Fraunhofer IPM

MUM mini
Mobile Urban Mapping

Small and universal tool for 3D measurement and evaluation of urban infrastructure

MUM mini provides classified 3D environmental data. The measurement box can be mounted on any vehicle, enabling regular mobile mapping at reasonable cost.

Environment data of high quality are crucial for planning, building and maintaining urban infrastructure as efficiently as possible. This applies to traffic routes as well as to the route planning of electricity, gas or telecommunication networks. The Mobile Urban Mapping System MUM mini provides the database for a wide range of planning processes. The measurement box can be mounted on any vehicle and generates classified 3D environmental data.

Regular monitoring with no need for special vehicles

The construction, maintenance and management of public infrastructure are often still based on outdated and inadequate data. Considerable cost savings can be achieved with a valid database – for example, through optimized routing, improved resource planning, or more efficient billing processes. Regular acquisition of environmental data, however, is time-consuming and expensive, as it is mostly performed by specialized mobile mapping service providers using very expensive sensor technology.

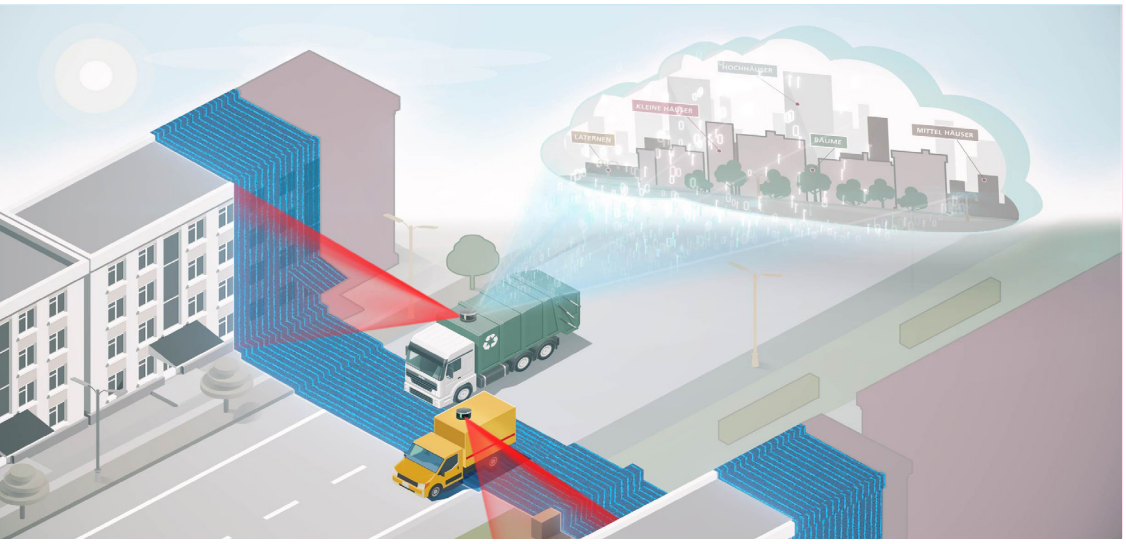
MUM mini is a compact, modular measuring box that can be mounted on vehicles of any size and shape. The system makes it possible to equip vehicles that regularly circulate in urban environments - e. g. cabs, delivery trucks, refuse collection vehicles or streetcars – with measurement technology. Equipped with MUM mini, they are able for the first time to provide constantly updated condition data, which will serve as a basis for construction planning, infrastructure maintenance or even autonomous driving.

Real-time data evaluation

The MUM mini multi-sensor system uses several color cameras and a laser scanner to capture the environment from a mobile platform. Other parts of the system include a positioning unit, a processing unit, and a data storage unit. Artificial intelligence (AI) is used to semantically interpret the data. As a unique feature, the data is processed in real time, using a buffer

Advantages at a glance

- Immediate availability of essential geometric and semantic information
- Deployable on any vehicle
- Flexible system design: adaptable to customer's requirements



MUM mini turns conventional vehicles into measurement vehicles: These vehicles map the environment and provide evaluated, classified measurement data in real time.

with a fixed data connection between measuring and processing unit. Highly accurate calibration of all components of the measuring system ensures that the image data is flawlessly augmented with the depth information included in the scanner data. Calibration is performed without external reference devices on the basis of a target panel. All system components are housed in a compact, robust housing that can be mounted on the roof of a vehicle using a simple carrier platform.

Data set includes essential information

Directly after the measurement, a 3D data set that has been reduced to essential information is transmitted to the customer. This set of data comprises classified objects of urban infrastructure such as streets, lamps, trees, and the like, specifying their absolute position in the 3D space. If required, the image data is automatically anonymized in real time before it is saved.

Camera images taken from different perspectives are fused with the depth information from the laser scanner data and reduced for data interpretation. This produces an RGB depth image in which depth information is assigned to each pixel. In this picture, typical elements – even overlapping objects such as trees positioned one behind the other – are detected by means of object recognition. Semantic interpretation of the measurement data is based on Deep Learning using an artificial neural network that has been trained especially to identify urban infrastructure and that assigns an object class to each image pixel.

Technical data

Dimensions (D × W × H)	30 cm × 20 cm × 30 cm
Weight	12 kg (incl. battery)
3 cameras	1.3 MPx each
LiDAR	600,000 measuring points per second
Accuracy	~ 90 percent (depending on object class)

Contact

Prof. Dr. Alexander Reiterer
Head of Department Object and Shape Detection
Phone +49 761 8857-183
alexander.reiterer@ipm.fraunhofer.de

Dr. Philipp von Olshausen
Group Manager Mobile Terrestrial Scanning
Phone +49 761 8857-289
philipp.olshausen@ipm.fraunhofer.de

Fraunhofer Institute for Physical Measurement Techniques IPM
Georges-Köhler-Allee 301
D-79110 Freiburg
www.ipm.fraunhofer.de/en