

Automation Network Engineer

Alternate Titles: IT Controls Engineer, Network Architecture Engineer, Computer Systems Engineer

Description: Automation Network Engineers provide technical support in the design, development, and application of automation systems. They identify requirements and develop functional and design specifications for networks and network components for automation systems. These automation professionals provide the technical support and design of interfaces to ensure that the automation system integrates with the customer’s enterprise system.

Sources of Material: Certified Automation Professional Body of Knowledge, Automation Competency Model.

Performance Domains:

Domain I: Definition

Domain II: System Design

Domain III: Deployment

Domain I: Definition	
Task 1: Determine operational strategies through discussion with key stakeholders and using appropriate documentation in order to create and communicate design requirements.	
Knowledge of:	Interviewing techniques Different operating strategies Team leadership and alignment
Skill in:	Leading an individual or group discussion Communicating effectively Writing in a technical and effective manner Building consensus Interpreting the data from interviews
Task 2: Establish detailed requirements and data including network architecture, communication concepts, safety concepts, security concepts, reliability concepts, standards, vendor preferences, equipment data sheets, reporting and information needs through established practices in order to form the basis of the design.	
Knowledge of:	Network architectures for industrial and enterprise level networks Communication protocols, including field level Safety concepts Industry standards and codes Security requirements

	<p>Safety standards (e.g., ISA, ANSI, NFPA)</p> <p>Control systems security practices</p> <p>Control system network reliability concepts and practices</p>
Skill in:	<p>Conducting safety, security, and reliability analyses</p> <p>Determining which data is important to capture</p> <p>Selecting applicable standards and codes</p> <p>Identifying new guidelines that need to be developed</p> <p>Defining information needed for reports</p> <p>Completing equipment data sheet</p>
Domain II: System Design	
Task 1: Perform safety and/or hazard analyses, security analyses, and regulatory compliance assessments by identifying key issues and risks in order to comply with applicable standards, policies, and regulations.	
Knowledge of:	<p>Applicable standards (e.g., ISA S84, IEC 61508, 21 CFR Part 11, NFPA)</p> <p>Electrical, electrical equipment, and electrical classification standards (e.g., UL/FM, NEC, NEMA)</p>
Skill in:	<p>Participating in a Hazard and Operability Review</p> <p>Analyzing safety integrity levels</p> <p>Analyzing hazards</p> <p>Assessing security requirements or relevant security issues</p> <p>Applying regulations to design</p>
Task 2: Select the physical communication media, network architecture, and protocols based on data requirements in order to complete system design and support system development.	
Knowledge of:	<p>Vendor protocols</p> <p>Ethernet and other open industrial and enterprise networks</p> <p>Physical requirements for networks/media</p> <p>Physical topology rules/limitations</p> <p>Network design</p> <ul style="list-style-type: none"> ▪ Cable (Wire and Fiber Optic) Networks ▪ Network Component Configuration ▪ Network Diagnostics ▪ Network Management ▪ Wireless Networks <p>Security requirements</p> <p>Disaster recovery</p> <p>Grounding and shielding practices</p>
Skill in:	Designing networks based on chosen protocols
Task 3: Perform the detailed design for the project by converting the engineering and system design into purchase requisitions, drawings, panel designs, and installation details consistent with the specification and functional descriptions in order to provide detailed information for development and deployment.	

Knowledge of:	Field devices, control devices, visualization devices, computers, and networks Installation standards and recommended practices Electrical and wiring practices Specific customer preferences Functional requirements of the system/equipment to be automated Applicable construction codes Documentation standards
Skill in:	Performing detailed design work Documenting the design
Task 4: Implement data transfer methodology that maximizes throughput and ensures data integrity using communication protocols and specifications in order to assure efficiency and reliability.	
Knowledge of:	Specific networking software products (e.g., I/O servers). Network topology Network protocols Physical media specifications (e.g., copper, fiber, RF, IR) Computer operating systems Interfacing and gateways Data mapping
Skill in:	Analyzing throughput Ensuring data integrity Troubleshooting Documenting configuration Configuring network products Interfacing systems Manipulating data
Task 5: Implement security methodology in accordance with stakeholder requirements in order to mitigate loss and risk.	
Knowledge of:	Basic system/network security techniques Cyber Security of the Automation System <ul style="list-style-type: none"> ▪ Security Programs, Plans, and Policies ▪ System and Network Security Techniques ▪ User Support Customer security procedures Control user-level access privileges Regulatory expectations (e.g., 29 CFR Part 11) Industry standards (e.g., ISA)
Skill in:	Documenting security configuration Configuring/programming of security system Implementing security features
Task 6: Test the automation system using the test plan in order to determine compliance with functional requirements.	

Knowledge of:	<ul style="list-style-type: none"> Testing techniques Specific control software products Specific HMI software products Specific database software products Specific reporting products Network communications Alarming schemes I/O structure Memory addressing schemes Hardware configurations Computer operating systems Functional requirements of system/equipment to be automated
Skill in:	<ul style="list-style-type: none"> Writing test plans Executing test plans Documenting test results Programming and/or configuration capabilities Implementing connections to remote devices Interpreting functional requirements of system/equipment to be automated Interpreting P&IDs
Domain III: Deployment	
Task 1: Install configuration and programs by loading them into the target devices in order to prepare for testing.	
Knowledge of:	<ul style="list-style-type: none"> Control system (e.g., PAC, PLC, DCS, PC) System administration
Skill in:	<ul style="list-style-type: none"> Installing software Verifying software installation Versioning techniques and revision control Troubleshooting (i.e., resolving issues and retesting)
Task 2: Solve unforeseen problems identified during installation using troubleshooting skills in order to correct deficiencies.	
Knowledge of:	<ul style="list-style-type: none"> Troubleshooting techniques Problem-solving strategies Critical thinking Processes, equipment, configurations, and programming Debugging techniques
Skill in:	<ul style="list-style-type: none"> Solving problems Determining root causes Ferretting out information Communicating with facility personnel Implementing problem solutions Documenting problems and solutions
Task 3: Test configuration and programming in accordance with the design documents	

by executing the test plan in order to verify that the system operates as specified.	
Knowledge of:	Programming and configuration Test methodology (e.g., factory acceptance test, site acceptance test, unit-level testing, system-level testing) Test plan for the system/equipment to be automated System to be tested Applicable regulatory requirements relative to testing
Skill in:	Executing test plans Documenting test results Troubleshooting (i.e., resolving issues and retesting) Writing test plans
Task 4: Test communication systems and field devices in accordance with design specifications in order to ensure proper operation.	
Knowledge of:	Test methodology Communication networks and protocols Field devices and their performance requirements Regulatory requirements relative to testing
Skill in:	Verifying network integrity and data flow integrity Conducting field device tests Comparing test results to design specifications Documenting test results Troubleshooting (i.e., resolving issues and retesting) Writing test plans