

Contact: Rachel Boon

**REQUEST FOR NEW CENTER AT IOWA STATE UNIVERSITY:
TRANSLATIONAL AI RESEARCH AND EDUCATION CENTER**

Action Requested: Consider approval of the request by Iowa State University for a new Translational AI Research and Education Center in the Office of the Vice President for Research.

The Council of Provosts and Board office support approval of this request.

Background: The proposed Translational AI Research and Education Center (TrAC) will formalize an interdisciplinary research center focused on the convergence of Artificial Intelligence (AI) and machine learning (ML) along with domain experts interested in applying AI/ML in their domains with the broad vision of solving science, engineering and societal problems for human welfare via applying AI principles, techniques and technologies.

Need for proposed center. With the advent of ubiquitous sensing technologies that generate large data sets, dramatic improvement in computing power, and recent advances in machine learning (ML), the discipline of artificial intelligence (AI) is poised to fundamentally transform several industries, including manufacturing, healthcare, transportation and agriculture. To accelerate AI research and development and to maintain America's leadership in this space, the National AI Initiative Act (2020) mandates significant national investment in AI R&D. The goal of this national initiative is to revolutionize the sectors of transportation, healthcare, manufacturing, financial services, agriculture, weather forecasting, national security and defense through AI. The federal government also considers AI to be a key strategic investment area. In view of this federal R&D emphasis on AI, and the broad industry acceptance of AI, the goal of this center is to position Iowa State University as a leading research institution in the area of Translational AI through establishing this university-level research center.

ISU is uniquely positioned to be a thought leader in Translational AI. ISU faculty have made significant intellectual contributions at the intersection of AI and various application sectors such as agriculture, manufacturing, healthcare and transportation. These efforts have been mostly siloed, involved small teams pursuing small/medium investments, and lacking a bottom-up institution-wide cohesion. Recently, ISU was awarded a \$20M National Science Foundation grant to move this area forward. Our overall vision of the proposed center is to break down these disciplinary silos and bring together core AI researchers at ISU with domain experts interested in applying AI in domains that are traditional and emerging strengths at ISU.

Activities and objectives of proposed center. The TrAC proposes to:

- Research: Grow Translational AI research at Iowa State with a focus on core AI research and its translational applications to various domains including (i) materials, design and manufacturing, (ii) health and quality of life, (iii) autonomy, (iv) food, energy and water. A key goal of our translational AI research is to ensure ethical, fair and bias-free use of AI technologies while overcoming various adoption barriers. The center will support multiple seed projects to initiate and strengthen convergent collaborations between AI experts and domain experts. To further enable and streamline translational AI research at ISU, the center will help to successfully initiate and maintain the research activities with appropriate high-performance computing (HPC) resources, and follow the best practices of managing and distributing data and software as required by the sponsors. Support will also include faculty and student onboarding with AI basics via carpentry and bootcamp style programs.

- Collaboration and knowledge transfer: The center will organize a seminar series to increase the visibility of Translational AI research at ISU, both internally and externally. We plan to host at least one workshop every year on a specific and timely topic of significant interest among the center members. We understand that the scientific language barrier often becomes a critical hurdle for interdisciplinary research, and Translational AI research is no exception in this regard. Therefore, we will promote a student-driven and faculty-advised journal club that will lower this barrier via discussing literature from the AI community and the application domains.
- Workforce development and training: The center will be committed to building the next generation AI workforce in the Midwest for various industries through training and educational activities. The center members will provide translational AI research experience at the intersection of AI and various application domains to a diverse pool of graduate and undergraduate students. In addition, we will provide thought leadership in enhancing ISU curricular activities in the area of translational AI.
- Industry consortium: The center will serve as a pre-compete industrial nexus for translational AI. The center will coordinate with the industry partners and connect them with appropriate ISU researchers to support Translational AI research needs of the industry. Such activities will be streamlined through developing a comprehensive IP infrastructure for software/algorithm products related to Translational AI activities. We will also work with industry leadership to identify low Technology Readiness Level (TLR) research problems to seek federal funding, and enable technology transition of high TRL research. The industry partners will have valuable representation opportunities in front of a Translational AI specific audience during various center events. This will help the industry partners connect with students having Translational AI expertise looking for internships and full-time employment.

Relationship to mission and strategic plan. As noted in the ISU strategic plan, ISU's mission is "to create, share, and apply knowledge to make Iowa and the world a better place." The proposed center aligns well by using transformational basic and applied research in Translational AI that play a key role in diverse application sectors including agriculture, manufacturing, healthcare, transportation and energy. In addition, TrAC's core mission includes training, education and workforce development, which aligns with ISU's mission to prepare future leaders of our nation and world. Federally - and industrially- funded research projects in the translational AI space will also create entrepreneurial opportunities for ISU faculty and students.

The proposed center will focus on core AI research and its translational applications to various domains. The application domains were identified based on demonstrated ISU expertise and the ISU Office of the Vice President of Research (OVPR) Grand Challenge Research Themes (GCRT). We will also continuously explore new emerging AI application areas to remain aligned with the national AI strategy. The proposed vision and the research areas align well with the grand challenges identified by the OVPR as shown in the table below.

Proposed TrAC research areas	OVPR GCRT
AI Core	Advancing Data-Driven Discovery and Secure Cybersystems
AI for materials, design and manufacturing	Creating Next-Generation Materials and Manufacturing Technologies
AI for health and quality of life	Enabling Healthy Lives
AI for autonomy	Advancing Data-Driven Discovery and Secure Cybersystems; Enabling Healthy Lives
AI for food, energy and water	Building Sustainable Human and Natural Ecosystems
Ethical, fair and bias free use of AI	Developing global citizens and vibrant societies

Relationship to other centers/institutes at the university. With a strong focus on data and machine learning driven technologies, we envision that TrAC will become an integral part of the overall ISU data science ecosystem. While it will fill a key gap in the ISU research center landscape, it will operate in a synergistic manner with other relevant centers within the campus such as Virtual Reality Applications Center (VRAC), Center for Survey Statistics and Methodology, Center for Nondestructive Evaluation (CNDE) and NSF HDR TRIPODS: D4 (Dependable Data-Driven Discovery).

Relationship to centers/institutes at other universities in Iowa and potential for collaboration. There are no existing centers within other institutions in Iowa that are poised to undertake the mission and activities established by TrAC. While smaller initiatives exist(ed), ie. ISU’s Data Driven Science initiative and UI’s Iowa Initiative for Artificial Intelligence, no large-scale effort of the proportion of TrAC exists. In particular, several large and medium scale industries (with strategic importance to the state of Iowa) have indicated interest in membership. The proposed center would enhance and expand the research opportunities for faculty at UI and UNI.

The only centers within Iowa institutions with potential for cooperation or collaboration in the area of multiphase flow research are affiliated with ISU, as described above.

Resources, facilities and equipment required. The principal administrative support staffing needs of the center and its associated faculty are pre- and post-award, operations, industrial liaison and communications. In addition, there is a critical need for a resident data scientist who can orchestrate all (a) training/ onboarding activities, (b) provide troubleshooting help for team members, (c) ‘professionalize’ SW/data products from the group for broad dissemination. Affiliated faculty will continue to use their existing office and laboratory spaces. Office space for staff members and space for TrAC student gatherings to host journal clubs and demonstration activities are required.

No additional facilities or equipment are needed.

Expected funding sources. The TrAC at ISU will be funded primarily by extramural grants and contracts. The center’s work will be supported by sponsored funding awarded to affiliated researchers from government agencies, foundations, and industry. The TrAC researchers have

a stable funding portfolio of greater than \$2M per year. Major sponsors are the NSF, USDA-NIFA, DoE and DoD.

To support TrAC administrative staff and operational costs that are not allowable by external grants, the OVPR and college partners will reallocate a portion of facilities and administrative costs that flows directly from the TrAC's external research funding expenditures.

	SOURCE(S) OF FUNDS	TOTAL ANNUAL COSTS
Year 1	Presidential Interdisciplinary Research Initiative (PIRI) award, F&A from federal grants	\$200,000
Year 2	Presidential Interdisciplinary Research Initiative (PIRI) award, F&A from federal grants, industry consortium fees	\$205,000
Year 3	Presidential Interdisciplinary Research Initiative (PIRI) award, F&A from federal grants, industry consortium fees	\$210,000
Year 4	F&A from federal grants, industry consortium fees	\$215,000
Year 5	F&A from federal grants, industry consortium fees	\$220,000

Evaluation plan. Each spring, the TrAC's activities, metrics, progress and goals will be reviewed by the OVPR at ISU. The Director will be provided a written performance assessment based on that review. In addition, the Center will be reviewed in depth in its fifth year and every seven years thereafter.

Date of implementation. Upon approval by the Board of Regents.