Opportunity Title: AI Design & Discovery for Developing Advanced Materials for Use in Advanced Power & Energy Systems Fellowship
Opportunity Reference Code: ICPD-2024-22

Organization
Office of the Director of National Intelligence (ODNI)

Reference Code
ICPD-2024-22

How to Apply

Create and release your Profile on Zintellect – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 3 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: https://orise.orau.gov/icpostdoc/index.html.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline
2/28/2024 6:00:00 PM Eastern Time Zone

Description

Research Topic Description, including Problem Statement:

We expect the scale and scope of AI-assisted discovery and design to grow significantly during the next decade as datasets become more robust and computer simulation-driven efforts are proven in real-world applications. In some cases, AI-driven technology design processes are estimated to run orders of magnitude faster than human intensive processes. Meanwhile, the world faces rising energy demands at a time when countries are trying to reduce their carbon footprint. Meeting growing energy demands, while reducing carbon emissions and dependence on fossil fuels have significant national security, environment, and economic impacts. This topic seeks opportunities where AI for design and discovery could be used to discover new materials, methods, or processes that will aid in the energy transition, significantly reducing the computationally intensive R&D phase, cost, and timeframes by years. This initiative aims to bring together AI researchers along with experts from other science and technology disciplines to integrate AI tools into power, energy, and materials technical fields and expedite the pace of scientific and engineering discovery.

Example Approaches:

energy generation. There are different ways to approach this research; versatility is encouraged. For example:

- One approach could use AI software to investigate energy innovations that could include novel ways of charging or optimizing batteries (improved energy density and increased cycle life), or the approach could investigate potential new battery chemistries that could ultimately replace lithium-ion batteries.
- AI could also be applied to fusion energy research for design and discovery. AI-designed and operated intelligent controllers could help prevent the release of massive free energy in multi-billion dollar fusion reactors, reducing the need for costly repairs. AI design and discovery could alternatively be used to identify new materials capable of functioning under the extreme pressures and temperatures of fusion energy generation.
- Any example where AI could be used to optimize or discover new advanced power and energy systems or materials through the reduction of research timelines, cost, and supply chain vulnerabilities is of interest.

Relevance to the Intelligence Community:

The linkage to current DNI's S&T priorities is dependent on the submissions we receive. However, we anticipate those submissions will likely include the following priorities: Artificial Intelligence/Machine Learning, Chemical Sciences, Energy and Power, and Materials and Manufacturing.

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Key Words: Artificial intelligence, AI for Science, AI4science, deep learning, emulation, machine learning, high-entropy alloys, metamaterials, chemical engineering, molecular design, molecular engineering, bio-engineering, next-generation batteries, advanced batteries, battery electrolytes, nuclear fusion, magnetic confinement fusion, tokamak, stellarator, hardware, software, data, optimization, supercomputing, intelligent controllers, intelligent control algorithm, neural networks, optimization algorithm, computer simulation, GPUs, super conducting metal, advanced magnets, advanced power and energy, clean energy, green energy

Qualifications

Postdoc Eligibility

- U.S. citizens only

- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the appointment start date

- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory

- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory

- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Communications and Graphics Design** (6 👁)
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (45 👁)
  - **Mathematics and Statistics** (11 👁)
  - **Other Non-Science & Engineering** (2 👁)
  - **Physics** (16 👁)
  - **Science & Engineering-related** (1 👁)
  - **Social and Behavioral Sciences** (30 👁)

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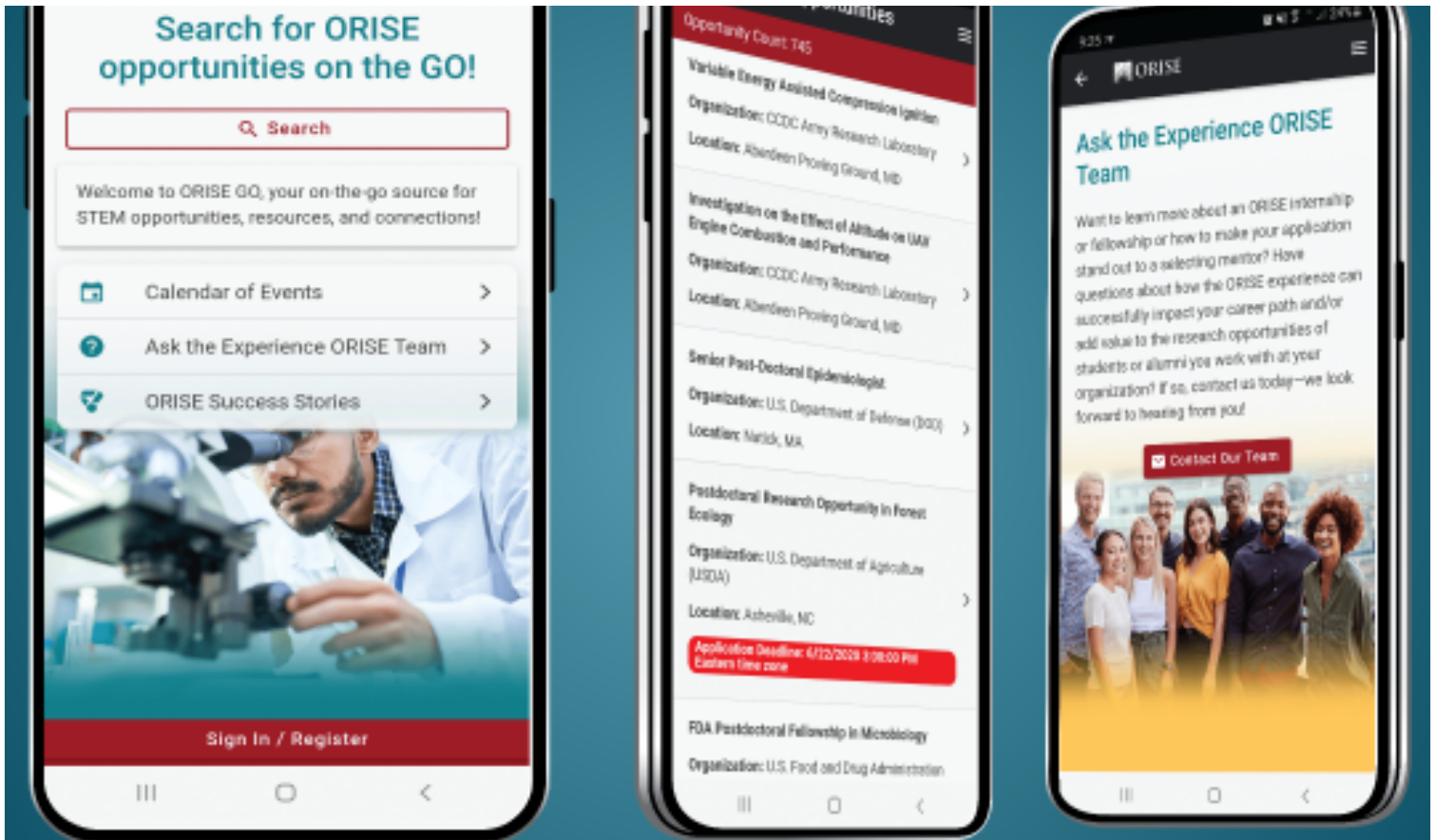
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