GeoAutomation – The Mobile Mapping System

Survey-Enabled Imagery –

A New Direction in GIS Data Collection or Why Are You Still in the Field?

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Mobile Mapping Review

What is GeoAutomation?

Asset Management and other Applications

Why Are You still In The Field?

Demo

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► The term 'Mobile Mapping' has been described in many ways:

- ► A map on a cell phone or a GPS enabled device
- ► Field data collection with a hand held device such as an ArcPad (GPS enabled or not)
- ► Vehicle mounted <u>imagery</u> collection
    - ► Google Streetview© or MicroSoft Streetside©
    - ► iLOOKABOUT© and similar video or digital frame imagery
- ► Vehicle mounted <u>data</u> collection
    - ► Video imagery
    - ► Video imagery supplemented with digital frame imagery
    - ► Terrestrial LiDAR point cloud data supplemented with digital frame imagery / mosaics and /or video
    - ► Georeferencing performed by vehicle mounted GPS/IMU and other devices
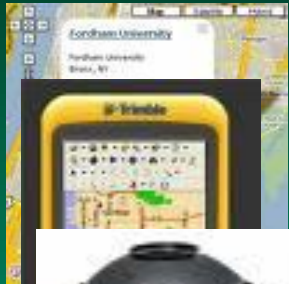
► GeoAutomation is a mobile digital camera system.

► Does not rely on GPS, IMU, LiDAR, INS or DMI systems for accuracy and georeferencing

► Developed in Europe by University of Leuven (Belgium) and licensed to McElhanney

► It is a simple, accurate and cost effective solution for:

  ► Asset Management Inventory

  ► Engineering Survey

  ► Property Assessment

  ► Asset Condition Assessment

  ► Mapping and GIS requirements.

► GeoAutomation is primarily a 'survey' tool.

► It allows users to sit in the comfort and safety of their office workstation and accurately collect data.

► Georeferenced using automated pixel correlation, photogrammetric triangulation, and ground control and / or GPS.

► Software has direct links to ArcGIS, MicroStation and AutoCAD

► Also a great visualization tool for condition assessment and a building block for 3D models.

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- The GeoAutomation solution is based on proven science and technology, Photogrammetry.
- Accuracies can be <u>independently</u> verified.
- Ability to reprocess data to higher accuracy with the addition of photo ID ground control, post collection.
- Accuracy based on ground control or GPS data.
- 14 camera views.

► Cameras collect and compress 11 frames per second.

► Thousands of images per km.

► Each camera has it's own computer with a 1.5 TB or 2.0 TB storage capacity.

► Require 3GB – 5GB storage for every km of image data.
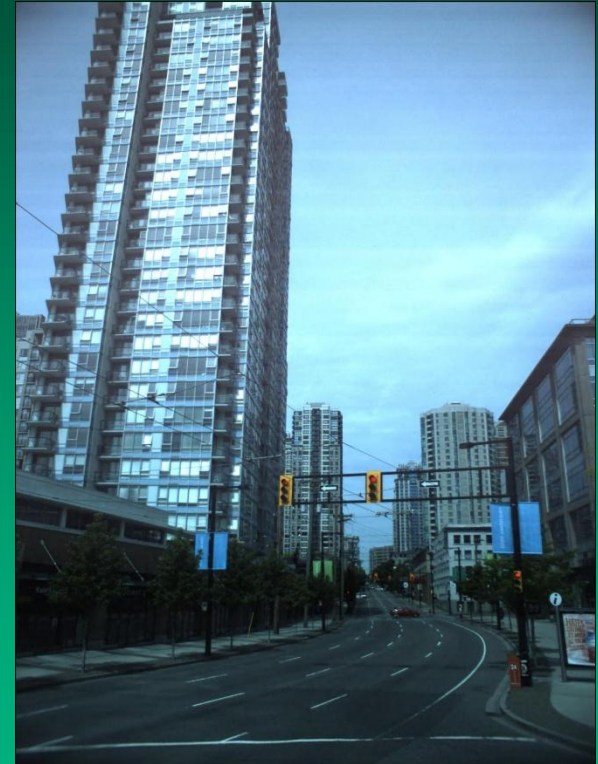
► Urban Environment with high accuracy (up to 2cm) requirements:

  ► Maximum collection speed is 35km per hour.

► Highway Environment with GPS accuracy (approx 25cm) requirements:

  ► Maximum collection speed is 75 km per hour.

► Imagery processed with advanced pixel correlation algorithms.

► Resulting in each image frame having hundreds of tie points.

► Each processed tie point or "track point" has the triangulated x, y and z coordinate of the same pixel in at least twelve other image frames.

► The process creates a tightly controlled LiDAR-like 3D image structure that has a relative accuracy down to the pixel level.

► Imagery processing is completed with ground control (GPS and / or GCPs)

► The required accuracy is always client dependent

► Image collection can take place without GPS. Photo ID control can be added as required

► Image Accuracy guaranteed to client requirements with Accuracy Statements and confirmed with blind control
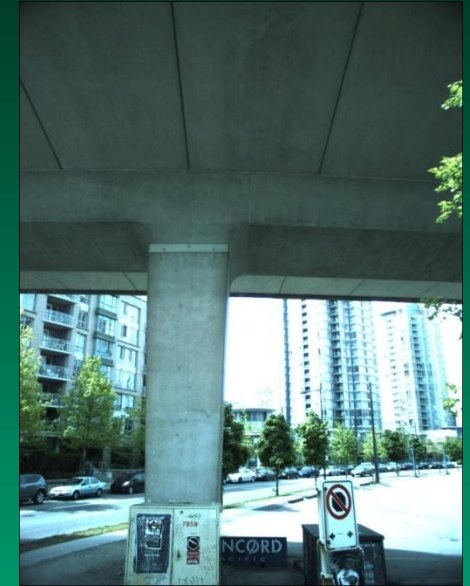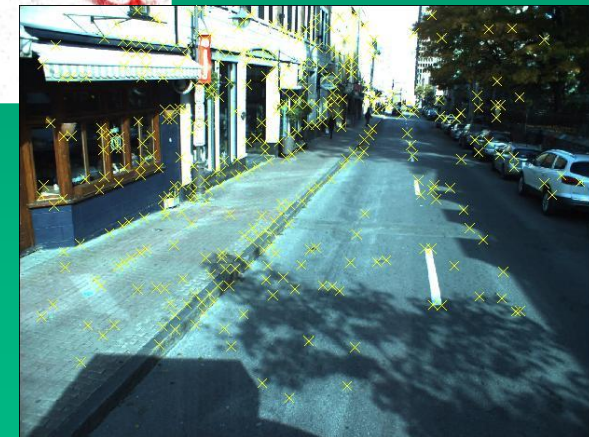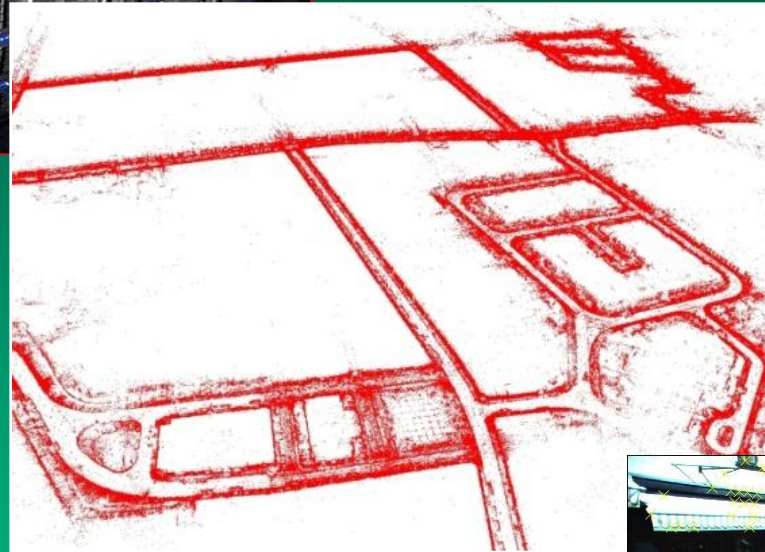
► **Track points are easy to find in urban or road imagery:**

    ► **At intersections of linear features;**

    ► **Along linear features; and**

    ► **At locations of image contrast**

Accuracy	Control	Application
Dependent on ortho	Ortho Photo	Video reviews; on-line street views; asset management
20-30cm (8"-12")	On Board DGPS	Asset management, data collection
10 cm (4")	100–200m (330-660 ft)	Forensics – Preliminary engineering design
5 cm (2")	50m (165 ft)	Detailed Design mapping – Public works infrastructure – Curb and gutter
1-2 cm (".4 – .8")	20m (65 ft)	Pavement overlay design and volume calcs - tie–ins

► Software has direct links to ArcGIS, MicroStation and AutoCAD.

► Simple set up, with CAD or GIS screen on one side and GeoAutomation screen on the other, or as an inset window.

► The points collected in the video were 'surveyed' to the x, y and z accuracies of the imagery.

► Points are surveyed, mapped, or assets are collected and directly input into your CAD or GIS system for manipulation and analysis.
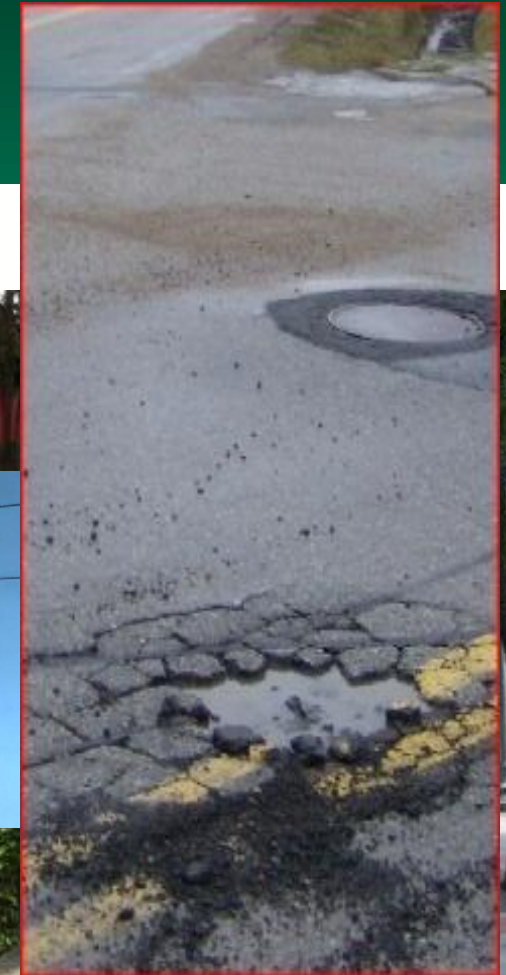
► Simple. Fast. Economical.

► Asset Management Needs

- ► Locate
- ► Measure
- ► Identify
- ► Inspect
- ► Meet Regulatory Requirements

► Asset Inventory for:

- ► Electric Utilities
- ► Water Utilities
- ► Signage and Furniture
- ► Traffic Control Systems
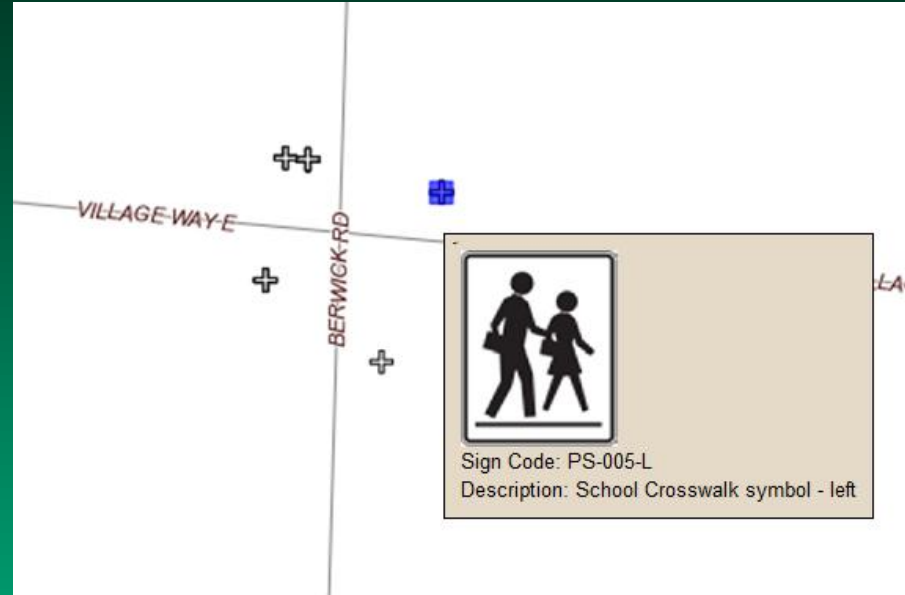- ► Pavement and Sidewalks
- ► Urban Forestry

Auto Feature Recognition

GeoAutomation – Auto Feature Recognition

Signs
Manholes
Valves
Catch Basins
Hydrants
Etc.

► Reduced Collection Time.

  ► Simple field collection and asset attribution can take 5 – 15 minutes per feature.

    ► GeoAutomation office collection and attribution of the same feature can be less than 1 minute.

  ► More detailed field collection and asset attribution (electric utility distribution) can take 15 - 30 minutes per feature.

    ► GeoAutomation office collection and attribution of the same feature can be less than 3 minutes.

► No GPS Problems.

- ► Urban canyon and dense tree cover issues are no longer a concern.
- ► Control for any project can be accomplished with ground control only.
- ► Where GPS is desired:
  - ► Can be collected with a local base station, greatly reducing issues.
  - ► Cameras are forward looking, able to 'see' under tree canopies.
  - ► Weak GPS areas are firmed up with surveyed ground control.

► Imagery delivered, ready to collect, with the required accuracy in every image.

► No Weather Delays.

    ► Improves productivity greatly, especially during the winter.

    ► All collection and attribution work is performed in the office.

► Workplace Safety Improvements.

    ► Significantly decrease accident potential.

    ► All collection and attribution work is performed in the office.

► GIS Data Verification

    ► What is the accuracy of your legacy data?

    ► Improve the overall accuracy of the GIS database.

► Database Currency and Maintenance

    ► Are your users confident that the information in the GIS database is both current and accurate?

    ► GeoAutomation imagery will give them that confidence.

► Additional Value:

    ► Image library.

        ► Revisit any time to view or collect additional data.

        ► Provides a one point in time view, enabling 'apples to apples' valuation of assets.

    ► 3D Modelling
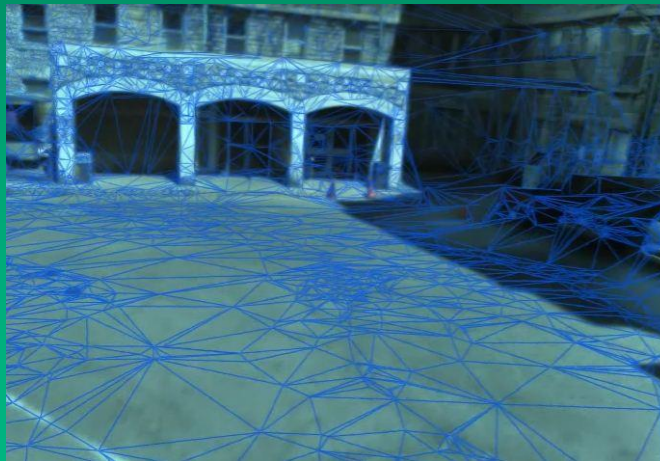
GeoAutomation –Why are you still in the field?

► Additional Value:

- ► Reduction in Carbon Footprint.
- ► Pre-construction Road Condition Inventory.
- ► Improve image accuracy with addition of Photo ID control.
- ► Engineering applications with additional GCPs.
  - ► GIS data collection for Engineering Survey design
  - ► Cross Sections
  - ► Virtual As-Builts

► Potential for Cost Reduction.

   ► Collection and attribution costs can be reduced up to 40%, depending on features collected.

   ► Even greater savings in time and $ in non-RTK areas; in collection of multiple features; and when using hand-held devices.

   ► Worst case scenario – costs are the same as traditional collection and attribution methods – with all the additional benefits.

► Building Information Management

► Property Assessment

► Facilities Managenent

► Forensics / Accident Investigation

► Property Litigation / Complaints

► Security Corridors

► Deliverables

  ► Imagery

  ► Software

  ► CAD plug-in

  ► Tracking points

Questions?

Thank You!