Human-Robot Interaction in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Human-Robot Interaction (HRI) in manufacturing represents a transformative shift toward intelligent, collaborative, and highly automated industrial ecosystems. As Industry 4.0 evolves into Industry 5.0, the integration of cobots (collaborative robots), AI-driven robotics, and smart sensor systems is redefining production efficiency, workplace safety, and operational precision. Human-Robot Interaction in Manufacturing Training Course equips learners with advanced knowledge of robot-human collaboration frameworks, real-time decision-making systems, and ergonomic integration strategies that enhance productivity while ensuring safe human-robot coexistence in modern factories.

With the rapid adoption of smart manufacturing, industrial automation, machine learning robotics, and cyber-physical systems, organizations are increasingly dependent on skilled professionals who can design, manage, and optimize HRI environments. This course provides hands-on and theoretical insights into robot perception systems, human-centered AI, motion coordination, safety protocols, and industrial IoT integration, ensuring learners are prepared for next-generation manufacturing challenges. Participants will gain expertise in bridging the gap between human cognitive skills and robotic precision to achieve seamless industrial collaboration.

Programme Curriculum

Human-Robot Interaction in Manufacturing Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of Human-Robot Interaction (HRI) systems in manufacturing
2. Analyze principles of Industry 4.0 and smart factory automation
3. Apply collaborative robot (cobot) programming techniques
4. Evaluate human-centered AI in industrial robotics
5. Implement robot safety standards and risk assessment protocols
6. Design ergonomic human-robot collaborative workspaces
7. Integrate Industrial IoT (IIoT) with robotic systems
8. Develop skills in real-time motion planning and control systems
9. Understand machine vision and sensor fusion technologies
10. Optimize workflow automation using intelligent robotics
11. Assess cyber-physical production systems (CPPS)
12. Manage predictive maintenance using AI-driven robotics
13. Enhance productivity through smart manufacturing optimization techniques

Target Audience

1. Manufacturing engineers and technicians
2. Robotics and automation engineers
3. Industrial production managers
4. AI and machine learning professionals
5. Mechatronics engineering students
6. Occupational safety and ergonomics specialists
7. Smart factory consultants
8. Technical trainers in industrial automation

Course Modules

Module 1: Fundamentals of Human-Robot Interaction

- Evolution of industrial robotics
- HRI principles and frameworks
- Human factors in automation systems
- Cognitive load in robotic environments
- Introduction to collaborative robots (cobots)

- **Case Study:** Tesla Gigafactory HRI integration for automated assembly lines

Module 2: Smart Manufacturing & Industry 4.0

- Smart factory architecture
- Digital twin technology
- Cyber-physical systems overview
- Real-time production analytics
- Cloud-based manufacturing systems
- **Case Study:** Siemens digital factory transformation in Germany

Module 3: Collaborative Robotics (Cobots)

- Cobot programming basics
- Human-safe robot design
- Force and torque sensing systems
- Adaptive task sharing
- Multi-robot collaboration systems
- **Case Study:** Universal Robots deployment in automotive assembly

Module 4: AI in Human-Robot Systems

- Machine learning in robotics
- Computer vision applications
- Predictive behavior modeling
- Neural networks in robotics control
- Autonomous decision-making systems
- **Case Study:** Amazon warehouse AI-driven robotics optimization

Module 5: Safety Engineering & Risk Management

- ISO robot safety standards
- Hazard identification in HRI
- Emergency stop systems
- Safety-rated monitored stops
- Risk mitigation strategies
- **Case Study:** BMW manufacturing plant safety robotics framework

Module 6: Industrial IoT & Connectivity

- Sensor networks in manufacturing
- Edge computing systems
- IIoT communication protocols
- Data-driven production systems
- Smart device interoperability
- **Case Study:** Bosch IoT-enabled smart factory implementation

Module 7: Human Factors & Ergonomics in Robotics

- Workplace ergonomics design
- Human cognitive interaction with robots
- Fatigue reduction systems

- Adaptive workstation design
- Usability engineering in automation
- **Case Study:** Toyota ergonomic assembly line redesign

Module 8: Future of Robotics & Autonomous Manufacturing

- Autonomous production systems
- Self-learning robots
- Ethical AI in manufacturing
- Sustainable automation systems
- Next-generation industrial robotics
- **Case Study:** Fanuc fully automated lights-out manufacturing plant

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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