

University of Arkansas Center and Institute Proposal

In addition to the ADHE Letter of Notification-2 form, a center proposal should include the following items in a separate document:

- Name of the College, School, Department, or Unit in which the Center will be housed.
 - College of Engineering, Department of Electrical Engineering and Department of Computer Science and Computer Engineering
- Name and title of the person(s) proposing creation of the Center.
 - Dr. H. Alan Mantooh, Distinguished Professor and Executive Director of the SEEDS Center
- The Center type (research, service, or instructional) that is requested.
 - Research
- The unique value of the program to the University, and the distinction to any similar programs in Arkansas.

In 2011, The Energy Sector Control Systems Working Group (ESCSWG) developed the revised “Roadmap to Achieve Energy Delivery Systems (EDS) Cybersecurity” in support of the Electricity Sub-sector Coordinating Council, the Oil and Natural Gas Sector Coordinating Council, and the Government Coordinating Council for Energy under the Critical Infrastructure Partnership Advisory Council (CIPAC) Framework. This project is specifically designed to address the high-level objectives and meet or exceed the Roadmap vision.

The overall objective of this project is to research and develop innovative cybersecurity technologies, tools and methodologies that will advance the energy sector’s ability to survive cyber attacks and incidents while sustaining critical functions. Part of this project is to verify and validate efficacy of the developed solutions and methodologies for transition to practice and commercialization in the energy sector. These solutions and methodologies will enhance the resilience of energy delivery infrastructure, which includes the electricity subsector and the oil and natural gas subsector. The specific technical areas of research and development will focus on five areas: secure grid control and operations; secure emerging power grid components and services; secure energy delivery system operation technology infrastructure; cybersecurity management and visualization and cybersecurity testing and validation.

SEEDS is one of only two centers funded under a very large solicitation (or FOA) by DoE. This establishes the UA in a wonderful position to move up among the leaders in cybersecurity research such as Carnegie Mellon University (a SEEDS partner) and the University of Illinois (the other center selected). Winning this center gave the UA instant credibility in this area and will help to enhance its research reputation.

- Information on the Director position and the organizational structure.

SEEDS is a cooperative research center that will have been formed between five U.S. Universities and the Arkansas Electric Cooperative Corporation. In addition, a member-based system will be set up in the first year of the center, allowing participation from a wide number and variety of companies interested in the field of cybersecurity for grid-connected systems.

The University of Arkansas, Fayetteville will serve as the lead site of the center. The other universities involved in the center are the University of Arkansas at Little Rock, Lehigh University, Carnegie-Mellon

University and Florida International University. The model being set up for the center will allow for additional university sites to be added if they complement the research agenda of the center. Within the University of Arkansas, Fayetteville this research effort is being led cooperatively by faculty from the Department of Electrical Engineering and the Department of Computer Science and Computer Engineering, both within the College of Engineering.

Dr. Alan Mantooth, Distinguished Professor, will serve as the Director of the Center and Dr. Shannon Davis will serve as the Managing Director. They are both members of the Department of Electrical Engineering. Dr. Qinghua Li will serve as the Associate Director of Research and Dr. Jia Di will serve as the Associate Director of Technology Integration. Dr. Li and Dr. Di are both members of the faculty of the Department of Computer Science and Computer Engineering.

Dr. Mantooth serves as the primary interface with the Department of Energy as well as the SEEDS Industrial Advisory Board (IAB). He will oversee the entire center, liaise with the IAB and DOE first. He will work on the recruitment of companies to participate on the IAB. Last, he will also participate technically on the software engineering decisions in order to help ensure proper testing and demonstration in the industry environment.

- Description of administrative control and lines of authority for the Center.

The Center will follow the campus policy and procedures of the University of Arkansas. The center reports to the Head of the Department of Electrical Engineering, who in turn reports to the Dean of the College of Engineering. The Dean reports to the Provost and the Provost reports to the Chancellor of the University.

- Identification of faculty (or qualifications of type of faculty), other personnel, and academic units that will be involved with the Center.

Dr. Davis, as the Managing Director, will perform the day-to-day functions associated with the center. This center aspires to become a national model. Therefore, the need to confirm that the research is in concert with industry goals and expectations is paramount from the beginning. Also, close relationships with industry from the outset help to immediately initiate the sustainability strategies of the center. The MD will be the representative of the center with industry on a day-to-day basis. She will participate in the recruitment of members for the IAB and will serve as the communications link between the IAB, Project Leadership Team (PLT), Executive Team and the Director. The MD will coordinate, collect, edit and submit quarterly and annual reporting materials, making sure that all partners have provided the appropriate input. The MD will provide logistics support for annual meetings and will perform outreach with industry with regard to technology transfer as the center matures. The MD will also be responsible for organization and oversight of the 6 partners (initially 5 universities and one company) in order to meet the prescribed milestones and nationally oriented goals.

Dr. Li (Associate Director for Research), will interface most directly with the Area leaders (see Fig. 1) on technical matters on a day-to-day basis. Coordination of activities across and between research areas is the primary responsibility of Li working through the area leadership. Dr. Di will (Associate Director for Technology Integration) will work closely with Li, the MD and the Director to ensure that the research activities are aligning well with national industrial goals.

- Description of the advisory board including its size, the method of its selection, and length of terms.

It is anticipated that the SEEDS IAB will initially consist of around 30 companies, recruited by all of the center’s sites. There is no upward limit on the number of companies that can join the center, however. Members can be any company that has interest in research being done in cybersecurity for grid-connected systems. It is anticipated that members will primarily be either users of cybersecurity tools (e.g., utility companies), manufacturers of equipment that embed cybersecurity tools, or companies providing/maintaining cybersecurity software. The IAB will be led by a Chair and a Vice-Chair. Each year the IAB will elect a Vice-Chair, who will serve in that position for one year. In the following year, the Vice-Chair will become the Chair and a new Vice-Chair will be elected. The IAB will be responsible for selecting projects for funding (based on projects proposed by faculty), reviewing progress of ongoing projects, and providing direction to researchers on future projects.

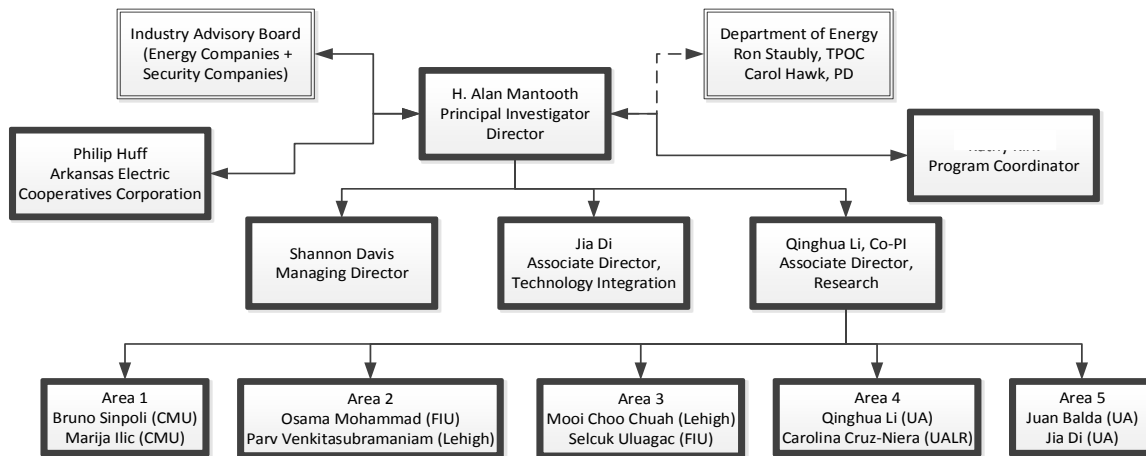


Fig. 1. Project leadership team for cybersecurity research activity.

- Student involvement, if any.

Students will play a critical role in the research agenda of the center. Each faculty researcher will have graduate research assistants working on projects in the center. In addition to their research activities, the center will provide students with a variety of opportunities to present their work at conferences, center meetings and in webinars. Funding is also available for undergraduate researchers to join the work where it is appropriate. Center faculty and staff will also actively seek supplements and other funding to provide more and more varied opportunities for students to become involved in SEEDS work.

- Annual budget for the Unit or the estimated expenditures per year.

The center will have estimated annual expenditures exceeding \$2M during the first 5 years. This expenditure rate is supported by a \$15.2 million dollar grant from the Department of Energy.

- Estimated fiscal resources and potential sources of funding (e.g., state, private, endowment, grant, contract, or other).

For the first five years of the center's life, funding will primarily be provided by the \$15.2 million dollar grant (including cost-sharing) awarded by the Department of Energy. During the first year of the center, a member-based model will be established to attract industrial partners to the center. No membership fees will be collected in the first year of the center's life. In subsequent years, membership dues will be collected from members of the center's IAB. The bulk of these funds will be used for research funding, but a percentage will be kept to cover administrative expenses for the center. After the first five years of the center, membership fees will be the primary funding source of the center. Faculty and staff will actively seek additional grants and supplements to provide additional funding support for the center.

Annual costs will vary each year depending on the work being done. See Table 1 for a breakdown of the awards by site and by year. Funds are used to support faculty, staff and students, tuition fees, equipment and supplies for research, and travel to center meetings and academic conferences.

- Space and equipment needs of the Center and a description of how they will be met.

Each university will provide lab space for their faculty and students to work. The bulk of space used will be in individual faculty labs. At the UA, Fayetteville, in addition to faculty labs, center work will be performed in the National Center for Reliable Electric Power Transmission (NCREPT). In support of this center, NCREPT will be expanded to better facilitate research in the area of cybersecurity. This will nearly double the amount of laboratory space in NCREPT and create space for additional students and faculty to work, as well as space for collaborative researchers visiting our campus to test their research.

- The metrics to be used to evaluate the Center's feasibility at its five-year review.
 - SEEDS will achieve the technical milestones set forth in the DOE Cooperative Agreement.
 - Per the DOE Cooperative Agreement, SEEDS will be a self-sustaining center in five years.
 - The Center will be a membership-based center with sufficient membership to sustain operations.
 - The Center will have at least two external universities involved.
 - There will be graduate student participation at the undergraduate and graduate levels.