

UNIVERSITY OF FLORIDA

UFTR Digital Control System Upgrade for Education and Training of Engineers and Operators

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Description: The goal of this project is to contribute to a major initiative on design, licensing and construction of a fully digital control system for the University of Florida Training Reactor (UFTR). This makes the UFTR the first operating nuclear power plant in the United States that uses a fully digital control system. This facility will provide for the training and education of the necessary workforce in the area of digital control and instrumentation for nuclear reactors. With this effort, a new focus/certificate on digital control and instrumentation will be developed at the Nuclear and Radiological Engineering (NRE) Department. Further, the UFTR facility will offer training courses for community colleges (Central Florida, Indian River, and Jacksonville) in the State of Florida, personnel from nuclear utilities and government agencies including the Nuclear Regulatory Commission (NRC). The project has already received significant funding from industry and government in form of grants, contracts, equipment/systems, and engineers' time.

Budget: \$308,000

Universities: UF

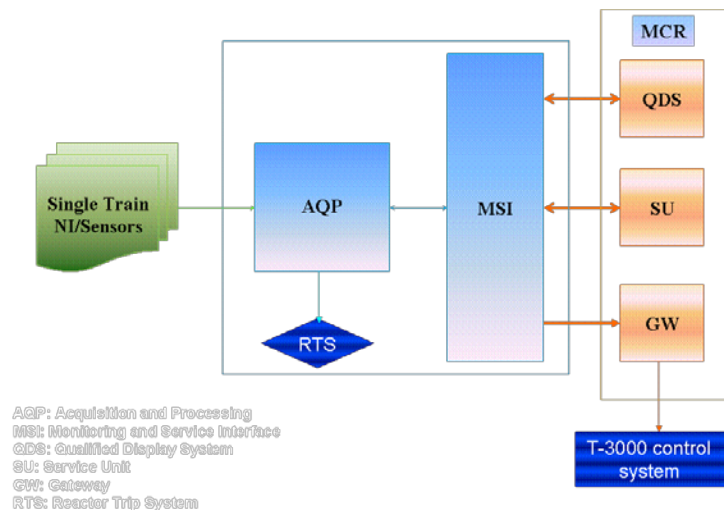
External Collaborators: Several engineers from AREVA NP Inc & Siemens Corporation

Progress Summary

We have been working on the following two major areas:

- i) Design of the new digital system
 - ii) Preparation and submission of licensing documentation to the NRC
- i) Digital system design

Thus far, we have completed a design for the AREVA's TXS protection system. Figure 1 shows the components of this design. The UFTR-TXS system includes three major components: Acquisition and Processing (AQP), Monitoring Service Interface (MSI), and Main Control Room (MCR). This design will be housed into two cabinets as shown in Figures 2a and 2b. Cabinet 1 includes the AQP and all the signal processing units, and the Cabinet 2 includes the MSI and all the MCR components.

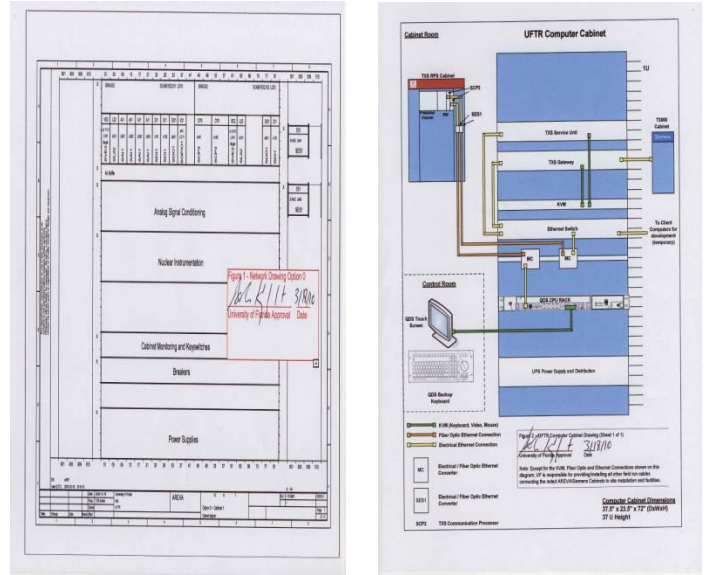


AQP: Acquisition and Processing
 MSI: Monitoring and System Interface
 MCR: Main Control Room; RTS: Reactor Trip System
 QDS: Qualified Display System
 SU: Service Unit; GW: GateWay

Fig. 1 - Schematic of the UFTR-TXS Protection System

ii) Preparation and submission of licensing documentation
 With support from AREVA, we have prepared several important documents, and since Jan 2010, we have submitted seven documents to the NRC. Table 1 presents the list of documents and indicates their status.

| Table 1 – List of Documents ¹ & Their Status |
|--|
| UFTR Quality Assurance Program ² |
| Conduct of Quality Assurance ² |
| Quality Assurance Project Plan (QAPP) ² |
| Safety System Design Basis ³ |
| Diversity and Defense in Depth Analysis (D3) ³ |
| Software Verification and Validation (SVVP) ⁴ |
| TXS Cyber Security ⁴ |
| Software Quality Assurance Plan (SQAP) ⁴ |
| Software Configuration Management Plan (SCMP) ⁴ |
| Software Safety Plan (SSP) ⁴ |
| Software Test Plan – SIVAT Plan ⁴ |
| Factor Acceptance Test (FAT) ⁴ |
| Functional Requirements Specification (FRS) ³ |



a) Cabinet 1

b) Cabinet 2

Fig. 2 – Schematic of UFTR-TXS protection system in two cabinets