Learning Outcomes for the Automation and Control Engineering Technology (ACET) Program

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Automation and Control Engineering Technology (ACET) program graduates will be responsible for the direction, definition, design, development/application, deployment, documentation, and support of systems, software, and equipment used in control systems, manufacturing information systems, systems integration, and operational consulting. These skills can be divided into six work performance domains, namely: (a) system feasibility, (b) system definition, (c) system design, (d) system development, (e) system deployment, and (f) system operation. The learning outcomes for the ACET program are documented *.

1. Within the domain of *system feasibility*, the student shall be able to:
   - define a preliminary project scope
   - determine the automation requirements
   - develop an automation strategy
   - conduct technical studies to define development needs and risks
   - perform a justification analysis
   - create a summary document to facilitate decision making.

2. Within the domain related to the *system definition*, the student shall be able to:
   - determine, document and communicate operational strategies and design requirements
   - analyze possible technical solutions in order to define best automation strategies
   - establish detailed requirements to form the basis for system designs through hardware and software system architectures, equipment data sheets, safety policies and vendor recommendations
   - generate a project cost estimate
   - create a basis-of-design document to summarize project requirements.

3. Within the domain related to *system design*, the student shall be able to:
   - perform safety analysis and identify compliance to standards and regulations
   - establish templates and guidelines in order to satisfy customer design criteria
   - create detailed equipment specifications and data sheets in order to purchase equipment and support system design
   - define data structures and flow models to provide specifications for hardware selection and software development
   - select the physical communication media, network architectures and protocols to support system design and development
   - develop functional specifications for control system solutions to guide development and programming
   - design a test plan to execute appropriate testing relative to functional requirements

- perform detailed design drawings, installation details and purchase requisitions in order to provide detailed information for development and deployment
- prepare construction work packages in order to release project for construction.

4. Within the domain related to *system development*, the student shall be able to:
   - develop Human Machine Interface hardware and software designs
   - develop database and reporting functions
   - develop control configuration or programming in accordance with the design documentation
   - implement data transfer methodology using communication protocols and specifications
   - implement security methodology in accordance with stakeholder requirements
   - review configuration and programming to establish compliance with functional requirements
   - test the automation system using the test plan
   - assemble required documentation and user manuals in order to transfer essential knowledge to customers and end users

5. Within the domain related to *system deployment*, the student shall be able to:
   - perform receipt verification of all system devices to ensure that devices are as specified
   - perform physical inspection of installed equipment against construction drawings
   - load configuration and programs to system devices
   - solve unforeseen problems identified during installation using troubleshooting skills
   - test configuration and programming in accordance with the design by executing the test plan
   - test communication systems and field devices in accordance with design specifications
   - test all safety elements and systems by executing test plans
   - test all security features
   - provide initial training for facility personnel in system operation and maintenance through classroom and hands-on training
   - execute system-level tests in accordance with the test plan
   - troubleshoot problems identified during testing using a structured methodology
   - make necessary adjustments using applicable tools and techniques in order to demonstrate system performance.

6. Within the domain related to *system operation and maintenance*, the student shall be able to:
   - verify system performance and records using established procedures in order to ensure compliance with standards, regulations, and best practices
   - provide technical support for facility personnel by applying system expertise
   - perform training needs analysis periodically for facility personnel using skill assessments

- provide training for facility personnel by addressing identified objectives
- monitor performance using software and hardware diagnostic tools
- perform periodic inspections and tests in accordance with written standards and procedures in order to verify system performance
- perform continuous improvement
- document lessons learned
- maintain licenses, updates, and service contracts for software and equipment
- determine the need for spare parts
- provide a system management plan for performing preventive maintenance, implementing backups, and designing recovery plans
- follow a process for authorization and implementation of changes in accordance with established standards

* These learning outcomes are closely aligned with the The Instrumentation, Systems, and Automation Society (ISA) Certified Automation Professional (CAP) definitions of knowledge domains required for the automation professional. For additional information on the CAP program, see http://www.isa.org/Content/NavigationMenu/Products_and_Services/Certification3/Certification.htm .