STENCIL 2-32

POWERED BY KAARTA ENGINE

KAARTA®

Real-time, high fidelity 3D mobile scanning and generation for rapid ground surface mapping

Kaarta Stencil® 2-32 is a flexible mobile mapping platform for rapid mobile scanning. Mounted to a vehicle, Stencil 2-32 accurately scans ground level surfaces, mapping items such as curbs, manholes, signs, poles, and other features. Stencil 2 is a computer, small and lightweight yet powerful enough to process and view any of the data it captures. Stencil's integrated 3D mapping and real-time position estimation allows capabilities not possible with fixed-base scanning systems at a fraction of the cost of a Mobile Mapping System (MMS).

At the heart of Stencil is Kaarta Engine, Kaarta's patent-pending advanced 3D mapping and localization algorithms. Kaarta Engine's proprietary approach surpasses the drift error of alternative SLAM systems by an order of magnitude.

Stencil accurately maps quickly and easily with a range of up to 100 meters with a lidar accuracy of ±20mm. Data rate is 720,000 points per second, double the data rate of 16 line lidar.

Stencil records GNSS data for use in loop closure to georegister or geolocate datasets, correcting for drift and further enhancing the fidelity of large area scans. Kaarta provides an optional GNSS receiver and bracket kit or Stencil integrates with most GNSS systems with NMEA 0183 output.

Stencil's user interface and on-screen keyboard accessed on the included tablet makes real time operation easy, organized, and intuitive; giving users better control over scanning operations.

Confidence Metrics provide feedback on the quality of scan matching by signaling whether new scan data is registered properly in the existing map, signaling the likelihood of errors and allowing the user to adjust data collection techniques or adjust parameters. Automated Floor Leveling and Sectioning algorithms identify floor structures and levels producing better scans and reducing post-processing time. The Floor Planner levels, rotates, and generates 2D images of slices from a point cloud.

The combination of small size and customizable capture hardware creates an adaptable system. Stencil base configuration is an aluminum enclosure with machined plates for lidar mounting and adapters as well as mounting points for the Vehicle Mounting Kit. Feature Tracker provides visual odometry capabilities that augment laser odometry to provide enhanced operation in open, unstructured environments. Stencil 2-32 includes a Velodyne HDL-32 with a +10° to -30° Vertical FOV.

Stencil is a turnkey system that contains everything needed to capture and process the captured data. No internet connection, additional computers, software licenses, or subscription needed. Stencil serves as a stand-alone scanning solution but can also be used to complement or augment other scanners.

Stencil's ease of use, breadth of applications, and streamlined workflow make it the perfect choice for infrastructure inspectors, surveyors, engineers, architects, facilities planners, security personnel, or anyone who needs an easy way to document the 3D world quickly and dependably.

STENCIL 2-32 SPECIFICATIONS

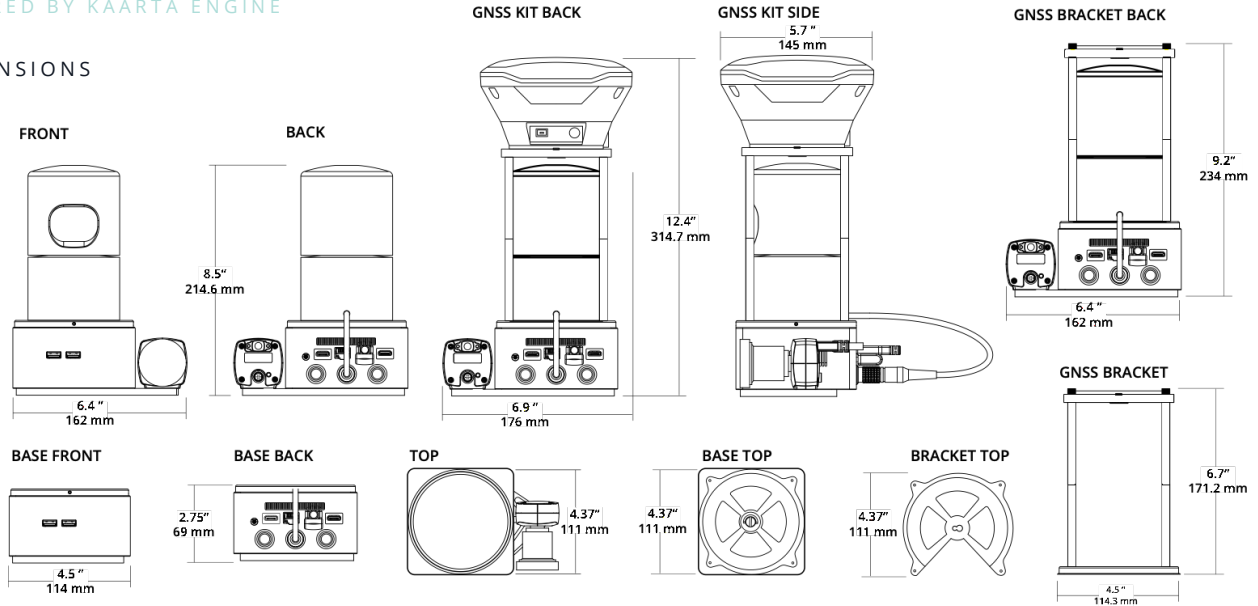|	
OUTPUT	.ply, .las
MODES	Baseline mapping Add-on mapping for complex & larger areas Compatible with .ply files from Kaarta Contour™ or other devices
IMU	Internal MEMS-based IMU Six DoF: X, Y, Z, Roll, Pitch, Yaw
PROCESSOR	Intel NUC 7i7 Quad Core
PORTS	2 HDMI 4 USB 3.0 RJ-45 Gigabit Ethernet
STORAGE	1TB SSD
DISPLAY	iPad 9.7" 32GB Wi-Fi HDMI port supports optional display
OS	Ubuntu Linux OS
LIDAR	Standard adapter fits Velodyne HDL-32 lidar 1m [min] – 100m [max] range 360° horizontal FOV 40° (+10° to -30°) vertical FOV Class 1 Eye-safe per IEC 60825-1:2007 & 2014
GNSS	Integrates with common GNSS systems Contact Kaarta for assistance in choosing the best system for your application
ACCURACY	±20mm (lidar)
SPEED	720,000 points/sec [data acquisition] Up to 10 Hz [scanning speed]
FEATURE TRACKER	640 x 360 Resolution 50 Hz frame rate Black & white images
WEIGHT	2,200g (4.9lb)
OPERATING TEMPERATURE	0°C [min] – 50°C [max]
HUMIDITY	<85%
POWER	12-19 VDC
BATTERY LIFE	2 hours maximum
MOUNTING PLATFORMS	Roadway vehicle, ATV, UAV, rail
INCLUDED ACCESSORIES	23000 mAh, 85W external LiPo battery (USA only) AC power adaptor Base plate for camera or tripod Hard plastic shipping container
OPTIONAL ACCESSORIES	Vehicle Mounting Kit GNSS Kit
WARRANTY	1 year
SAFETY	Complies with FCC Part 15, Subpart B Class B Radiated and Conducted Emissions
MODEL NUMBERS	KRT-STN-FT-32-020: Base + HDL-32 + feature tracker KRT-STN-FT-00-020: Base + feature tracker KRT-ACC-GS-00-010 : GNSS Kit KRT-ACC-BK-00-010: GNSS Bracket KRT-STN-SW-00-010: 1 yr software service KRT-STN-HW-01-010: 1 yr extended hardware warranty KRT-STN-HW-02-010: 2 yr extended hardware warranty KRT-ACC-ST-00-010: Stencil Accessory Kit KRT-ACC-VH-00-010: Vehicle Mounting Kit

KAARTA ENGINE

Microsoft INDOOR LOCALIZATION COMPETITION IPSN 2016   KIT Karlsruhe Institute of Technology

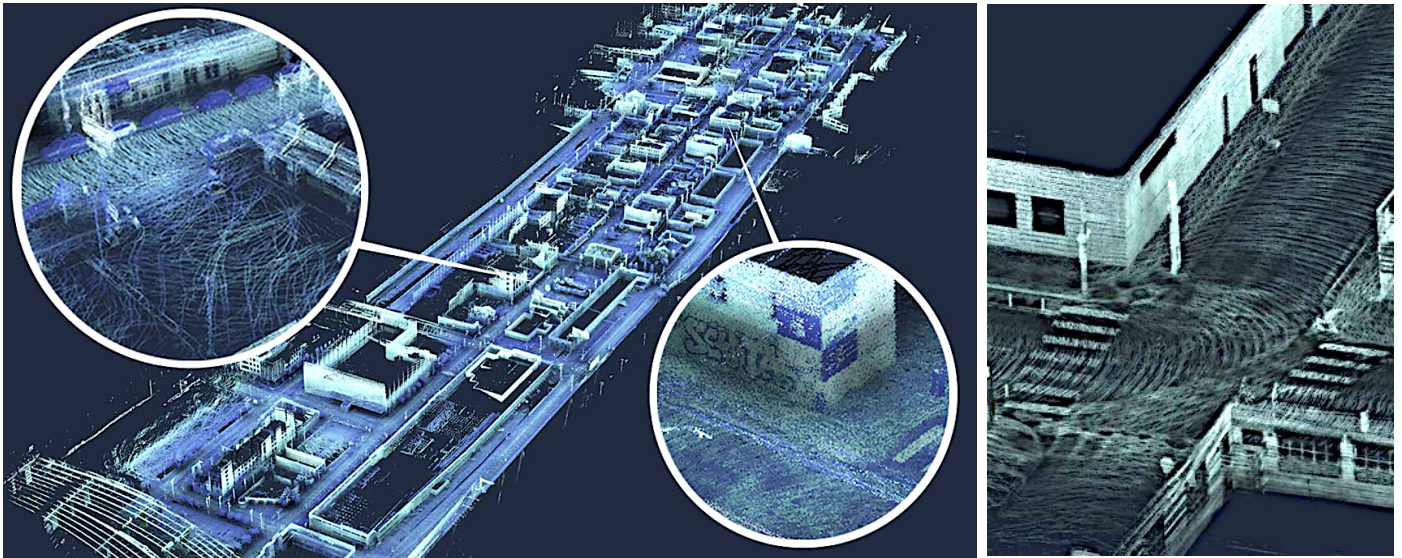| |
|---|
| Real-time registered point cloud generation |
| Real-time localization |
| Multi-sensor input (lidar, IMU, feature tracker) |
| Continuously self-correcting minimal drift techniques |
| Implicit loop closure |
| Fast, explicit loop closure at point of scan |
| Point-of-scan work confirmation |
| Point cloud sharpening technology |
| Patent-pending technology |
| 1st place Microsoft Indoor Localization Competition 2016 & 2017 |
| 1st & 2nd ranking KITTI Vision Benchmark Suite |

STENCIL 2-32

POWERED BY KAARTA ENGINE

DIMENSIONS

FRONT

BACK

GNSS KIT BACK

GNSS KIT SIDE
5.7 "
145 mm

GNSS BRACKET BACK

9.2"
234 mm

8.5"
214.6 mm

12.4"
314.7 mm

6.4 "
162 mm

6.4 "
162 mm

BASE FRONT

BASE BACK

TOP

BASE TOP

BRACKET TOP

GNSS BRACKET

2.75"
69 mm

6.9 "
176 mm

4.37"
111 mm

4.37"
111 mm

4.37"
111 mm

6.7"
171.2 mm

4.5 "
114 mm

4.5 "
114.3 mm

SAMPLE OUTPUT

5 km (3.1 mi) total distance of city streets mapped in 20 minutes traveling up to 40kph (25mph). 240 million points collected. Insets: close up of 2 areas of the scan showing sign and graffiti details.

Close up of Intersection of scan [right] showing paint, curb & sign details

GNSS INTEGRATION

GNSS data with dropouts

Stencil 2 trajectory

Corrected trajectory
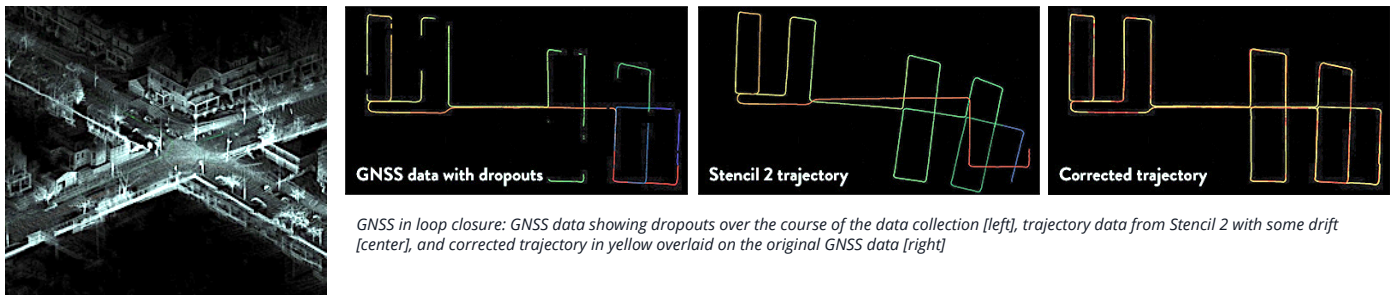
GNSS in loop closure: GNSS data showing dropouts over the course of the data collection [left], trajectory data from Stencil 2 with some drift [center], and corrected trajectory in yellow overlaid on the original GNSS data [right]

Three passes through an intersection correctly registered in post processing using GNSS in loop closure

KAARTA®