# Remote sensing of transportation flows - feasibility of near real-time automated flow

# Geo-referenced digital acquisition and processing system using LIDAR technology

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**Sponsor:** Federal Department of Transportation
Ohio Department of Transportation (ODOT)

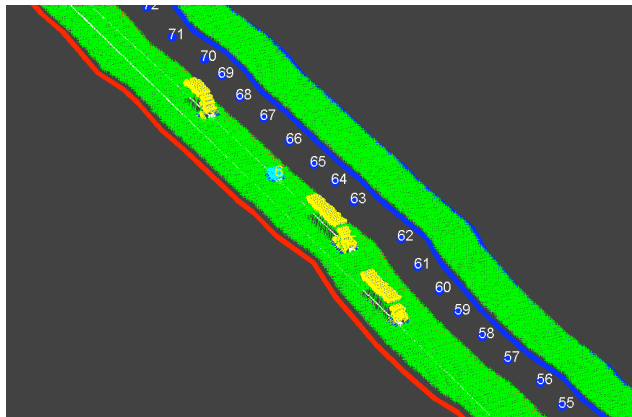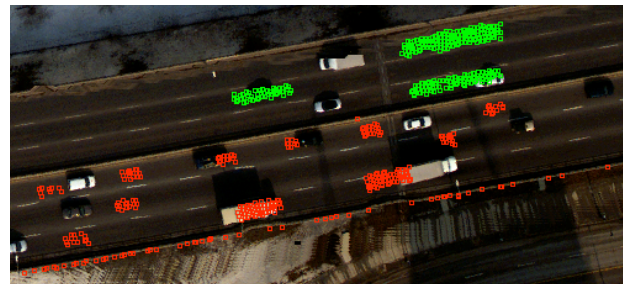**Figure 1.** Vehicles in LiDAR data          **Figure 2.** LiDAR and image data fused

The primary objective of these projects was to develop and implement an efficient procedure of vehicle extraction and automatic vehicle speed detection, from the airborne multi-sensor imaging system. The primary imaging sensors of interest were a frame CCD (Charged Coupled Device) digital camera and a LiDAR (Light Detection and Ranging) system, supported by an integrated georeferencing system based on GPS/INS developed at OSU.

In the first stage of the project, the major focus was on enabling a seamless and highly automated multi-sensor image data acquisition and processing technology for the ODOT Office of Aerial Engineering (OAE). The new system, including a modernized aerial data acquisition platform and a largely automated post-processing production, which offer better spatial data at a substantially reduced cost, were acquired, calibrated and tested. The research tasks completed in 2005 included: procurement and integration of a LIDAR system into the OAE airborne platform, introduction of the LIDAR data into the surface extraction process, including LIDAR registration, calibration techniques, QA/QC control and specialized filtering techniques the production environment.

The second stage of the project focused on investigation of the effectiveness of using LiDAR data to estimate velocity and flow patterns over high-traffic highway corridors. In addition, an assessment of the feasibility of combining LiDAR and simultaneously acquired imagery for the same purpose was provided. This combination of sensors offers a very robust method for vehicle identification and motion estimation as both shape and textual information is provided.