LimeCam - Efficient Characterization of Light-Installations

Object-Tracker

LimeCam = **Efficient characterization of light-installations**

Informative: **2D-light-distributions, maps, photos, database with all light points, 3D-coordinates, illuminance, analysis of savings potentials**
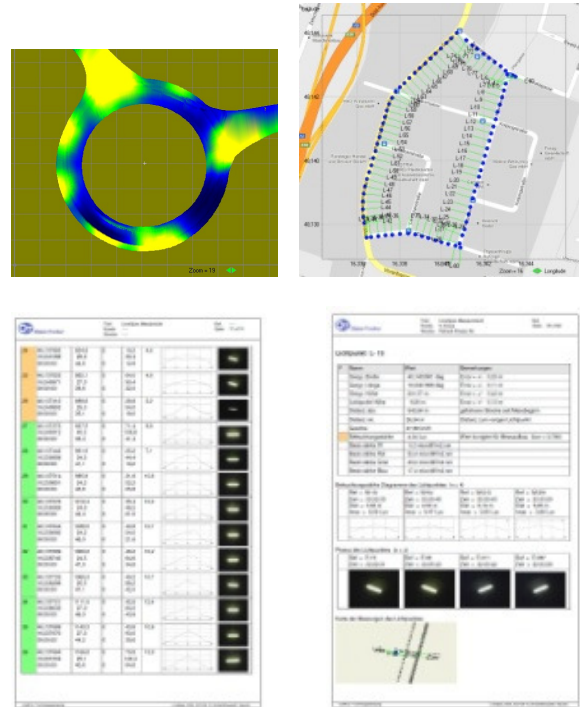
Innovative: **State of the art technology (Gps, image processing, sensor-fusion)**

Easy: **No need to close-off streets, one lane per acquisition**

Save: **Technician save in vehicle, not exposed to traffic**

Fast: **Up to 200 light points / hour**

Scaleable: **Project size 100 – 10000 LP**

OVERVIEW

LimeCam is an innovative solution for the fast and cost-efficient characterization of light installations.

LimeCam yields reliable information on which customers can build their plan to service, upgrade, or renew a light installation: 2D-light-distributions, light maps, photos, a database with details of all light points like 3D-coordinates and illuminance measures, and an analysis of energy savings potentials. Customers receive the results of a LimeCam measurement campaign in the form of digital maps, tables, reports, and GIS data sets.

The LimeCam system is typically mounted to a vehicle. The acquisition of key-variables of illumination is performed at night while the vehicle is moving with velocities of up to 80 km/h with the regular traffic flow. There is no need to close-off streets for the measurement, as is common practice when performing measurements manually.

LimeCam has a measurement capacity of up to 200 light points per hour, which is 20 times faster than manual acquisition methods. As such it can easily handle projects with several thousand light points. And LimeCam is safe, because the technician is operating inside a vehicle, protected from the passing traffic.

Typical application areas of LimeCam include: The measurement of street illumination in cities and in smaller communities, of national roads and highways, of industry terrains and parking areas, parks, and monuments.
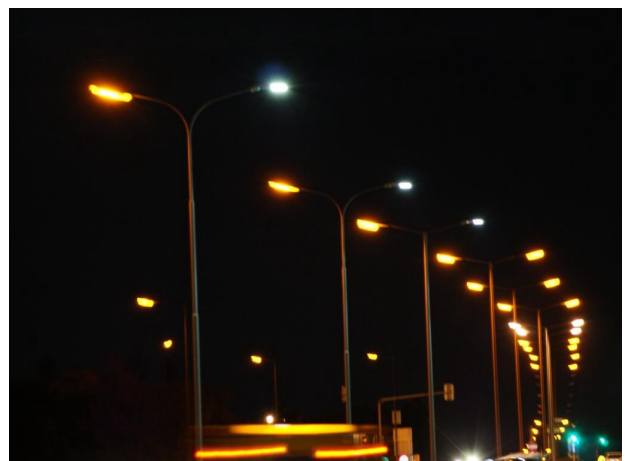
TECHNICAL DESCRIPTION

LimeCam measures a unique combination of light- and geometrical / geographical variables for each light point:

• GPS coordinates of the light point
• Mounting height of light source
• 2-D illuminance distribution (in lux)
• Irradiance-spectrum
• Photographic documentation

LimeCam has a modular construction. It consists of a support structure, the LimeCam Sensor-Rack, to which a variety of sensor-modules can be attached, each measuring a different aspect of the illumination infrastructure. All acquired data are fused and stored in a common database.

LimeCam Sensor-Rack

The Sensor-Rack serves as mounting structure for sensor- and acquisition modules. It is reliably mounted to the vehicle with 2 suction pads, and can be horizontally aligned with lockable joints. The standard configuration includes several light sensors, a GPS receiver, a power supply, data acquisition electronics, and memory. Several sizes are available to fit the system to the requirements of the task.

Figure 1: LimeCam Sensor-Rack, attached to vehicle.

LimeCam Cameras

Calibrated cameras are used to determine the position of the Sensor-Rack relative to the light points, and to measure the mounting height of light sources. Cameras are either mounted to the Sensor-Rack, or inside the vehicle.

Figure 2: LimeCam calibrated cameras

LimeCam Logistics

The LimeCam Sensor-Rack and cameras are mounted to the vehicle and are aligned. The measurement drive is performed at night with the vehicle moving with velocities of up to 80 km/h with the regular traffic flow. There is no need to close-off streets for the measurement.
At the end of the measurement, recorded data are transferred to the LimeCam server and processed with LimeCam software. Reports, maps, analysis, and data sets are generated automatically with little user interaction.
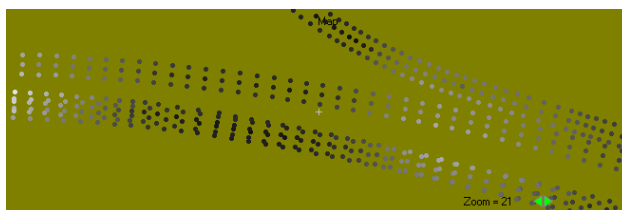

Figure 3: Track of light measurements, distance between measurement points is approx. 50 cm.
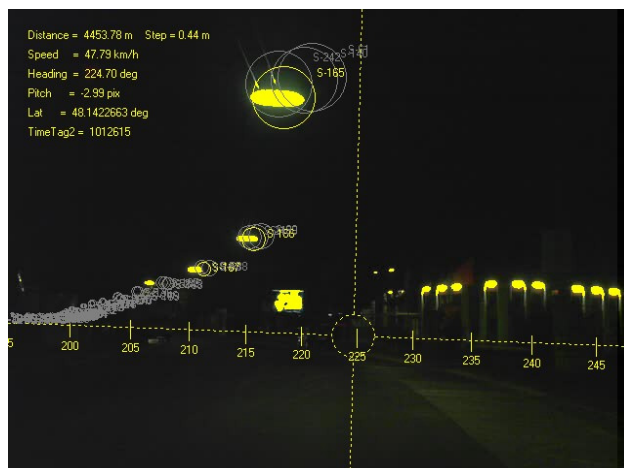

Figure 4: Screenshot of LimeCam image processing program: Automatic tracking of light points in a sequence of images, followed by the calculation of light point position and mounting height above ground.

Illuminance measurements, which are performed at a distance of 75 cm from the street surface, are mathematically corrected to reflect the illuminance level on the street surface.

The absolute positioning accuracy of light maps is determined by the Gps-receiver and is typically better than 1.5 meters. The positioning accuracy / repeatability of light measurements relative to the light points is determined by the photogrammetric camera measurement and better than 50 cm.

LimeCam - Output

LimeCam results are presented and delivered to the customer in several formats:

- Detailed reports (PDF)
- Table of identified light points with light-technical and geographical details
- Light maps with illuminance values and light points (JPG), map format A0 - A4, 600 dpi, super-imposed on street maps and/or aerial images.
- Data sets for import in GIS systems (CSV)

Light maps are 2-dimensional renderings of the illuminance distribution (lux) in either gray-level or false color. They provide an excellent overview of the lighting situation in the investigated locations, clearly highlighting regions with intensive / low / missing illumination.
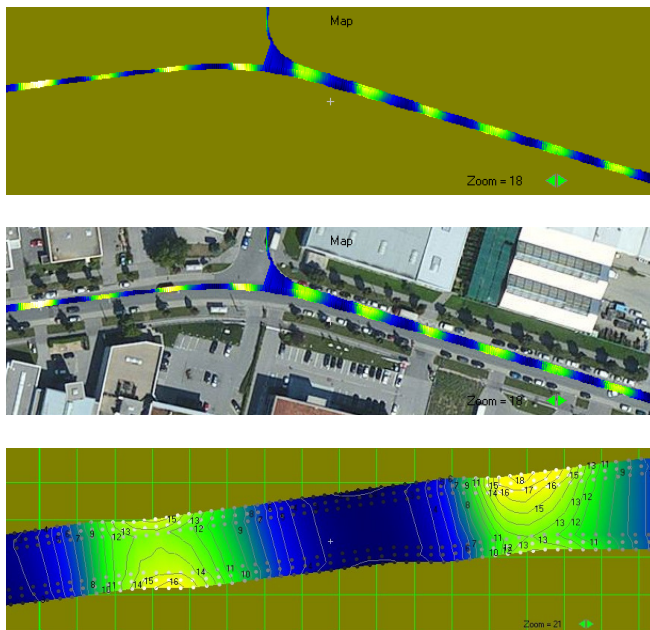
Figure 5: 2-D Illuminance distribution maps

Figure 6: Excerpt of LimeCam report, showing light point summary and details.

Figure 7: Street map with light point

CONTACT

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REFERENCES

LimeCam received the 1st price in the RIZ Genius Competition 2012 of the county of Niederösterreich (Austria).

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