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DARSE

Democratizing Access to Research Software Engineering

Our Mission

Democratize access to research software engineering (RSE) by creating an educational pipeline for RSE, building a team of RSE professional and trainees, and engaging them in the advancement of computational, data-intensive, and AI-enabled science projects in the Mid-Atlantic region and beyond.

What is an RSE?

Research Software Engineer (RSE)

Someone who combines professional software engineering expertise with an intimate understanding of research.

Who would be considered an RSE?

- Researchers who spend a lot of time programming
- Software engineers who write code to solve research problems
- Someone who feels they are in between a researcher and a software engineer!

Project Goals

- Establish a graduate level course and RSE pilot certificate
- Identify and create a sustainable and scalable pipeline of RSEs to accelerate and enable domain sciences, especially in the SBE and CSI domain areas
- Connect RSEs from other initiatives such as NSF ACESS, SCIPE and US-RSE to foster a broader network
- Explore how data-driven ML/AI methods can be applied for problems in domain science

Research Software Engineers

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Abhin Suresh, Ph.D
Physics from UD
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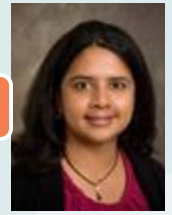
UD Leadership

PI



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🚀 Design and build state-of-the-art AI Infrastructure in-house

🧠 Build tailored open-source LLMs

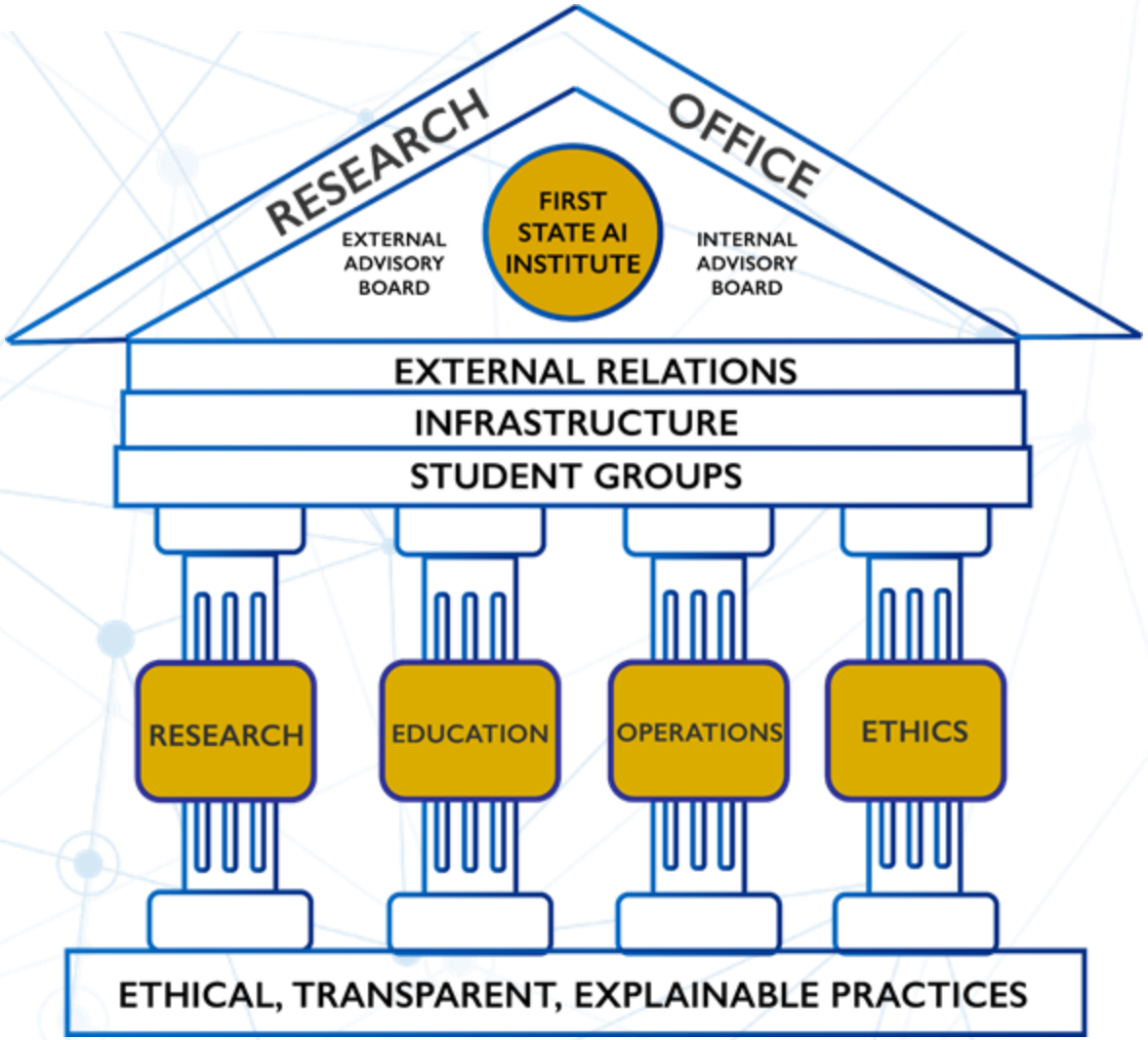
🧪 Experiment with cutting-edge AI practices

📚 Advance foundational AI research

🎓 Upskill/reskill next-generation workforce

Partner closely with the State of DE AI Commission

🌐 Position FSAII as an economic catalyst for UD and the State



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NSF

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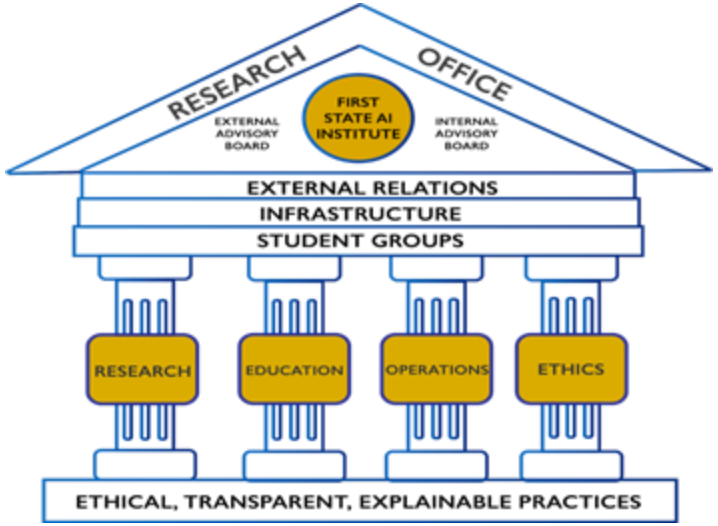
FIRST STATE AI INSTITUTE



SUMMARY –Interdisciplinary Science Projects

- Urban and Coastal Flood Modeling
- Sub-Model for Settling Velocities of Cohesive Sediment
- Multi-Model Topic Models of Foreign Policy Speech Texts and Photographs
- Detect arsenic and other toxic elements in book cloth using XRF + machine learning
- Prediction of Flocculation size Distribution in Coastal region
- Machine Learning to Augment Pitcher Performance – Sports Analytics
- AI Predicted College Readiness for High-School Students
- Phase-behavior of multicomponent emulsions under the influence of thermal fluctuations
- And more….

MOTIVATION

Researchers (STEM and non-STEM) want to push boundaries and unearth questions that were not possible to answer until now – thanks to hardware/software advancements

COMPUTING/AI TOOLS & METHODS

Laptops to large GPU/CPU clusters, Tensor Flow, PyTorch, LLMs for inferencing, ML methods (Random Forest, XGBoost, etc), GCP instances

IMPACT

- Reduces manual effort through automated data validation, increasing the overall efficiency of data collection and processing
- Assist the athletic department to improvise game strategy real-time; increasing experiential learning opportunities for students
- Create a detailed classification of urban environments supports flood risk assessment, urban development, and conservation strategies.
- Create new resources for policymakers & analysts, to monitor policy priorities of less transparent regimes.
- Earlier identification of at-risk students; fewer missed interventions; District-level reporting to inform policy and funding decisions

CHALLENGES, **HOW TO:**

- Sustainability and long-term maintenance
- Complexity in creating scientific software with evolving hardware landscape
- Diverse teams, coordinating contributions, managing code quality
- Shared learning
- Equip researchers with state-of-the-art skills
- Adopting FAIR principles across disciplines; incentive