Training course on Robotics and Automation in Construction

Professional Development Training Course Outline

Category	Civil Engineering and Infrastructure Management	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The construction industry, traditionally reliant on manual labor and often characterized by inherent challenges in productivity, safety, and consistent quality, is on the cusp of a profound transformation driven by the rapid advancements in robotics and automation. These cutting-edge technologies are not merely incremental improvements but are fundamentally revolutionizing various facets of construction—from precision prefabrication and rapid on-site assembly to efficient inspection, smart logistics, and even demolition processes. By integrating robotic systems and automated workflows, the industry can significantly enhance efficiency, dramatically improve worker safety by delegating hazardous or repetitive tasks, substantially reduce material waste through precise execution, and achieve unprecedented levels of accuracy and quality control. This technological shift is crucial for addressing critical industry pain points, attracting a new generation of skilled workers, and ultimately paving the way for more sustainable, predictable, and high-performance project delivery in the built environment.

Training Course on Robotics and Automation in Construction is meticulously crafted to equip participants with a deep theoretical understanding and, critically, the hands-on practical skills necessary to evaluate, implement, and manage robotic and automation solutions in real-world construction projects. The curriculum will delve into the practical applications of diverse robotic systems—including industrial robotic arms, autonomous mobile platforms, and specialized construction drones—and explore the principles of automation inherent in modular construction and digital fabrication. Participants will gain insights into fundamental concepts such as robot kinematics, advanced control systems, seamless sensor integration, and the crucial dynamics of human-robot collaboration. Furthermore, the course will address the economic feasibility, regulatory landscape, and ethical considerations surrounding the adoption of these transformative technologies. Through a dynamic blend of expert-led instruction, hands-on simulations, real-world case studies, and potentially direct exposure to cutting-edge robotic equipment, attendees will be fully prepared to lead the charge in automating the construction industry.

Programme Curriculum

Training Course on Robotics and Automation in Construction

Introduction

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Course Objectives

Upon completion of this course, participants will be able to:

1. Analyze the fundamental concepts of robotics and automation and their transformative impact on the construction industry.
2. Comprehend the principles of robot kinematics, control systems, and sensor integration relevant to construction tasks.
3. Master various types of robotic systems and automated equipment applicable in different construction phases.
4. Develop expertise in designing and simulating automated construction workflows and processes.
5. Formulate strategies for leveraging robotics to enhance construction productivity and efficiency.
6. Understand the critical role of automation in improving construction site safety and reducing labor risks.
7. Implement robust approaches to quality control and precision construction using robotic systems.
8. Explore key strategies for integrating robotic and automation solutions with BIM and digital fabrication workflows.

9. Apply methodologies for assessing the economic feasibility and return on investment of automation in construction.
10. Understand the importance of human-robot collaboration and re-skilling the construction workforce.
11. Develop preliminary skills in programming basic robotic movements for construction-specific tasks.
12. Design a comprehensive roadmap for adopting robotics and automation in a construction organization.
13. Examine global best practices and future trends in advanced robotics and autonomous construction.

Target Audience

This course is essential for professionals seeking to lead and implement robotic and automation solutions in construction:

1. Construction Managers & Directors: Seeking to implement advanced technologies for efficiency and safety.
2. Civil & Structural Engineers: Interested in incorporating robotics into design and construction processes.
3. Automation & Robotics Engineers: Aiming to apply their expertise specifically to the construction sector.
4. BIM/Digital Construction Specialists: Focused on integrating automation with digital workflows.
5. Health & Safety Managers: Exploring robotic solutions for hazardous tasks and improved site safety.
6. Manufacturing & Prefabrication Specialists: Looking to enhance automation in off-site construction.
7. Innovation & Technology Leads: Driving digital transformation in construction companies.
8. Researchers & Academia: Exploring cutting-edge applications and challenges in construction robotics.

Course Duration: 10 Days

Course Modules

Module 1: Introduction to Robotics and Automation in Construction

- Define robotics, automation, and their historical context in the construction industry.
- Discuss the drivers for adoption: productivity, safety, quality, labor shortages, and sustainability.
- Understand the spectrum of automation: from mechanized tools to fully autonomous systems.
- Explore existing applications of robotics across different construction phases (e.g., prefabrication, demolition, inspection).
- Identify the key challenges and opportunities in integrating robotics into construction workflows.

Module 2: Fundamental Principles of Robotics

- Comprehend robot kinematics: degrees of freedom, forward and inverse kinematics.
- Learn about robot types and configurations (e.g., articulated robots, gantry robots, mobile robots).
- Master basic robot control systems, including open-loop and closed-loop control.
- Discuss robotic end-effectors and tooling for various construction tasks.
- Explore sensor technologies for robotic navigation, perception, and interaction.

Module 3: Automation in Digital Fabrication and Prefabrication

- Develop expertise in automated processes for off-site construction and prefabrication.
- Learn about robotic welding, additive manufacturing (3D printing), and automated assembly lines.
- Explore the integration of robotic fabrication with CAD/CAM and BIM software.
- Discuss the benefits of modularization and mass customization enabled by automation.
- Gain hands-on understanding of digital fabrication workflows.

Module 4: On-Site Robotics and Autonomous Systems

- Formulate strategies for deploying robots and autonomous equipment on active construction sites.
- Understand the principles of autonomous navigation, localization, and mapping (SLAM) for construction robots.
- Explore applications such as robotic bricklaying, concrete pouring, drilling, and surveying.
- Discuss the use of autonomous heavy equipment and construction vehicles.
- Learn about safety protocols and operational challenges for on-site robotics.

Module 5: Drones and Remote Sensing for Construction Automation

- Understand the critical role of Unmanned Aerial Vehicles (UAVs) or drones in construction.
- Implement robust approaches to automated site surveying, progress monitoring, and volumetric analysis.
- Explore techniques for visual inspection, thermal imaging, and LiDAR scanning using drones.
- Discuss the use of AI/ML for automated defect detection and progress tracking from drone data.
- Learn about regulatory frameworks and best practices for commercial drone operations.

Module 6: Human-Robot Collaboration and Safety

- Apply methodologies for designing safe and effective human-robot collaborative workspaces.
- Master techniques for risk assessment and hazard identification in automated construction environments.
- Understand ergonomic considerations and the role of exoskeletons in augmenting human capabilities.
- Discuss the ethical implications and societal impact of increasing automation in construction.
- Explore strategies for workforce training and re-skilling for a robotic future.

Module 7: Data-Driven Robotics and AI in Construction

- Explore key strategies for integrating sensor data and AI/ML with robotic systems.
- Learn about real-time data analysis for robotic control and adaptive task execution.
- Understand how machine learning can enhance robot perception, decision-making, and fault diagnosis.
- Discuss the role of digital twins in simulating and optimizing robotic operations.
- Practice developing data pipelines for robotics data.

Module 8: Economic and Business Case for Construction Automation

- Develop preliminary skills in assessing the economic viability and ROI of robotics investments.
- Learn about cost-benefit analysis, productivity gains, and risk reduction from automation.
- Discuss the impact of robotics on project schedules, budgets, and labor costs.
- Explore business models for technology adoption, including RaaS (Robotics-as-a-Service).
- Understand strategies for securing funding and stakeholder buy-in for automation initiatives.

Module 9: Integration with BIM and Digital Workflows

- Explore how BIM serves as the central data backbone for automated construction.
- Learn about generating robot-ready code directly from BIM models.
- Discuss the use of BIM for simulating robotic paths, collision avoidance, and task planning.
- Understand automated quality assurance and verification using BIM and robotic scans.
- Apply methodologies for creating a seamless digital thread from design to robotic execution.

Module 10: Legal, Regulatory, and Standards for Construction Robotics

- Understand the current legal landscape and regulatory challenges for autonomous construction.
- Discuss industry standards and guidelines for robot safety and interoperability.

- Learn about liability issues, insurance implications, and intellectual property in automation.
- Explore future policy developments impacting the adoption of robotics in construction.
- Examine case studies of regulatory approvals and setbacks for robotic projects.

Module 11: Advanced Robotics and Emerging Technologies

- Examine cutting-edge developments in soft robotics, swarm robotics, and self-reconfiguring robots.
- Explore the role of augmented reality (AR) and virtual reality (VR) in human-robot interaction and remote control.
- Discuss the potential of cognitive robotics and general-purpose AI for construction.
- Understand the convergence of robotics with advanced materials and construction methods.
- Analyze future research directions and disruptive technologies in construction automation.

Module 12: Strategic Implementation and Future Roadmapping

- Learn to develop a strategic roadmap for integrating robotics and automation into a construction organization.
- Discuss change management strategies and addressing workforce resistance to new technologies.
- Explore partnership models with robotics companies, academia, and technology providers.
- Understand the importance of pilot projects, iterative development, and continuous improvement.
- Analyze best practices from leading companies in construction automation worldwide.

Training Methodology

- **Interactive Workshops:** Facilitated discussions, group exercises, and problem-solving activities.
- **Case Studies:** Real-world examples to illustrate successful community-based surveillance practices.
- **Role-Playing and Simulations:** Practice engaging communities in surveillance activities.
- **Expert Presentations:** Insights from experienced public health professionals and community leaders.
- **Group Projects:** Collaborative development of community surveillance plans.
- **Action Planning:** Development of personalized action plans for implementing community-based surveillance.
- **Digital Tools and Resources:** Utilization of online platforms for collaboration and learning.
- **Peer-to-Peer Learning:** Sharing experiences and insights on community engagement.
- **Post-Training Support:** Access to online forums, mentorship, and continued learning resources.

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

- Participants must be conversant in English.

- Upon completion of training, participants will receive an Authorized Training Certificate.
- The course duration is flexible and can be modified to fit any number of days.
- Course fee includes facilitation, training materials, 2 coffee breaks, buffet lunch, and a Certificate upon successful completion.
- One-year post-tra

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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