MOBILE MAPPING

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Mobile mapping in general is used as the technology to map and verify map data in the field.

Mobile mapping represents a heterogeneous type of sensor integration consisting of navigation sensors as well as imaging sensors, together time synchronized and mounted on a common platform.

Mobile mapping is the process of collecting geospatial data from a mobile vehicle, typically fitted with a range of photographic, radar, laser, LiDAR or any number of remote sensing systems.

Such systems are composed of an integrated array of time synchronized navigation sensors and imaging sensors mounted on a mobile platform.
The primary output from such systems includes GIS data, digital maps, and geo-referenced images and video.

The development of direct reading geo-referencing technologies opened the way for mobile mapping systems.

GPS and Inertial Navigation Systems, have allowed rapid and accurate determination of position and attitude of remote sensing equipment, effectively leading to direct mapping of features of interest without the need for complex post-processing of observed data.

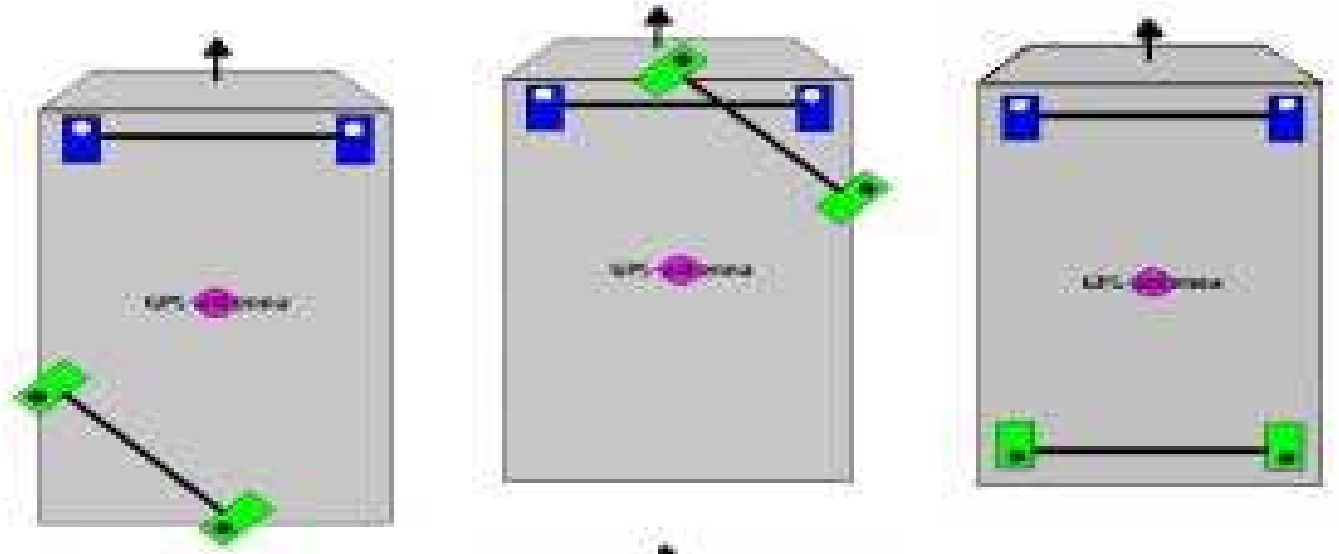
1) Camera

2) Differential GPS

3) Odometer

Various camera configurations - Mobile mapping van

Configurations
With
4 cameras

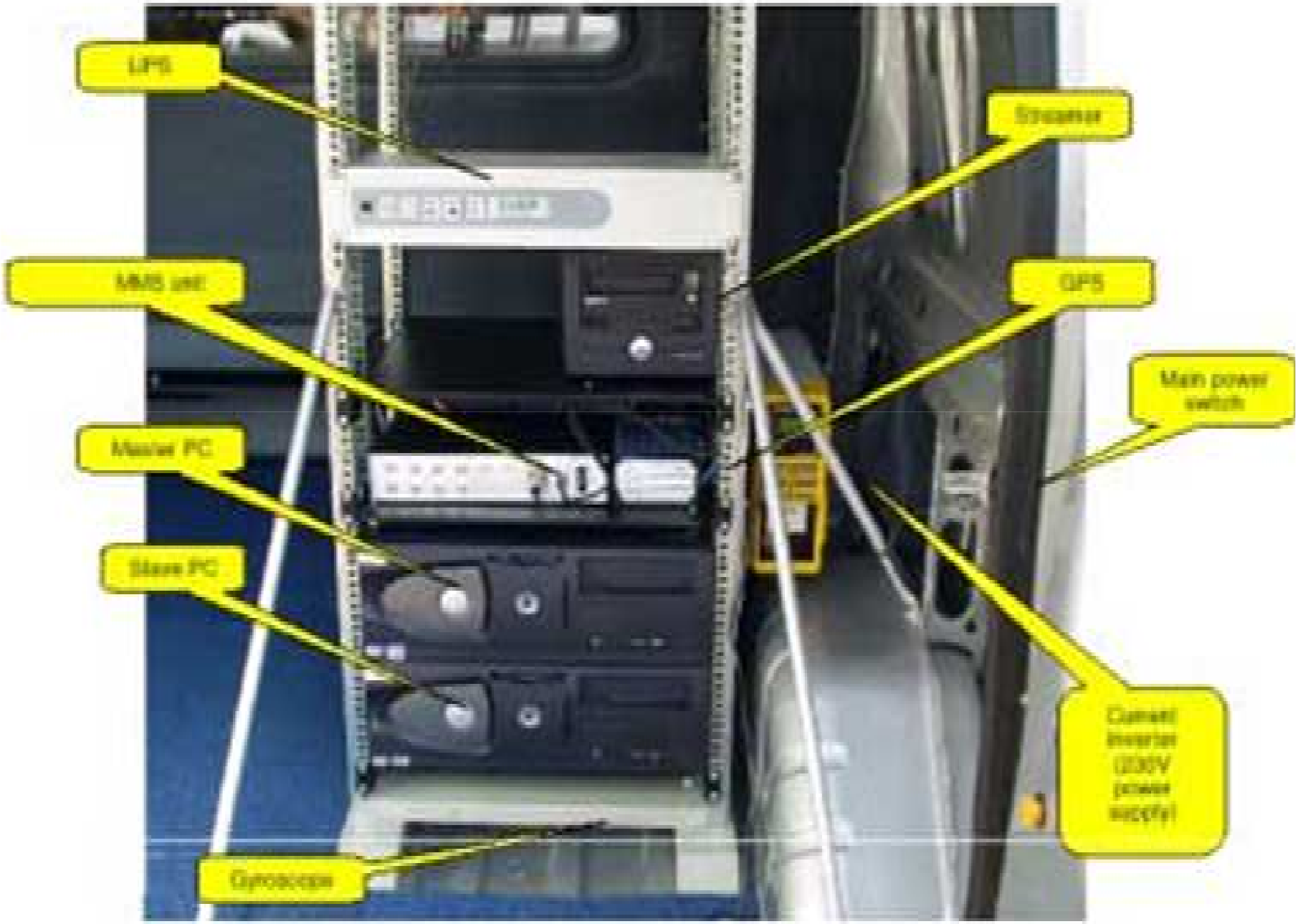


Configuration
With
6 cameras

With these configurations, >95% of the visual components of the required objects/features can be recognized.
Specifically for house-numbers and street name signs, the accuracy is lower and specific camera mounting is needed per country and per situation.
The positioning devices calculate the co-ordinates of a specific point on the vehicle. Following positioning sensors are included:
5Hz differential GPS unit
100Hz single axis gyro
Odometer with rear wheel instrumentation

Orientation and distance of the cameras versus that point are known, the captured images can be used as photogrammetric source material.

To handle the high incoming data stream, 1-4 PC's (one PC is linked to 2 cameras) are mounted in the back of the van, including UPS back-up facilities.


UPS
Ethernet
MMS unit
GPS
Main power switch
Master PC
Slave PC
Current inverter (230V power supply)
Gyroscope

- 1) LCD screen
- 2) PC switch box
- 3) Keyboard
- 4) Movable desk

Front & rear view of the MMS equipment mounted in the mobile mapping van

- **The back-end of the mobile mapping system is an in-house processing unit that allows the visualization of the imagery.**
- **It also allows photogrammetric measurements of objects on the images and the linking of the images and measurements to map data.**
  The Mobile Mapping System (MMS) consists of two main components:
- **MMS vehicle software & hardware to capture MMS data in the field;**
- **Post-process (PP) tools to handle & interpret MMS data (including vehicle position calculation).**
- **Data interpretation & database operation software: This is carried out by a combination of licensed and proprietary software.**

- The MMS vehicle is used in field to gather
- a sequence of images (taken by cameras situated on different vehicle sides),
- positional information and Calibration parameters.

Advantages of Mobile Mapping:

•The MMS vehicle can capture data at high frequencies. No data is lost in the capturing phase.
•If any error is detected in data interpretation and processing algorithms, the problem can be solved without a single need to re-drive the area of interest (which gives a significant cost & time reduction).
•The vehicle fleet operates to a carefully prepared schedule that aims to ensure all major roadways are checked frequently and that all other roads are checked regularly.
The databases created and maintained by Tele Atlas are used for route calculation, route guidance, turn-by-turn navigation and other geospatial applications. They contain particular map features and attributes.

- **There are five main categories of features and attributes:**
- **Addressing features, such as street names;**
- **Routing features such as importance and type of road, direction of traffic flow direction;**
- **Turn-by-turn information such as accurate road geometry and manoeuvre information;**
- **Visual interface features e.g. land cover and usage, for cartographic representation;**
- **Guidance features e.g. signposts, lane information, traffic signs, man holes in the ground.**

- **As digital map-based applications become more sophisticated, with systems such as ADAS, it increases the need to keep map databases up to date and to ensure complete accuracy.**
- **In addition, as new uses and use extensions are devised, such as 3-D mapping, the level of information and detail required also increases.**
- **The imagery materials collected by the MMS do provide to a large extent the necessary reference material to create and/or maintain the features and attributes referred to above as illustrated in some example imagery .**

Applications:

- **Aerial mobile mapping: Traditional techniques of geo-referencing aerial photography, ground profiling radar, or Lidar are prohibitively expensive, particularly in inaccessible areas, or where the type of data collected makes interpretation of individual features difficult.**
- **Image direct geo-referencing, simplifies the mapping control for large scale mapping tasks.**
- **Road mapping and highway facility management: GPS combined with digital camera systems allow rapid update of road maps.**
- **The same system can be utilized to carry out efficient road condition surveys, and facilities management.**
- **Laser scanning technologies, applied in the mobile mapping sense, allow full 3D data collection of slope, banking, etc.**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