



Hey, I am Samarth Pandey, I am into AI, Advocacy, Fashion and Filmmaking. I build infrastructure for the next generation of AI and the people who build with it. I am currently working on three things that I believe will shape the next decade.

First,

I am building HackSkool, a community where people learn to build by shipping instead of watching. Most education is about consuming content. HackSkool is about creating it. It is a dojo for builders, a place where you learn by breaking things and fixing them.

Second,

I am building Svere, an operating system for the entire fashion economy. It connects designers, manufacturers, and consumers through a unified platform that handles everything from design files to supply chain logistics to direct-to-consumer sales. The fashion industry is fragmented, opaque, and inefficient—Svere is my bet on fixing that.

Third,

and most importantly, I am building the AI infrastructure layer that will power all of this. I am focused on the four pillars that every intelligent agent needs: memory, compute, storage, and context. Memory so agents can remember across time. Compute so they can think fast. Storage so they can hold vast amounts of information. Context so they can make decisions that actually make sense. My project State-layer tackles the memory piece—it is a biologically inspired architecture that gives AI the ability to recall, reason, and adapt like a human brain.

I am on a gap year from a small city in India, building all of this on a worn-out laptop with no mentors, no labs, and no funding. I have been a Regeneron ISEF finalist, a TEDx speaker, and a full-ride scholar at The Knowledge Society. But I am not here to talk about what I have done. I am here to talk about what I am building.

You can reach me at [samarthpan945@gmail.com](mailto:samarthpan945@gmail.com), [My SSRN](#), [My LinkedIn](#), [My Instagram](#), [My X](#) or see my work at [my website](#). Let me know if you want to build together!

## Introduction

I am a researcher who builds bridges between disciplines. My work spans aerospace engineering, artificial intelligence, neuroscience, and public policy, unified by a single thread: I try to understand complex systems at their foundations and then design interventions that actually work.

I grew up in Jamshedpur, a steel city in India where nobody talks about research or AI. I built my first research project—a brain-wave stimulation prototype for Alzheimer's and Parkinson's—in my bedroom with no lab and no mentor. That project went to Regeneron ISEF, the world's largest pre-college science competition, and I represented India. That experience taught me that good research doesn't need fancy institutions. It needs a question you cannot stop asking.

Since then, I have published six papers across four domains. In aerospace and AI, I have worked on UAV-assisted relaying for ecological monitoring and designed a CubeSat mission for greenhouse gas detection. In geopolitics and innovation policy, I have analyzed the Baltic Way's impact on collective memory and assessed Hong Kong's role as a tech gateway, and submitted a formal public comment to the European Commission on critical raw materials. In neuroscience, I built a brain-wave stimulation prototype that went to ISEF. In political science, I have examined ranked choice voting and its effects on campaigns and voter engagement.

What connects all of this is not a single field. It is a single way of thinking. I believe the biggest problems are not technical or political or scientific in isolation. They are all of these at once, and they demand researchers who can move between them. My portfolio reflects that belief: I am not a specialist in any one discipline. I am a generalist who follows questions wherever they lead.

## I. AEROSPACE & ARTIFICIAL INTELLIGENCE

Paper 1: "Optimizing UAV-Assisted Relaying through Split Learning for Enhanced Distributed Inference in IoT-Based Ecological Monitoring"

- Author: Samarth Pandey
- Published in: *Acceleron Aerospace Journal*, Vol. 3, No. 3, pp. 487–494, 2024
- DOI: [10.61359/11.2106-2446](https://doi.org/10.61359/11.2106-2446)
- Links: [Acceleron Official](#) | [OUCI](#) | [Semantic Scholar](#)

Overview: This paper introduces a novel framework that integrates Unmanned Aerial Vehicle (UAV)-assisted relaying with Split Learning (SL) to optimize distributed inference for IoT-based ecological monitoring. UAVs act as relay nodes to address connectivity challenges in remote and rural areas, while Split Learning partitions neural networks across end-devices and UAVs to optimize data processing and preserve privacy.

About the Research:

- Problem Addressed: Connectivity gaps and computational constraints in IoT-based environmental monitoring, particularly in remote or harsh terrains.
- Proposed Solution: A hybrid architecture where UAVs serve as intelligent relays that not only forward data but also participate in collaborative model training via Split Learning.
- Key Technical Contributions:
  - Proposes an adaptive server strategy that dynamically adjusts based on real-time channel conditions and performance metrics.
  - Enables flexible trade-off management between data quality, inference latency, and computational load across distributed nodes.
  - Demonstrates through extensive simulations that the framework significantly enhances system adaptability and accuracy, particularly under harsh channel conditions (e.g., low SNR, high interference).
- Applications: Environmental monitoring, disaster response, precision agriculture, and rural connectivity solutions.

## Paper 2: "The DivyaSat: Green Horizon Explorer"

- Author: Samarth Pandey
- Published in: *Acceleron Aerospace Journal*, Vol. 2, No. 5, pp. 287–294, 2024
- DOI: [10.61359/11.2106-2421](https://doi.org/10.61359/11.2106-2421)
- Link: [Acceleron Official](#)

Overview: This paper presents the "DivyaSat" mission concept, a CubeSat-based platform designed to combat climate change and global warming by deploying miniature, cost-effective instruments for atmospheric greenhouse gas monitoring.

### About the Research:

- Inspiration: The mission draws inspiration from the successful MeznSat mission, adapting its core principles for a new scientific objective.
- Technical Configuration:
  - Primary Payload: A Short-Wave Infrared (SWIR) micro-spectrometer called Argus 2000, specifically selected for measuring atmospheric greenhouse gas concentrations (e.g., CO<sub>2</sub>, CH<sub>4</sub>).
  - Secondary Payload: A high-definition camera for precise geolocation and contextual imaging of emission sources.
- Unique Scientific Value: The specific combination of SWIR spectrometry and high-resolution imaging makes DivyaSat a distinctive CubeSat mission capable of generating critical data for atmospheric correction algorithms, improving the accuracy of larger satellite missions.
- Mission Scope: The paper outlines the full mission architecture, including orbital parameters, data downlink strategies, and the satellite's potential contribution to understanding regional greenhouse gas flux patterns.

## II. GEOPOLITICS & INNOVATION POLICY

Paper 3: "The Long Road to Freedom: Estonia's Baltic Way and the Soul of a Nation"

- Author: Samarth Pandey and Others
- Published in: *The Perrin Research Institution Working Papers / SSRN*, 37 pages, 2025
- DOI: [10.2139/ssrn.5438197](https://doi.org/10.2139/ssrn.5438197)

Overview: This working paper examines the Baltic Way of August 23, 1989—a peaceful political demonstration of approximately two million people across Estonia, Latvia, and Lithuania—and analyzes its enduring impact on collective identity and memory politics in the context of contemporary hybrid threats.

About the Research:

- Core Event: The study centers on the 600-kilometer human chain that united the three Baltic capitals, marking the 50th anniversary of the Molotov-Ribbentrop Pact.
- Analytical Framework: The research focuses on the intricate relationship between collective memory, national narratives, and the politics of memory.
- Key Findings:
  - Positions the Baltic Way as a pivotal event of anti-Soviet resistance that was instrumental in shaping a distinct ethno-national identity for each Baltic nation while fostering regional solidarity.
  - Traces the diachronic evolution of historical narratives—how the memory of the event has been preserved, contested, and repurposed from the Soviet era through to the present day.
  - Explores how this peaceful resistance undermined Soviet authority in the region and transformed into a powerful, enduring symbol of unity and self-determination, now referenced in countering modern disinformation campaigns.

## Paper 4: "Hong Kong as a Strategic Gateway for Trusted Asia-Pacific Tech Innovation"

- Author: Samarth Pandey (co-authored with Nathaniel Nadler, Livia Kam, Vikram Ranganath, Storey Kuo, Ayushmaan Mukherjee, Finn Järvi)
- Published in: *SSRN Working Paper Series*, 29 pages, 2025
- DOI: [10.2139/ssrn.5399515](https://doi.org/10.2139/ssrn.5399515)
- Link: [SSRN](#)

Overview: This white paper assesses Hong Kong's evolving role as a strategic gateway for trusted technology and financial innovation in the Asia-Pacific region, evaluating its competitive advantages amid shifting global geopolitics.

### About the Research:

- Core Thesis: Argues that the unique combination of Hong Kong's common law system's clarity, capital fluidity, and integration with the Greater Bay Area (GBA) positions it as a pivotal global innovation hub that cannot be easily replicated.
- Analytical Dimensions:
  - Evaluation of financial infrastructure and the current landscape of regulatory developments.
  - Analysis of IPO frameworks, regulatory sandboxes, and their role in attracting tech firms.
  - Examination of cross-border finance, legal transparency, and the synergy between Hong Kong and the GBA's manufacturing and R&D capabilities.
- Key Recommendations: Suggests that Hong Kong can sustain its status as an "Asia-Pacific innovation fortress" by continuing to leverage its legal transparency, cross-border synergies, and adaptive regulatory frameworks, while addressing challenges related to data governance and international perception.

### III. NEUROSCIENCE

Paper 5: "Brain-Wave Stimulation as a Technique for Preventing and Treating Alzheimer's, Parkinson's, and Other Movement Disorders and Improving Cognitive Abilities"

- Author: Samarth Pandey
- Published in: *Regeneration International Science and Engineering Fair (ISEF)*, Behavioral and Social Sciences Category, Booth ID: BEHA014, 2023
- Link: [ISEF Abstract Page](#)

Overview: This project investigates the development of a brain-wave therapy prototype and its potential effects on patients with Parkinson's Disease (PD), Alzheimer's Disease (AD), and other movement disorders, aiming to improve their cognitive abilities and overall quality of life.

About the Research:

- Problem Addressed: PD and AD are major neurological disorders causing behavioral changes and cognitive decline, for which there is currently no definitive cure.
- Research Hypothesis: The application of brain-wave stimulation at specific frequencies may alleviate symptoms and improve cognitive function.  
Specifically:
  - Delta and Theta waves for sleep improvement and relaxation.
  - Gamma waves (via binaural beats) for enhanced memory, attention, and cognitive processing.
  - Mid-range Beta and Theta waves for anxiety reduction and mood stabilization.
- Developed Solution: A comprehensive prototype named "Brain ReWireo" , which employs multiple stimulation methods including auditory stimulation, visual stimulation, and bone-conduction techniques. The device uses binaural beats to entrain brainwave activity to desired frequencies.
- Crucial Clarification: This research is explicitly positioned as a potential therapeutic intervention aimed at improving patients' quality of life and

managing symptoms—it is not presented as a cure for Alzheimer's or Parkinson's disease. The proposed mechanism suggests that regular stimulation may assist in regulating brainwaves toward a normative state, thereby improving behavioral and cognitive capabilities over time.

## IV. POLITICAL SCIENCE

Paper 6: "Beyond the Ballot Box: How Ranked Choice Voting Influences Campaigns and Voter Engagement"

- Author: Samarth Pandey and Others
- Published in: *The SPRING Group Research Paper Series*, 2025
- [Link](#).

Overview: This research paper explores the multifaceted impact of Ranked Choice Voting (RCV)—an electoral system where voters rank candidates in order of preference—on campaign strategies, voter behavior, and electoral integrity.

About the Research:

- Research Context: Positioned against the backdrop of 2025 legislative efforts across 17 U.S. states to restrict or ban RCV, making the study highly policy-relevant.
- Empirical Foundation: Analyzes data collected from 72 RCV elections held between 2004 and 2024, providing a longitudinal perspective on the system's performance.
- Key Findings:
  - Voter Confusion: A 2025 study of over 3 million RCV ballots revealed that nearly 1 in 20 ballots had marking errors—these were approximately ten times more likely to be rejected than traditional ballots, with error rates disproportionately higher in low-income areas.
  - Campaign Dynamics: Examines how RCV alters campaign strategies, encouraging candidates to build broader coalitions and appeal to second-choice voters, which reduces negative campaigning.

- Representational Outcomes: Assesses whether RCV leads to more representative and consensus-driven election outcomes compared to plurality voting systems.
- Analytical Scope: The paper does not take a prescriptive stance but instead provides a balanced analysis of the trade-offs, including the benefits of reduced polarization versus the logistical and educational challenges posed by the system.

(Latest) Paper 7: Public Comment on the European Union Critical Raw Materials Centre (Ref. Ares(2026)7371697 - 27/07/2026)

- Author(s): The SPRING Group (Videep Agarwal (Lead Author), Arik Karim (Advisor), Abhay Harika, Abhi Bhambri, Ethan Cui, Karina Yue, Samarth Pandey, Shivum Telang)
- Published/Submitted: July 2026 (Submitted as a formal public comment to the European Commission's call for evidence)
- Reference/Link: Ref. Ares(2026)7371697 (European Commission public consultation reference). Available via the European Commission's "Have Your Say" portal; no external DOI or permanent URL has been assigned to this submission.
- [Link](#).

Overview: This document is a formal public policy submission responding to the European Commission's call for evidence on the proposed EU Critical Raw Materials (CRM) Centre. It argues that the European Union's dependence on concentrated critical raw material supply chains—particularly from China—has escalated from a long-recognized vulnerability into an active industrial crisis. The submission contends that while the Critical Raw Materials Act (CRMA) and the RESourceEU Action Plan have established the right policy objectives, they lack the institutional capacity and legal teeth to deliver secure supply chains. The paper provides detailed, actionable recommendations across five key operational pillars: joint purchasing, stockpiling, investment support, market intelligence, and governance. It emphasizes that the Centre's success hinges entirely on binding commitments rather than voluntary coordination, with particular attention to transparency, human rights due diligence, and equitable access for small and medium-sized enterprises (SMEs).

## About the Research:

- **Background & Problem Definition:** The submission opens by contextualizing the crisis triggered by China's April 2025 export restrictions on rare earth elements and permanent magnets, which led to immediate production slowdowns and temporary shutdowns across European automotive, renewable energy, and defense sectors. It quantifies the EU's extreme strategic dependency—sourcing 97% of its magnesium, 98% of its rare-earth permanent magnets, and significant majorities of other critical minerals from a single third-country supplier (China). The paper outlines the EU's policy trajectory to date: Regulation (EU) 2024/1252 (CRMA) establishing 2030 benchmarks for extraction (10%), processing (40%), and recycling (25%); Mario Draghi's September 2024 competitiveness report proposing a dedicated European platform for joint purchasing and stockpiling; and the December 2025 RESourceEU Action Plan, designed to accelerate implementation after the rare earth crisis exposed the shortcomings of existing non-binding tools.
- **Comparative International & National Frameworks:** The document extensively analyzes existing models to draw evidence-based lessons. It examines Japan's JOGMEC (Organization for Metals and Energy Security)—the primary template the Commission cites—which operates as an integrated institution with direct operational authority over equity investment, loans, project financing, stockpiling, technology development, and market intelligence. It reviews national European efforts, including Germany's €1.1 billion Raw Materials Fund (managed by KfW, recently investing €50 million in Australia's Arafura Rare Earths Nolan Project), and France's €34 billion "France 2030" investment plan (allocating €1 billion specifically for raw material production and securing international mining agreements with Australia, Canada, and Mongolia). The analysis highlights that while national funds exist, they operate with different eligibility criteria, funding cycles, and strategic priorities, causing fragmented and inefficient support across the single market. It also contrasts these with China's state-backed mining monopoly and its new overseas investment vehicle (Guangyan International Investment Co), demonstrating the scale of institutional coordination required to compete.
- **Identified Gaps and Structural Challenges:** The submission systematically identifies critical weaknesses in the current EU framework. These include: the CRMA's non-binding targets (which the European Court of Auditors has found

lack published justification and risk creating bottleneck dependencies even if aggregate targets are met); weak EU bargaining power due to fragmented, company-led purchasing where individual European buyers face state-backed monopolists; significant financing gaps for CRM projects (which require high upfront investment, take 5-15 years to develop, and lack stable offtake agreements to secure investor confidence); the complete absence of an EU-managed emergency stockpile (prior to 2025, European companies had not stockpiled rare earth reserves); and poor market intelligence (outdated trade data, weak demand forecasts, and no comprehensive EU-wide value chain mapping). It further notes that the Omnibus I package (effective March 2026) raised CSDDD thresholds, effectively placing most upstream CRM operators beyond the scope of mandatory human rights and environmental due diligence until at least 2029, making conditionality through the Centre's own financing the only credible enforcement lever.

- Core Recommendations (The Five Pillars):
  - *Joint Purchasing*: The Centre must convert voluntary matchmaking into binding commitment by contracting in its own name for registered buyers, backed by binding volume commitments and standardized terms. The paper argues this requires a dedicated legal design under Article 101(3) TFEU, with an information barrier operated by the Centre (so participants never see one another's volumes, specifications, or prices, thereby preventing buyer cartel behavior), and non-discriminatory access criteria.
  - *Stockpiling*: Proposes a public-private reserve with tiered targets (60 days of EU consumption as a baseline, rising to 180 days for high-risk materials where a single third country supplies the majority). Release triggers must be objective and legislated in primary legislation (e.g., third-country export restrictions, sustained price dislocation beyond a defined threshold, verified physical shortage), with provisions for automatic expiry, restocking obligations, and a reserved proportion for SMEs and strategic defense chains.
  - *Investment Support*: Rather than merely providing fragmented capital, the Centre should offer revenue certainty through two-way contracts for difference (guaranteeing price floors and sharing upside), modeled on the US Department of Defense's agreement with MP Materials (USD 110/kg floor for NdPr) and Lynas's commercial floor with Japanese

partners. This must be conditional on EU offtake, time-limited, paired with equity and guarantees, and served by a fast-track approval window measured in weeks.

- *Market Intelligence*: Mandatory, machine-readable reporting duties must be imposed on large users (covering volumes, origin at each processing stage, contract tenor, and inventory levels), discharged under statutory confidentiality. The Centre must firewall its intelligence functions from its purchasing functions to prevent competition law violations. A European price assessment capability should be built where none currently exists.
- *Governance & Due Diligence*: Human rights and environmental due diligence (aligned with UN Guiding Principles and OECD Guidance for Minerals from Conflict-Affected and High-Risk Areas) must be a binding condition of Centre support, evidenced by independent assurance (e.g., IRMA certification). Oversight should include a public contract register, annual reports to Parliament on purchasing and aggregate stockpile levels, standing ECA audit mandate, and full parliamentary membership on the Centre's board (beyond the observer role on the existing CRM Board). SME access must be engineered through reserved tranches, standardized contracts, fee waivers, aggregation services bundling small orders, and Centre-backed credit guarantees.
- **Implementation & Legal Feasibility**: The submission addresses the legal foundation under Article 114 TFEU, citing relevant jurisprudence (ENISA ruling and ESMA short-selling case) that permits the establishment of independent EU bodies with operational powers. However, it cautions against the Meroni doctrine, which requires that delegated powers be clearly defined, subject to strict scrutiny, and cannot involve unfettered discretionary powers—necessitating clear legislative criteria, judicial review provisions, and robust oversight mechanisms. The institutional structure should emulate JOGMEC's integrated model with a Governance Board comprising Commission, Member State, and Parliament representatives. It also acknowledges stakeholder concerns: industry associations (Eurometaux) warn against potential market distortion and distorted pricing signals from artificial demand consolidation, while civil society organizations (SOMO, EURMC) criticize the focus on extractive investments over circular alternatives and warn

of exacerbated human rights and environmental risks in partner countries. Leaked Commission documents revealing politically motivated additions to the strategic projects list further underscore the need for transparency and objective criteria.

- Conclusion: The document concludes that Europe's critical raw materials problem is no longer one of diagnosis. The CRMA set benchmarks, RESourceEU set direction, and the European Court of Auditors has confirmed that neither has translated into secure physical supply. What is missing is an institution with the legal power to commit, contract, purchase, stockpile, and invest at scale. Strategic autonomy built on unaccountable supply chains would not be resilience but a transfer of risk to vulnerable communities and partner countries. Every strand of the proposed Centre must operate through binding commitment rather than voluntary coordination: contracts for purchasing, legislated triggers for stockpiles, guaranteed revenue for investment, and mandatory reporting for intelligence.