

Opportunity Title: Testing of Online System Identification for Equipment Malfunction Detection

Opportunity Reference Code: NETL-2021-FRP-Shadle

Organization National Energy Technology Laboratory (NETL)

Reference Code NETL-2021-FRP-Shadle

How to Apply Applicants should apply through the Oak Ridge Institute for Science and Education (ORISE) program in Zintellect. The ORISE Program provides opportunities for undergraduate students, recent graduates, graduate students, postdoctoral researchers, and faculty researchers to apply classroom knowledge in a real-world setting to learn about NETL Research and Innovation Center's (R&IC) core mission areas. For more information on the program, visit https://orise.orau.gov/netl/programs/frp.html.

A complete application consists of:

- · An application
- A current resume or CV, including academic history, employment history, relevant experiences
- · Two educational or professional recommendations

All documents must be in English or include an official English translation.

If you have questions on the application process, you may reach us at <u>NETLinfo@orau.org</u>. Please include the reference code for this opportunity in your email.

Application Deadline 10/31/2021 3:00:00 PM Eastern Time Zone

Description The Faculty Research Program offers qualified academic faculty an opportunity to collaborate with NETL principal investigators on research that is mutually beneficial to NETL and the selected applicant at state-of-the-art NETL facilities. While typical appointments are part-time, some appointments are offered on a full-time basis during the summer or as a sabbatical. Prior to the appointment, the NETL principal investigator and selected applicant will define the scope of research and schedule the appointment period. Appointment periods range from one month to more than one year. Funding varies and is awarded based upon the participant's institutional salary. Faculty members are expected to elevate the collaboration with NETL by supporting connections with students at their home institution, in addition to the research project.

Connecting Students with NETL

The collaboration between the selected faculty member and NETL will include connecting their academic institution and students with NETL. Student connections may be fostered through activities such as, but not limited to, the following

- Inviting NETL scientists and engineers to present at a departmental seminar
- Joining NETL at institutional career/job fairs to discuss your experiences with NETL
- Speaking about your experiences with NETL (expect 5-15 minutes) at information sessions
- · Sharing invitations to NETL information sessions with students

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- Partnering with NETL on proposals and other funding opportunities
- Recommending opportunities to NETL scientists and engineers, such as serving as a reviewer or editor, leading a workshop, etc. to NETL scientists and engineers
- Serving as an ambassador to NETL for students interested in careers in the national labs

Research Project

Through the Oak Ridge Institute for Science and Education (ORISE), this posting seeks a faculty collaborator to engage in projects with the Research Innovation Center (RIC) at the National Energy Technology Laboratory, under the mentorship of Larry Shadle.

NETL Advanced Sensors & Controls group has a collaboration opportunity available concerning Testing of Online System Identification for Equipment Malfunction Detection. In Task 53 of the AS&C FWP, System ID algorithms will be adapted to improve control during boiler load following operations. NETL is partnering with Ames Lab to demonstrate online System ID techniques on historical power plant data, dynamic models, and power generating equipment including NETL laboratory pilot-scale power system, and where feasible, on power plants. In this study, advanced control algorithms employing online system ID technology will be conceived and developed for steam attemperation. The dynamic model will be enhanced to simulate a commercial boiler identified by NETL's industrial partner. The performance of the advanced controllers will be compared to the controller in use at power plant, particularly during load following operations.

Qualifications The ideal candidate would have a background in some, but not necessarily all, of these elements:

- 1. Advanced control technologies
- 2. Online and dynamic modeling techniques
- 3. Autorecursive numerical methods
- 4. Boiler plant operations
- 5. Steam turbine behavior
- 6. Heat recover steam generators.

To be eligible, you must have a research interest in NETL core R&D areas and hold one of the following faculty positions at an accredited college/university:

- Full-time or part-time faculty member
- · Faculty emeritus guiding student research
- University researcher guiding student research

Additional requirements:

- The selected applicant will be asked to submit a certification of institutional salary, confirming their position with the college/university/institute.
- Part-time appointment candidates must submit a Part-Time Approval



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Form.

• Sabbatical appointment candidates must include a statement describing the financial arrangements with their academic institution, including fringe benefits paid by the institution (state as a percentage of salary and itemize).

Eligibility Requirements

- Citizenship: LPR or U.S. Citizen
- Degree: Master's Degree or Doctoral Degree.
- Academic Level(s): Faculty.
- Discipline(s):
 - Chemistry and Materials Sciences (12.)
 - Communications and Graphics Design (2.)
 - Computer, Information, and Data Sciences (17. •)

 - Engineering (<u>27</u> [●])
 - Environmental and Marine Sciences (14)
 - Life Health and Medical Sciences (46)
 - Mathematics and Statistics (10 (10)
 - Physics (<u>16</u> [●])
 - Science & Engineering-related (1.)
 - Social and Behavioral Sciences (28 •)
- **Affirmation** I certify that I have a research interest in NETL core R&D areas and hold one of the following faculty positions at an accredited college/university:
 - Full-time or part-time faculty member
 - · Faculty emeritus guiding student research
 - · University researcher guiding student research