Machine Vision in Mining Training Course

Professional Development Training Course Outline

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

Course Introduction

Machine Vision in Mining is rapidly transforming the global extractive industry by integrating Artificial Intelligence (AI), deep learning, computer vision systems, and industrial automation to enhance safety, productivity, and operational intelligence. As modern mining operations evolve into smart, data-driven ecosystems, machine vision technologies enable real-time monitoring of equipment, automated ore classification, hazard detection, conveyor belt inspection, and predictive maintenance. Machine Vision in Mining Training Course is designed to equip learners with cutting-edge competencies in AI-powered mining analytics, IoT-enabled vision systems, real-time defect detection, and autonomous mining operations, aligning with the global shift toward Industry 4.0 mining innovation.

The course focuses on practical deployment of high-resolution imaging systems, thermal cameras, 3D vision sensors, and edge AI computing platforms in mining environments. Participants will gain hands-on exposure to solving real-world mining challenges such as rock fragmentation analysis, underground safety monitoring, and equipment failure prediction using machine vision pipelines. With increasing demand for smart mining solutions, digital twins, automated mineral processing, and AI safety compliance systems, this course prepares professionals to lead transformation in mining operations through intelligent visual technologies

Programme Curriculum

Machine Vision in Mining Training Course

Introduction

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Course Duration

5 days

Course Objectives

1. Understand AI-powered machine vision systems in mining environments
2. Apply deep learning for ore classification and sorting automation
3. Develop real-time hazard detection and safety monitoring systems
4. Implement computer vision-based conveyor belt inspection systems
5. Use edge AI for underground mining surveillance
6. Analyze rock fragmentation using image processing techniques
7. Integrate IoT and machine vision for smart mining operations
8. Design predictive maintenance systems using visual analytics
9. Deploy thermal imaging for fire and gas leak detection
10. Build autonomous mining equipment vision guidance systems
11. Apply 3D vision and LiDAR in mine mapping and modeling
12. Optimize mineral processing using AI-based visual sorting
13. Ensure mining safety compliance using real-time vision analytics

Target Audience

1. Mining Engineers and Geotechnical Engineers
2. AI and Machine Learning Engineers
3. Industrial Automation Specialists
4. Safety and Risk Management Officers in Mining
5. Data Scientists in Industrial Applications
6. Equipment Maintenance Engineers
7. Mining Operations Managers and Supervisors
8. Robotics and Computer Vision Developers

Course Modules

Module 1: Fundamentals of Machine Vision in Mining

- Overview of machine vision architecture in mining systems
- Industrial cameras, sensors, and imaging technologies
- Lighting challenges in underground environments
- Data acquisition and preprocessing techniques

- Case Study: Vision-based ore sorting in open-pit mining operations

Module 2: AI & Deep Learning for Mineral Classification

- CNN models for rock and mineral recognition
- Dataset labeling and augmentation for mining images
- Training models for ore grade classification
- Transfer learning for mining applications
- Case Study: AI-based gold ore classification system in processing plants

Module 3: Safety Monitoring & Hazard Detection Systems

- Real-time PPE detection using computer vision
- Gas leak and fire detection using thermal imaging
- Worker proximity detection in heavy machinery zones
- Alert systems and safety dashboards
- Case Study: AI surveillance system reducing underground accidents in coal mines

Module 4: Conveyor Belt Inspection & Defect Detection

- Image processing for belt tear and misalignment detection
- High-speed camera integration
- Anomaly detection algorithms
- Automated maintenance triggers
- Case Study: Conveyor belt failure prevention in iron ore mines

Module 5: Edge AI & IoT Integration in Mining

- Edge computing for real-time mining analytics
- IoT sensor fusion with vision systems
- Low-latency AI deployment strategies
- Remote monitoring systems
- Case Study: Smart underground mine using edge AI monitoring system

Module 6: 3D Vision, LiDAR & Mine Mapping

- 3D reconstruction of mining environments
- LiDAR scanning for tunnel stability analysis
- Spatial analytics and terrain modeling
- Integration with GIS systems
- Case Study: 3D mapping of underground gold mine tunnels for safety optimization

Module 7: Predictive Maintenance Using Visual AI

- Equipment wear and tear detection
- Visual anomaly prediction models
- Time-series analysis from image data
- Maintenance scheduling automation
- Case Study: Excavator failure prediction using AI vision system

Module 8: Autonomous Mining & Robotics Vision Systems

- Autonomous haul truck navigation systems

- Obstacle detection and path planning
- Multi-camera fusion systems
- Real-time decision-making algorithms
- Case Study: Autonomous drilling system deployed in large-scale mining site

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:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com