



Leveraging Drones, GPS, and Digital Twins in Modern Construction

- Enhancing Efficiency, Accuracy, and Collaboration
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Surveying Techniques - Then vs. Now

1970s (Old) Techniques:

- Chains, tapes, and optical instruments.
- Limited precision, lengthy processing.



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Surveying Techniques - Then vs. Now

Modern Techniques:

- Drones with LiDAR.
- GPS-enabled systems.
- Digital twins for simulations.



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Surveying Techniques - Then vs. Now

Key Takeaway:

- Revolutionized accuracy, efficiency, and visualization.






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Agenda

 Introduction to Modern Surveying Technologies	 Drones in Construction and Surveying
 GPS Applications and Integration	 Digital Twins: Bridging Physical and Digital Worlds
 Examples	 Future Trends and Q&A

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Introduction to Modern Surveying Technologies

 Key Trends: Digital and automated workflows.	 Purpose: Precision, efficiency, and safety.	 Core Tools: Drones, GPS, and digital twins.
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Drones in Construction and Surveying

Benefits:

- Rapid data collection.
- High-resolution imagery.
- Reduced field time, improved safety.

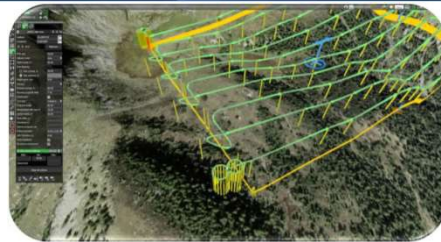
Applications:

- Topographic surveys.
- Progress monitoring.
- Volumetric calculations.

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Drone Workflow Example

- Process:
 1. Mission Planning.
 2. Data Capture.
 3. Processing (Point Clouds).
 4. Analysis & Reporting.
- Key Tools:
 - Vehicle or drone mounted LiDAR
 - Point cloud processing software
 - Extraction and/or modeling software



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GPS Applications and Integration

Why GPS Matters:

- Real-time positioning.
- Georeferencing accuracy.

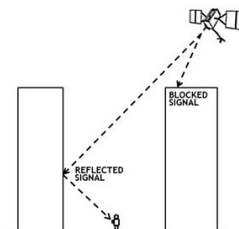
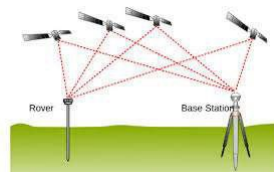
Applications:

- Machine control.
- Layout surveys.
- Ground control for drones.

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GPS Workflow Example

1. Base Station Setup.
 - RTK, VRS, IBSS
2. Rover Configuration.
3. Data Logging.
4. Quality Assurance.
 - Coordinate systems, vertical datums, anomalies



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Digital Twins: Bridging Physical and Digital Worlds

Definition:

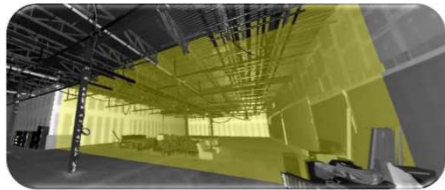
- Virtual representation of physical sites.

Benefits:

- Real-time updates.
- Collaboration.
- Predictive maintenance.

Applications:

- Modeling.
- Planning.
- Structural monitoring.



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Digital Twin Workflow Example

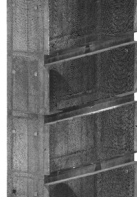
1. Data Acquisition.
 2. Model Development.
 3. Integration with BIM/GIS.
 4. Simulation & Analysis.
- Key Tools:
 - - Trimble RealWorks,
 - Leica Cyclone,
 - Autodesk



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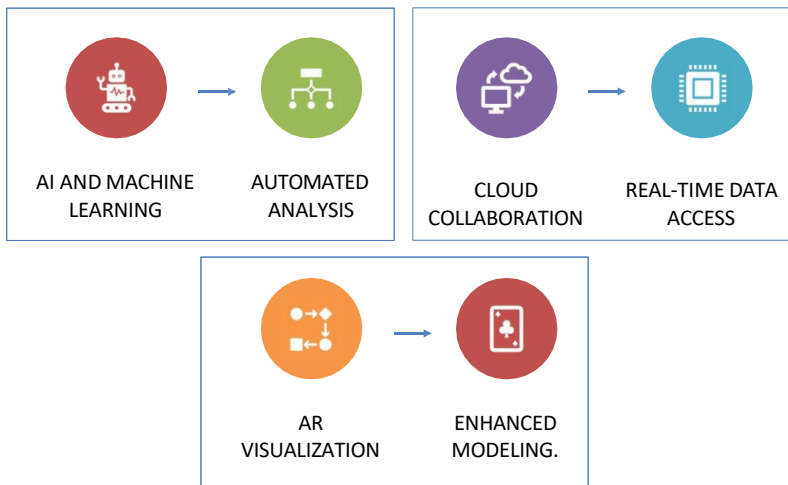
Examples

- Monitoring volumes/progress with drone LiDAR.
- GPS for excavation/design accuracy.
- Digital twins for virtual tours/collaborative work



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Future Trends




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Summary and Key Takeaways


- Efficiency:**
 - Faster, safer processes.
- Collaboration:**
 - Better communication.
- Outlook:**
 - Smarter workflows.

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Questions and Discussion



OPEN FOR QUESTIONS.



SHARE CHALLENGES OR INSIGHTS.

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