Training Course on Real-Time GIS and IoT Data Streaming for Web Maps

Professional Development Training Course Outline

Category	GIS	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

This intensive training course delves into the convergence of **Real-Time GIS (Geographic Information Systems)** and the **Internet of Things (IoT)**, revolutionizing how we interact with dynamic spatial data. Participants will gain practical expertise in **data streaming**, **sensor integration**, and **web map development** to create highly interactive and responsive **geospatial applications**. Training Course on Real-Time GIS and IoT Data Streaming for Web Maps is designed to equip professionals with the cutting-edge skills needed to leverage **live location intelligence** for critical decision-making, enabling them to build intelligent systems that transform **operational efficiency** and enhance **situational awareness** across diverse industries.

The curriculum emphasizes **hands-on experience** with industry-leading tools and open-source frameworks, focusing on the practical implementation of **real-time data pipelines** from IoT devices to dynamic web maps. Through a blend of theoretical understanding and **practical labs**, attendees will master techniques for **geospatial big data processing**, **real-time analytics**, and **interactive visualization**. This empowers them to design, develop, and deploy **scalable web mapping solutions** that provide immediate insights from constantly evolving **sensor networks** and **streaming data feeds**, fostering a new era of **intelligent mapping** and **location-based services**.

Programme Curriculum

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Course Duration

10 days

Course Objectives with Strong Trending Keywords:

1. Master Real-Time GIS fundamentals and their application in dynamic web mapping.
2. Understand IoT architecture and sensor network integration for geospatial data acquisition.
3. Implement high-throughput data streaming pipelines using technologies like Kafka and MQTT.
4. Develop interactive web maps capable of visualizing live IoT sensor data with popular frameworks (e.g., Leaflet, Mapbox GL JS).
5. Perform real-time spatial analysis and geofencing on streaming geospatial data.
6. Design and deploy scalable cloud-based GIS solutions for real-time data processing.
7. Integrate edge computing concepts for optimized IoT data processing at the source.
8. Explore AI/Machine Learning applications for predictive analytics on real-time geospatial data.
9. Develop custom web mapping applications with advanced interactivity and user interfaces.
10. Understand data governance, security, and privacy considerations for real-time geospatial data.
11. Leverage open-source GIS tools and libraries for cost-effective real-time mapping solutions.
12. Implement API integrations for seamless data exchange between IoT platforms and web maps.
13. Design operational dashboards for comprehensive situational awareness using real-time GIS and IoT data.

Organizational Benefits

- Real-time visualization of assets, operations, and environmental conditions.
- Access to live, location-aware insights for faster and more informed choices.
- Automation of monitoring and alerting based on dynamic geospatial data.
- Early detection of anomalies and potential issues through real-time monitoring.
- Efficient deployment of personnel and assets based on live spatial intelligence.
- Development of innovative location-based services leveraging IoT data.
- Adoption of cutting-edge technologies for advanced geospatial capabilities.
- Reduced downtime, optimized routes, and improved asset utilization.
- Ability to leverage rich, dynamic datasets for strategic planning and analysis.

Target Audience

1. GIS Analysts and Specialists.
2. Software Developers
3. Data Scientists.
4. Urban Planners and Smart City Technologists
5. Environmental Scientists and Researchers.
6. Logistics and Supply Chain Managers
7. Emergency Response and Disaster Management Professionals.
8. IT Professionals.

Course Outline

Module 1: Introduction to Real-Time GIS and IoT Ecosystems

- Defining Real-Time GIS and its evolution in a connected world.
- Overview of the Internet of Things (IoT) landscape and key components.
- Synergies between GIS and IoT for location-aware applications.
- Key challenges and opportunities in real-time geospatial data.
- **Case Study:** Smart City initiatives leveraging real-time traffic and environmental sensor data on web maps.

Module 2: Fundamentals of Geospatial Data Streaming

- Concepts of data streams, events, and real-time data models.
- Common protocols for IoT data transmission (MQTT, HTTP, CoAP).
- Introduction to stream processing engines and their role.
- Data formats for streaming geospatial data (GeoJSON, Protocol Buffers).
- **Case Study:** Monitoring vehicle fleets with GPS trackers streaming location data to a central GIS.

Module 3: IoT Sensor Integration for Spatial Data Acquisition

- Types of IoT sensors relevant to GIS (GPS, environmental, movement, etc.).
- Hardware considerations and connectivity options
- Data collection methodologies from various IoT devices.
- Georeferencing and spatial accuracy of sensor data.
- **Case Study:** Agricultural sensors providing real-time soil moisture and temperature data for precision farming maps.

Module 4: Real-Time Data Ingestion and Processing

- Setting up data brokers and queues
- Designing robust data ingestion pipelines for high-volume streams.
- Data validation, cleaning, and transformation in real-time.
- Techniques for handling data velocity, volume, and variety.
- **Case Study:** Processing live weather sensor data from a distributed network for regional weather maps.

Module 5: Web Mapping Fundamentals for Dynamic Data

- Review of essential web mapping concepts
- Introduction to popular JavaScript mapping libraries
- Structuring data for efficient web map rendering.
- Client-side vs. server-side rendering of dynamic data.

- **Case Study:** Creating a base web map to display static city infrastructure.

Module 6: Visualizing Real-Time Data on Web Maps

- Techniques for live data visualization
- Optimizing rendering performance for dynamic layers.
- Symbology and styling for clarity in real-time displays.
- Implementing time-series visualization on web maps.
- **Case Study:** Visualizing live bus locations and estimated arrival times on a public transport map.

Module 7: Real-Time Spatial Analysis and Geofencing

- Performing spatial operations on streaming data
- Defining and implementing geofences for location-based alerts.
- Real-time aggregation and filtering of geospatial events.
- Triggering actions and notifications based on spatial conditions.
- **Case Study:** Alerting emergency services when a tracked asset enters or exits a predefined hazardous zone.

Module 8: Cloud Platforms for Real-Time GIS

- Leveraging cloud services for scalable real-time GIS infrastructure
- Managed services for data streaming, databases, and compute.
- Serverless architectures for processing real-time geospatial events.
- Cost optimization strategies for cloud-based real-time GIS.
- **Case Study:** Building a cloud-native platform to monitor thousands of connected smart meters in real-time.

Module 9: Advanced Web Map Interactivity and UI/UX

- Developing custom controls and widgets for web maps.
- Integrating external data sources and APIs into web applications.
- Designing intuitive user interfaces for real-time dashboards.
- Best practices for mobile-responsive web maps.
- **Case Study:** Creating a public dashboard with interactive filters for live air quality data.

Module 10: Geospatial Big Data and Real-Time Analytics

- Processing large volumes of streaming geospatial data efficiently.
- Introduction to distributed computing frameworks
- Performing complex analytical queries on real-time data streams.
- Storing and querying massive real-time geospatial datasets.
- **Case Study:** Analyzing real-time cellular network performance across a city to identify coverage gaps.

Module 11: Security and Data Governance in Real-Time GIS

- Securing IoT devices and data streams.
- Authentication and authorization for web map access.
- Data privacy and compliance considerations for location data.
- Implementing data encryption and integrity measures.
- **Case Study:** Ensuring secure access to sensitive real-time infrastructure monitoring data for authorized personnel only.

Module 12: Open-Source Tools and Ecosystem for Real-Time GIS

- Deep dive into open-source GIS libraries and frameworks
- Leveraging open-source stream processing tools.
- Building end-to-end real-time GIS solutions with open-source components.
- Community resources and best practices for open-source development.
- **Case Study:** Developing a cost-effective, open-source real-time tracking system for delivery vehicles.

Module 13: Edge Computing and IoT Data Processing

- Understanding the role of edge computing in IoT architectures.
- Processing geospatial data closer to the source for reduced latency.
- Edge analytics for real-time insights and local decision-making.
- Synchronization between edge and cloud environments.
- **Case Study:** Analyzing real-time video feeds from smart cameras at intersections to optimize traffic light timings locally.

Module 14: AI and Machine Learning for Predictive Geospatial Insights

- Applying machine learning models to streaming spatial data.
- Predictive analytics for future events
- Anomaly detection in real-time geospatial patterns.
- Integrating AI-powered insights into dynamic web maps.
- **Case Study:** Predicting potential equipment failures in a smart factory based on real-time vibration and temperature sensor data.

Module 15: Deploying and Managing Real-Time Web GIS Applications

- Deployment strategies for highly available web mapping applications.
- Monitoring and troubleshooting real-time data pipelines and applications.
- Performance tuning and scalability considerations.
- Maintenance and updates for live geospatial systems.
- **Case Study:** Deploying and maintaining a real-time public safety alert system with high uptime requirements.

Training Methodology

This course adopts a highly interactive and practical training methodology, focusing on **experiential learning** and **real-world application**.

- **Instructor-Led Sessions:** Engaging lectures and discussions to introduce core concepts and theoretical foundations.
- **Hands-on Labs:** Extensive practical exercises using industry-standard software (e.g., ArcGIS Velocity, GeoEvent Server, open-source tools like Kafka, Leaflet, PostGIS, Python libraries) to build real-time GIS applications from scratch.
- **Case Study Analysis:** In-depth examination of successful real-world implementations to understand design patterns and challenges.
- **Live Demonstrations:** Visualizing concepts with dynamic and interactive examples.
- **Group Projects and Collaborative Exercises:** Fostering teamwork and problem-solving skills on simulated real-time scenarios.
- **Q&A and Troubleshooting Sessions:** Dedicated time for addressing participant queries and resolving technical issues.

- **Continuous Feedback:** Opportunities for peer and instructor feedback on practical assignments.
- **Resource Sharing:** Provision of code repositories, datasets, and reference materials for continued learning.

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.

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

Start Date	End Date	Location	Price
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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