**Collaborative Robotics Programming Technician**

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| Function Areas | | Specific Tasks | | | | | | | |
| 1. **Install Robot** | | Connect robot mechanically | Connect robot electronically | Connect robot pneumatically | Reteach points | Install a program | Verify safety functionality (wiring, response, checklist) |  |
| 1. **Move Robot** | | Determine disassembly needs | Determine rigging requirements for movement (per manufacturer’s manual) | Secure robot for shipping (build pallet, etc., when necessary) | Connect robot mechanically | Connect robot electronically | Connect robot pneumatically | Reteach points |
|  | | Verify safety functionality |  |  |  |  |  |  |
| 1. **Maintain Robot** | | Consult manufacturer’s manual for preventive maintenance checks and services | Save current program prior to conducting new operations | Disassemble robot | Grease points | Change seals on pneumatic tooling | Replace filters | Replace Belts |
|  | | Replace joints | Recalibrate robot | Monitor & toggle I/O | Reteach points | Maintain a current backup | Perform recovery operations from backups | Verify safety functionality |
| 1. **Troubleshoot robot operations** | | Follow the steps/logic to determine problem | Determine the root cause (mechanical, electrical, pneumatic, etc.) | Communicate with operator | Change machine modes (auto/manual) | Run robot at variable speeds to identify mechanical issues | Manipulate machine in manual mode | Start, stop, and clear errors |
|  | | Locate a bad sensor | Determine sensor trouble | Recover from a crash | Trace and correct faults in area scanners, light curtains, and load cells | Verify safety functionality |  |  |
| 1. **Identify Program Feasibility** | | Identify robot’s capabilities & limitations | Identify controller’s capabilities & limitations | Conduct risk assessment | Identify quality control requirements | Interact with other areas/departments | Identify mechanical system features |  |
| 1. **Write Code** | | Save current program prior to conducting additional operations | Define/flow chart the process | Define I/O | Inputs fault messaging & recovery codes into the program | Define standard program modes/ mode control | Comment and label code (label early, label often)  *(as important as saving backups)* | Implement standard program modes |
|  | | Read current program code and determine how to modify if needed | Develop/program safety logic | Verify the quality of the programming through physical check or quality control personnel | Debug programming | Ensure the programming will meet or improve production requirements | Program data reporting requirements | Communicate with field bus devices (Ethernet, IP, DeviceNet, Profibus, etc.) |
|  | | Interact with end of arm tooling and other interconnected automation equipment | Verify safety functionality |  |  |  |  |  |
| 1. **Perform Maintenance Functions** | | Maintain firmware | Generate backups | Perform recovery operations using backups | Follow/adhere to company specific standards and requirements |  |  |  |

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|  | Occupational Task Analysis Panel Members |  |

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| Maintenance Supervisor | Core Tech |
| Robotics Field Service Engineer | Cross Robotics & Machine Automation |
| Controls Engineer  Controls Engineer  President  Controls Manager  Sales Support Engineer | Brooks Machine & Design, Inc.  Brooks Machine & Design, Inc.  Mertek Solutions  Mertek Solutions  SCHUNK |
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| **Analysis Facilitator:** | Jay Jackson |
| **Analysis Coordinator:** | Rachel Haskins |
| **Analysis Recorder:** | HollyAnn Nye Rogers |

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| Collaborative Robotics Programming Technician | **A robotics programming technician is a collaborative robotics technician who programs a robotic cell to be collaborative and to meet specific safety standards.** |

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| Knowledge | Control Circuits  Industrial/Mechanical Maintenance  Basic Physics  Read a Schematic  Basic Electrical Wiring  Pneumatic Principles and Schematics  Gearing (Mechanical)  Basic Automation Products (core components)  Basic Tools (i.e., multimeter)  Safety Standards and Robotic Industry Association (RIA) Standards  Cartesian Coordinates and Frames  Ability to Use Google | Arc Flash Suits  Linear Devices (screws, belt drives, drives, rack and pinion)  How Machine Runs in Auto  Advanced Programming Logic  Programming Languages (C++, Ladder, Function Block, Structured Text)  Data Types and Structures (floating points)  Advanced Data Networking  Advanced Motors and Encoders  Servo Drives and Amplifiers  Real Time Data Exchange |

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| Skills | Basic Wiring (including soldering)  Mechanical Skills  Ability to Read a Multimeter  Problem-Solving Skill  Basic Computer Skills | Soft Skills   * Customer Interaction * Communication   Advanced Machine/Device Communication  Typing/Keyboarding |

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| Equipment | Screwdrivers  Allen Wrenches (SAE & Metric)  Needle-Nose Pliers  Digital Multimeter  Wire Strippers  Lockout/Tagout Kit  Torque Wrench  Safety Glasses  Ear Plugs  USB Drives  Cables (Ethernet, Serial, USB) | Box Cutter  Adjustable Wrenches  Soldering Kit  Rubber Mallet  Cell Phone Camera  Flashlight  Laptop with a Windows Pro edition and Good Text Editor (i.e., Go Pad, UltraEdit, Notepad++)  Converters and Cables  Wireshark |

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| Instruction Equipment (needed by the college) | Laptop  Simulation Software (Robot Studio, Yumi)  Light Curtains and Area Scanner  Safety Hardware Fencing  End-of-Arm Tooling Options (grippers, vacuum cups, magnets)  Wiring Cabinet with Electrical Terminal  Blocks, HMI, PLC, Vision/Camera  Air Supply (compressor) | 3D Printer  Safety Relays  Tool Changers  Compliance Device (tool on the robot arm)  Push Buttons and Switches/Relays  Stack Light  Simulation Software That Can Be Run Without Actual Jardware (Allen Bradley, Parker Motion, Code Assist)  Wireshark |

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**Occupational TASK ANALYSIS**

### Developed by

**Wake Technical Community College**

**Corporate and Business Solutions**

**Robotics Awake**

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**Raleigh, NC**

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