **2022-2024**

- Helped rebuild post-COVID customer acquisition and sales through events, offers, channel experiments, WhatsApp follow-up, premium positioning, and sales-process changes. Reported footfall rose approximately threefold and conversion improved from roughly 3-4% to 13-14%.
- Partnered directly with BMW Ranchi and Porsche Kolkata on premium customer activations; initiated the Porsche collaboration that brought the brand to Jharkhand for its first such presence in the state.

SELECTED RESEARCH AND PRODUCT SYSTEMS

- Neural-operator qualification: ran 848 solver-qualified OpenFOAM cases with an ensemble surrogate, split-conformal field coverage, in-distribution and out-of-distribution evaluation, applicability gating, solver fallback, fixed seeds, and 23 automated tests. Named weak interior-regime error ranking instead of hiding it.
- Solver-budget and effective-dimension study: executed 1,574 OpenFOAM and CalculiX calls across a 50-parameter liquid-cooled power-electronics space; used Morris screening and reduced and direct Sobol audits, and excluded weak-fit outputs from headline claims.
- Continuous-caster advisory: built a synthetic proof of concept across 4,962 simulated heats with acceptance checks, abstention, causal replay, fallback, and drift monitoring. Treated the results as mechanism evidence, not plant performance or savings.
- Project ATOM: developed an experimental simulation-first control stack using JAX lattice-Boltzmann worlds, Fourier neural operators, liquid time-constant control, symbolic discovery, and a safety supervisor; retained its status as experimental research.
- Infrastructure option studies: built open-data Pareto explorations for sea-bridge alignments and urban flood mitigation, using simulation and optimisation for early option generation rather than certified engineering design.

HOW I WORK

- Start from the decision, physical behaviour, customer need, or research question; identify what evidence would make the answer credible; build the smallest system that can test it; investigate mismatches; and leave behind a reproducible explanation and failure route.
- Use AI heavily for literature search, code generation, debugging, experimentation, and communication. Do not treat generated output as authority: check it against primary sources, numerical solvers, data, automated tests, domain experts, and customer review.

METHODS AND TOOLS

Research and validation Scientific literature review, requirement decomposition, numerical evaluation, solver-in-the-loop testing, calibration, ID/OOD analysis, applicability gates, failure analysis, and reproducible evidence.

Product and delivery Customer discovery, workflow mapping, product requirements, acceptance criteria, rapid prototypes, QA, technical documentation, stakeholder reviews, handover, partnerships, and GTM.

Applied tools Python, JAX, OpenFOAM, CalculiX, Gaussian processes, Bayesian optimisation, active learning, neural operators, Docker, AWS EC2, MPI, Linux, Bash, Django, SQLite, MediaMTX, GStreamer, WebRTC, VTK, Git, and AI coding agents.

EDUCATION AND PROGRAMMES

University coursework with no completed degree Computer Science, University of Colorado Boulder, 2018-2020 and one semester in 2022; Mechanical Engineering, ICAS / Manipal University, 2016-2018.

Additional study Aerospace and Mechanical Engineering Summer School, University of Strathclyde, 2017.

Venture and ecosystem programmes NVIDIA Inception, HEC Paris DeepTech CDL, Microsoft for Startups, and T-Hub.

CREATIVE WORK

Performance and music Credited actor in the Hindi film Woh Bhi Din The; national Top 4 in BREEZER Vivid Shuffle Season 4; NEXA Music Season 3 Top 100; active music work as RXKZIT.

PUBLIC EVIDENCE

Technical work and public endorsements topmate.io/aditya_tiwari_research | github.com/phyloop-ai