Product Guide
AEC

⌒ emesent

Keep your AEC projects on track with fast, safe, and accurate data collection.

Capture high resolution, true-color point clouds to create digital twins of assets such as bridges, buildings, towers, tunnels, and more, with the advanced capabilities of Emesent SLAM.

Fast, highly accurate and easily repeatable scans allow you to verify construction and identify potential issues early to reduce rework, helping to keep your projects on track and within budget.

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Emesent is a world leader in drone autonomy, premium SLAM-based 3D LiDAR mapping, and data analytics.
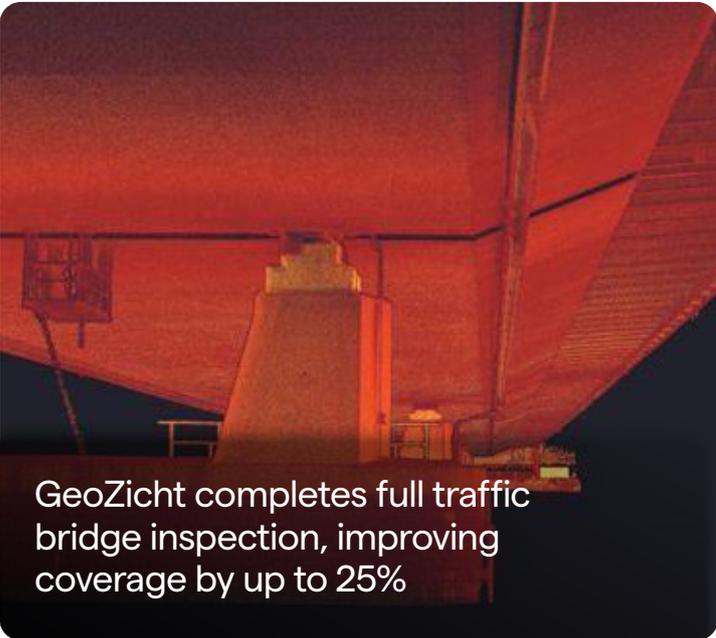
Founded in 2018, after a decade of cutting-edge research at the Robotics and Autonomous Systems arm of Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), Emesent has built a reputation for delivering high quality data capture, working side-by-side with customers to provide revolutionary efficiency, safety, and operational insights.

Our expertise spans Robotics, Autonomy, AI, Machine Learning, and Data Analytics, with research and development exploring new possibilities and developing innovative technologies as we advance the autonomous digitization of the physical world.

Founders
Dr Farid Kendoul & Dr Stefan Hrabar

Client Success Stories

Rapid, comprehensive, versatile 3D data capture for a 2km roadway with GeoTwin.

GeoZicht completes full traffic bridge inspection, improving coverage by up to 25%

Brierley Associates speeds up road tunnel inspection by 95%

Trusted by world leaders

snowyhydro   veris   gm   Trimble.   JOHN HOLLAND

"Using Emesent technology, the entire scan was completed in just one day versus the 3 weeks it would have taken using a total station."

— **Garry Elali** | Operations Manager, GeoTwin, Australia

Surveyors, reality capture professionals and organizations around the globe rely on Emesent solutions for...

Accuracy

Access 5-10mm global accuracy and reliability in the most challenging environments with Emesent's proprietary SLAM algorithm, designed and proven for autonomous drone operations, optimized for AEC.

Reliability

Capture repeatable, highly accurate results with rapid validation reports that satisfy the most demanding client requirements and give you peace of mind that the job's done to spec.

An End-to-End Solution

Seamlessly move from field capture through processing to validated deliverables with Aura and Aura Cloud, eliminating fragmented workflows and collaboration barriers.

Versatility

Deploy versatile scanning solutions across roads, buildings, and tunnels with numerous purpose-built mounting modes and flexible georeferencing that adapts to every project workflow.

Integrated & Simplified User Experience

Simple enough for juniors, powerful enough for experts - users can learn Emesent technology in just days. Access connected systems where LiDAR, RTK, cameras, and software work together to deliver impressive results.

Technology That Helps Scale Your Business

Scale operations profitably with technology that reduces training time, expands service offerings, and differentiates your firm in competitive markets.

Indoor and outdoor environments

Topographic Survey

Detailed maps showing both natural and built features:

→ Road Survey
→ Rail Survey
→ Terrain Mapping

Building and Infrastructure Construction

→ Scan to BIM
→ Construction Progress Tracking
→ As-built Models
→ QA / QC
→ Clash Detection
→ Floor Plans
→ Design Planning

Building & Infrastructure Asset Management

Large, complex asset and site survey, and inspection:

→ Asset Inspection
→ Condition Monitoring
→ Change Detection

Easily and accurately scan:

→ Residential, commercial, institutional buildings
→ Warehouses, data centers, hospitals, schools
→ Standalone structures (towers, monuments)
→ Tunnels
→ Bridges & overpasses
→ Dams, retaining walls, embankments
→ Airports, ports
→ Public spaces
→ Manufacturing plants, refineries
→ Power generation facilities
→ Oil & gas facilities, chemical plants

Hovermap STX

Fast, versatile mobile scanning — on the ground or fully autonomous.

Featuring AI-powered autonomous mapping, Hovermap incorporates the latest in LiDAR sensing technology to generate high-density point clouds in areas where humans struggle to access.

With a sensing range of up to 300 meters and the ability to capture more than a million points per second, Hovermap delivers detailed, survey-grade data over a wide area fast – accelerating your time to insight.

→ Emesent SLAM - Proprietary
→ Hesai XT32M2X
→ RTK integrations with Emlid, Trimble & Leica
→ GoPro 360 degree image kit

Hovermap STX Accessories

Backpack RTK — Fast, accurate and repeatable results

Emesent's Backpack RTK automates high-accuracy georeferencing and drift-correction for backpack based scans, to deliver fast, accurate and precise scans while reducing or eliminating the need to lay out and georeference ground control points. Intelligently leveraging both RTK and SLAM to optimize results, Backpack RTK ensures the most reliable, robust point cloud.

Drone RTK — Fast, accurate drone-based scans

Emesent Aura supports RTK, automating high accuracy georeferencing and drift correction for Hovermap scans on DJI's M300 and M350 drones, in addition to Astro Max. This enables the delivery of fast, accurate and precise above-ground drone scans on demand, without the need to lay out and georeference ground control points.
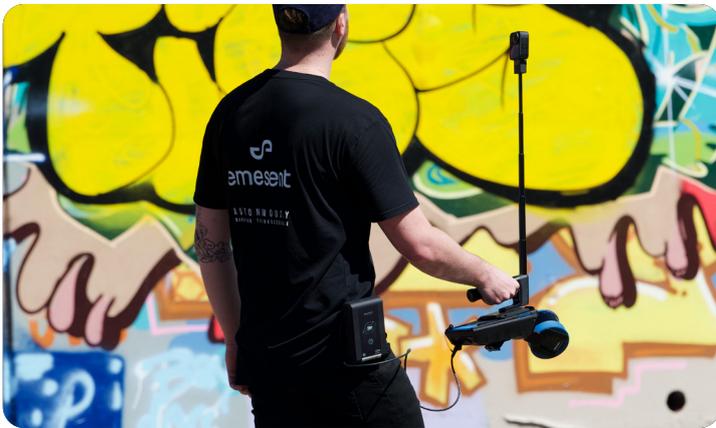
360° Image Kit — Augment Hovermap point cloud scans

The Handheld 360° Image Kit attaches a 360° camera directly to Hovermap, allowing users to capture panoramic imagery alongside LiDAR data in a single pass—adding visual context that makes point clouds easier to understand for non-technical stakeholders.

Vehicle RTK — Rapid vehicle-based scanning

Drone scan not suitable? Need to scan an area too large to walk? Emesent Vehicle RTK delivers confident scanning over large areas and of long, linear assets without the need for GCPs.

> "It's got to the point now where people use that scanner in the office more than other scanners because you can just grab it and go. Emesent has taken probably 80% of the TLS jobs away."
>
> — John Philipp | Director, Orion Spatial Solutions, Australia

GX1

Reliable, highly accurate SLAM that works in any environment.

→ 1hr integrated battery
→ Quick Mount Accessory

Emesent GX1 is the world's most accurate RTK SLAM scanner, delivering 5-10mm global accuracy with integrated premium RTK georeferencing.

Featuring 4×20MP cameras for stunning 360° panoramas and rapid accuracy reports in Aura, GX1 provides the proof professional surveyors need to stand behind their data.

→ Emesent SLAM - Proprietary
→ Hesai XT32M2X
→ Premium, integrated RTK Receiver
→ 1hr integrated battery
→ Quick Mount Accessory

GX1 Features

Emesent SLAM

Proven in some of the world's most extreme environments via autonomous drone mapping, Emesent SLAM is the powerful technology that drives GX1's impressive accuracy results.

Integrated RTK

GX1's premium 448-channel RTK receiver delivers 0.6cm + 0.5ppm horizontal and 1cm + 0.5ppm vertical accuracy – supporting real-time monitoring.

Superb 360° imagery

360° horizontal and 284° vertical coverage, GX1 captures every detail in a single pass, reducing mission times and saving on return visits.

Best-in-class LiDAR

1.92 million points per second, a 300m range for high-precision and 360° scanning for capturing accurate data quickly and reliably.

Unlimited Processing, No Usage Fees

Process unlimited datasets on-premise with no per-scan charges or cloud processing costs that eat into your project margins.

Enhanced End-to-End Workflow

A complete survey system from in-field monitoring and capture to point cloud processing – and integrations with industry platforms like Revit.

GX1 Accessories

Quick Mount

Vehicle Mount

Backpack/case

Handheld

> "You are able to turn up on site, press go and start capturing data. Still the same robust SLAM and great pickups as far as point cloud density goes, but packaged in a more thoughtful and efficient way."
>
> — Adam Wylie | Operations Manager, Sonto, Australia

Your End-to-End Solution

Field to finish, Emesent delivers your complete workflow

From capture to collaboration — access your data where you need it, when you need it. Our technology is more than scanners — developments in Commander, Aura and Aura Cloud will enable users to better capture, visualize, share and collaborate on their data.

Unlock the power of your point clouds with Aura

Experience Emesent Aura — the all-in-one processing and visualization platform that takes your scans to the next level.

Powerful automation, intelligent filtering, and advanced point cloud enhancement tools deliver precise, high-quality results with speed and ease. Now, with innovations in Aura Cloud - you'll be able to share 360 degree walk-throughs of your data more easily than ever before.

Mission control with Commander

Emesent Commander is your mission control app, designed to make mapping simple and intuitive. Designed with a responsive touchscreen interface, user-friendly workflows, and high-density visualization, Commander puts powerful control at your fingertips.

It's also your gateway to Emesent Cortex, the intelligent software that powers Hovermap's world class autonomy and smart navigation capabilities.

Integrated Technology

> "I found the interface to be super intuitive, and the display of all control points' error is very much appreciated. I especially like how you can see the rigid control error before you "commit" to running the longer SLAM GCP adjustments."
>
> — **Scott Harrigan** | President, Chief Pilot, Harkin Aerial

Emesent Assure

Stay operational. Minimize downtime.

When incidents happen, don't wait weeks for repairs. Emesent Assure is a proactive recovery solution designed to keep your team flying. With fast replacement swaps for Emesent scanners (Hovermap and GX1) or Hovermap + drones, you stay productive and focused on your mission.

Emesent Advance

Never fall behind.

Emesent Advance ensures your investment stays current, secure, and supported - so you can focus on the mission, not the technology.

→ Future-proof your operations - Automatic access to all software innovations means you're always equipped with the latest capabilities

→ Maximize uptime - Expert support and proactive maintenance keep your teams productive.

→ Protect your investment - Regular updates and security patches ensure reliability and longevity.

"Emesent provides great customer care...
It's really easy to get help from them."

— Ratu Vetaia Ogoogofou Vuinakelo | Underground Surveyor, Lion One Limited, Fiji

GX1

Specifications

*Specifications are indicative only and are subject to change without notice.

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Emesent GX1 is powered by Emesent SLAM, a proprietary SLAM algorithm which is the key to unlocking stunning global accuracies in a variety of environments. All global accuracies are reported as 3D RMSE in accordance with good surveying practice. SLAM global accuracy is correlated with the density of features in the scan environment.

Global accuracy

Global accuracy - unconstrained [1]	→ 5mm (many features) → 10mm (few features)
Global accuracy - with GCPs [2]	→ 5mm (many features) → 8mm (few features)
Global accuracy - with RTK/PPK [3]	→ 15mm

[1] *Measured in test environments by performing a rigid alignment to control points.*

[2] *Measured in test environments by non-rigidly constraining the point cloud with control points and measuring global accuracy with check points. Constraint points are not used in the accuracy calculation.*

[3] *Measured in a standard outdoor test environment using a local base station (<1km baseline).*

Local accuracy & precision

Local accuracy [1]	5mm
Precision [2]	Up to 2mm

[1] *Reported as 3D RMSE. Measured in test environments by calculating point-to-point distances between control points. Constraint points are not used in the accuracy calculation.*

[2] *Reported at 1 standard deviation.*

Integrated RTK

Channels	448
Horizontal Accuracy[1]	0.6cm + 0.5ppm
Vertical accuracy	1cm + 0.5ppm
PPK	Yes
Connectivity	Integrated 4G modem, nano size SIM

[1] *RTK receiver accuracy only. Not indicative of overall global accuracy. Global accuracy is typically improved when combining RTK and SLAM data.*

LiDAR

Model	Hesai XT32M2X
Sensing range	300 meters / 984ft
Returns	3
Points/sec	→ 640,000 (single return) → 1,920,000 (triple returns)
Channels	32

Cameras

Cameras	4 x 20MP high-resolution cameras
Panorama field of view	360° x 284°
Ground sample distance	→ 0.96mm/px @ 1 meter → 4.8mm/px @ 5 meters

Scanner

Weight	→ 3.2kg / 7.05lbs (without battery) → 3.5kg / 7.71lbs (with battery)
IMU	High-performance AHRS
Travel protection	Store in custom-designed IP65 backpack
IP rating	IP65
Operating temperature	-10 to 45°C (14 to 113 °F)
External interfaces	→ RJ45 (Ethernet) → Multi-function connector → USB-C (USB3.2)WiFi (2.4GHz)
Wireless interfaces	→ WiFi 2.4/5.8GHz → 4G
Storage	→ 2TB → SD card expansion (up to 2 TB)
Mounting methods	→ Backpack → Survey pole (5/8" thread) → Vehicle → Supported handheld

Battery & charging

Power	54Wh 10.8V Smart Li-Ion Battery (removable)
Battery life	60 minutes
External power	→ Multi-function connector (9-24V) → USB-C (65W, for offload and firmware upgrades only)
Charging	→ Dual-bay battery charger → In-device battery charging with external power
Charging time	Approx 2 hours

Hovermap STX

Specifications

Specifications are indicative only and are subject to change without notice.

Emesent Hovermap STX is powered by Emesent SLAM, a proprietary SLAM algorithm which is the key to unlocking stunning global accuracies in a variety of environments. All global accuracies are reported as 3D RMSE in accordance with good surveying practice. SLAM global accuracy is correlated with the density of features in the scan environment.

Global accuracy

Global accuracy	5 - 10mm
Global accuracy - RTK/PPK1	15 - 30mm

Local accuracy & precision

Local accuracy	5 - 10mm
Precision²	Up to 2mm

² *Reported at 1 standard deviation.*

RTK

RTK georeferencing	With external RTK receivers: → Emlid RS2/RS2+/RS3 → Leica GS18/GS18I/GS18T → Trimble R10/R12/R12i/R980
PPK	Yes

Cameras

Cameras	Optional accessories: → 360 colorization kit (GoPro Max) → Handheld 360 Image Kit
Panorama field of view	360°

LiDAR

Model	Hesai XT32M2X
Sensing range	300 meters / 984ft
Returns	3
Points/sec	→ 640,000 (single return) → 1,920,000 (triple returns)
Channels	32

Battery & charging

Power	External battery (V-Mount compatible), or Platform power (drone or robot) 14-55V
Battery life	2 hours
Charging	Battery charger (with international adapters US/Canada/Japan, AUS/NZ, UK and Europe)
Charging time	Approx 3-4 hours

Scanner

Weight	1.57kg / 3.46lb
IMU	High-performance AHRS
Travel protection	→ Hardshell backpack or → Hovermap carry case
IP rating	IP65
Operating temperature	-10 to 45°C (14 to 113 °F)
External interfaces	→ USB-A (USB 3.0) → Push-pull connector → Smart connector (accessory expansion)
Wireless interfaces	WiFi (2.4GHz)
Storage	512 Gigabytes (<16 hours of sensor data)
Mounting methods	→ Handheld → Backpack → Vehicle → Drone → Boston Dynamics Spot Robot → LHD Mount → Cage → Telescopic boom pole → Cavity Monitoring System adapter kit

Other Accessories & Hardware

Supported drones	→ Freefly Astro → Astro Max → DJI M300 → M350
Additional hardware	→ Long Range Radio → Emesent Control Point targets → Samsung tablet and tablet display kit for DJI Smart Controller

Autonomy

Tap-to-fly and guided exploration	Waypoint, bounding box settings in real time 3D map and autonomous path planning.
Collision avoidance	→ LiDAR omnidirectional range of 1.2 to 40m (3.9 to 131 ft) → Size of an obstacle > 2 mm wire (3/32 in) → In-flight adjustable safety distance
Intelligent return to home	Autonomous Return To Home navigation triggered by low battery or excessive dust.
Assisted flight	Non-GPS flight, position hold, assisted flight, collision avoidance, regulated flight speed

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Know more.
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dataset catalog.