Title: An Educational Platform for Modern Instrumentation and Control of Nuclear Systems

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We propose to establish the infrastructure for an educational platform that will attract and instruct students in modern nuclear instrumentation and control (I & C) methods to serve the nuclear power fleet, laboratories in the DOE complex, and technology based industries for the next generation. The emphasis will be on the use of real time digital instrumentation in both an educational and research environment. Our objective will be to use the support from this proposal to construct five instrumentation stations and one end station for a high neutron fluence based research program containing the digital technologies used in national research laboratories and industry. We also intend to expose students to radiation damage studies using the end station which are relevant for the NEUP's advanced fuel initiatives. According to the IAEA, about 40% of the worlds operating nuclear reactors have modernized their analog based instrumentation and control systems with digital technology. We believe our proposal will establish a practical modern instrumentation training facility in support of the NEUP's mission to further NS&E R&D and education.

The equipment acquired through this proposal will be used to establish six digital instrumentation stations, similar to a station that was establish by the PI. Five of the stations will be deployed in a classroom environment to educate students on the theory and application of modern techniques for digital instrumentation and control. A set of five controlled experiment will provide students with practical experience in digital measurements of the analog output of several different types of radiation detectors. A sixth station will be deployed as an end station. We propose constructing a target to be used for producing a high fluence ($10^{13} n/s/cm^2$) electron accelerator based neutron source which the students will use with a fission chamber detector meant to resemble the neutron monitoring of a nuclear power plant core. The neutron fluence can be controlled by changing the electron beam intensity incident on the high power target used to generate neutrons.