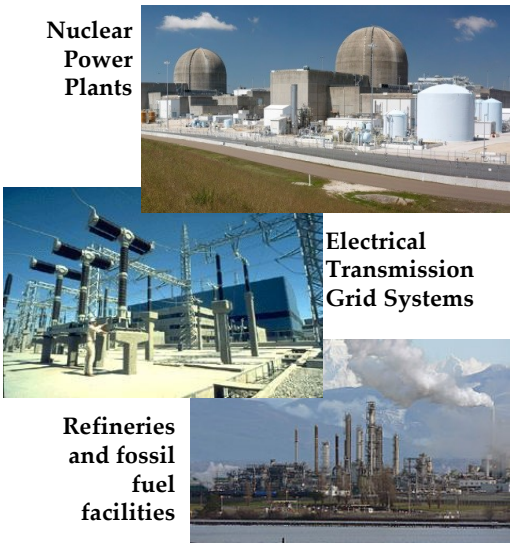
Cybersecurity of Nuclear Facilities and Critical Infrastructure Program

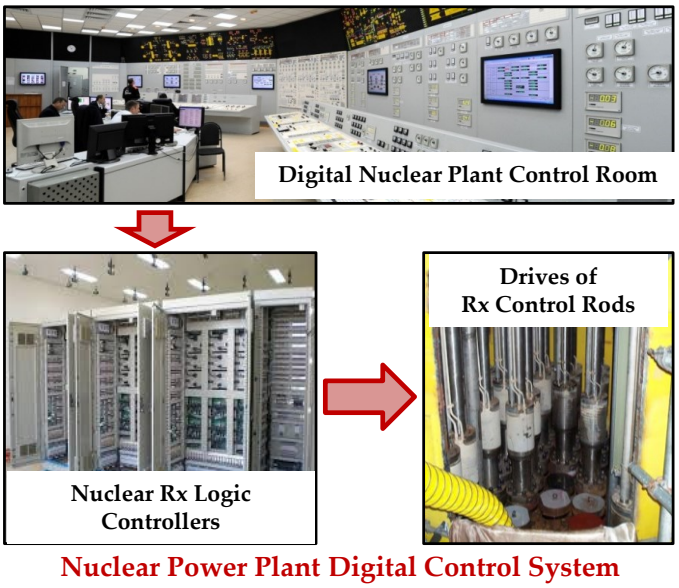
Institute for Space and Nuclear Power Studies, University of New Mexico

The University of New Mexico's Institute for Space and Nuclear Power Studies (UNM-ISNPS) http://isnps.unm.edu/, in collaboration with Sandia National Laboratories (SNL), Albuquerque, NM, is initiating a new program starting fall 2018 under a multi-year DOE-NEUP grant.



Examples of Energy Infrastructure

The new program is led by Distinguished and Regent's Professor Mohamed El-Genk, with key participation and involvement by Dr. Christopher Lamb, member of technical staff at SNL and Research Assistant Professor at UNM, and Dr. Timothy Schriener, Research Assistant Professor with UNM-ISNPS. The program activities that would be carried out both at UNM and SNL, offer unique opportunities to qualified students from UNM to participate in cutting edge research on the timely and important topic of protecting the national critical infrastructure from malicious cyber-attacks and enhancing the functionality and resiliency of commercial nuclear power plants and other energy infrastructure facilities.

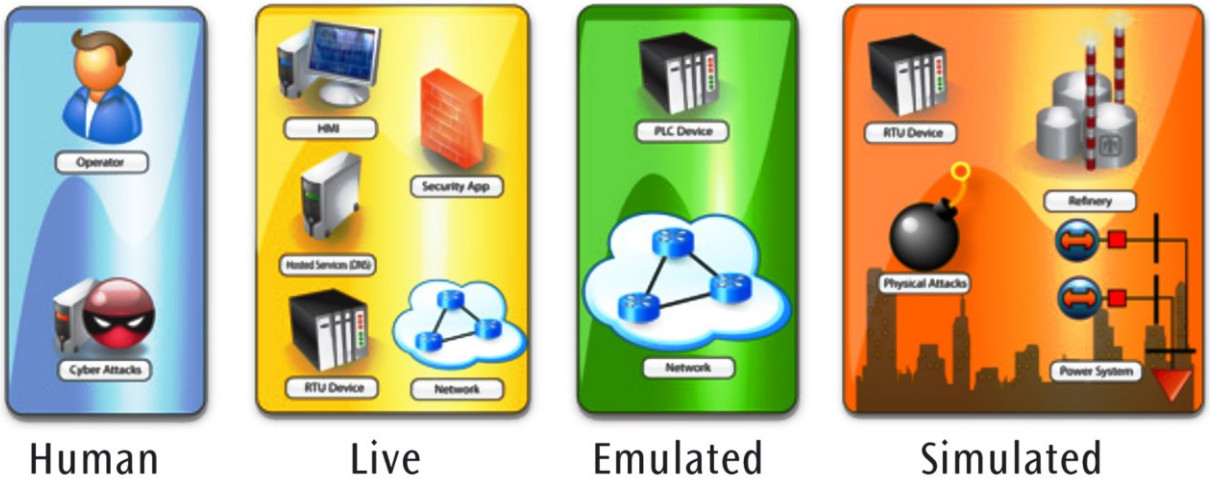


Nuclear Power Plant Digital Control System

The primary focus of the effort is to develop a Nuclear Instrumentation and Control Simulation (NICSim) platform with novel emulytics capability to simulate control systems and components in nuclear power plants. The platform would use the DOE SCEPTRE emulation framework, developed at SNL to evaluate cyber-attacks on energy grids, to simulate digital instrumentation & control (I&C) systems in nuclear power plants by running actual software images, or, if needed, specific hardware elements of these systems. It would simulate (via computational models), emulate (via precise firmware and software execution in emulated hardware environments), and embed

hardware to evaluate the cybersecurity posture, vulnerability, and potential response of control systems in nuclear power plants to cyber-attacks.

The hardware emulation of I&C system components, using real device firmware and software images, would enable the NICSim platform to evaluate with high fidelity the response and behavior of the actual software running system components under cyber-attack. The emulated I&C system components would be coupled to simplified, physics-based models of a given plant's components to enable real and direct feedback of the integrated I&C system's behavior, both nominally and while under cyber-attack.



DOE SCEPTRE Framework

The results of this cooperative and joint effort between UNM-ISNPS and SNL will help increase the understanding of the real risks of cyber-compromise to I&C systems in the existing and future nuclear power plants. This effort will also help educate and train a new cadre of engineers and computer scientists and the next generation of researchers and security specialists. Students interested in participating in this exciting research program please contact UNM-ISNPS at mgenk@unm.edu. Only qualified US citizens and permanent residents who are full time students can apply for a Research Internship or a Research Assistantship to start fall 2018.

INSTITUTE FOR SPACE AND NUCLEAR POWER STUDIES

THE UNIVERSITY OF NEW MEXICO.

NEUP Nuclear Energy University Program

U.S. Department of Energy