

August 7, 2023

Company Name	Kudan Inc.	
Representative	CEO	Daiu Ko
	(Securities code: 4425 TSE Growth)	
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Kudan and Vecow Reach the First Milestone on Their Partnership and Release Joint Product for Mobile Mapping

Kudan Inc. (henceforth in this document as “Kudan”) and Vecow Co., Ltd (henceforth in this document as “Vecow”), a team of global embedded experts with its headquarter based in Taiwan, are delighted to announce the initial target milestone in their partnership. The companies are thrilled to introduce a new generation of mobile mapping dev kit that harnesses the core technologies of both entities. This jointly developed mapping solution is poised to cater to the growing demand for capturing precise and comprehensive 3D environmental information across diverse industries.

1. Background to the release of the products and their details

The release of the mobile mapping dev kit marks the first milestone in the partnership expansion between Kudan and Vecow, as previously revealed in the release "[Kudan and Vecow Expand Strategic Partnership to Address Growing Demands of Outdoor Autonomous Mobility and Mobile Mapping Applications](#)"(July 24, 2023).

The spotlight on SLAM-based 3D mobile mapping has surged in recent years, with its ability to capture 3D data automatically while the mobile platform (such as humans, vehicles, robots, or drones) traverses through the scene. This technology finds a wide range of applications, such as Smart Cities and Urban Planning, ICT-based Construction, Infrastructure Inspection and Maintenance, Stockpile Management in Mining and Quarrying, and Emergency Response and Disaster Management.

Different from TLS (Terrestrial Laser Scanning) -based 3D mapping, which utilizes stationary laser scanners and is time-consuming for capturing precise data of static scenes, SLAM-based 3D mobile mapping has gained market attraction due to its real-time and efficient mapping of vast areas. However, SLAM-based 3D mobile mapping has been in general not as precise as TLS-based approach due to the inherent noise and uncertainties in mobile sensor data. This is why an industrial-grade SLAM, which is capable of multiple sensor fusion, becomes crucial to get closer to the precision of TLS-based approach while still maintaining the benefits of fast mapping.

In the realm of multiple sensor fusion, time synchronization plays a pivotal role in ensuring precise alignment of all sensor data in the temporal domain. This critical process enables the precise association of sensor measurements with corresponding landmarks or features in the environment,

effectively reducing errors during data processing. Additionally, time synchronization significantly contributes to achieving invaluable motion estimation and loop closure[※] detection, resulting in a marked enhancement in the accuracy, reliability, and overall quality of SLAM-based mapping outcomes.

The jointly developed mapping solution is a back-pack/handheld type of 3D mapping device, which leverages Kudan's exclusive 3D-Lidar SLAM (KdLidar) with multi-sensor fusion technology, together with Vecow's rugged VCM-1000F controller for precise time synchronization and efficient computing.

The mapping dev kit possesses the ability to efficiently and robustly generate precise 3D point clouds in various environments, including GNSS-denied areas. This makes it suitable for a wide range of applications, such as forest survey, facade survey, infrastructure maintenance, underground survey, industrial digital twin, facility asset management, volume measurement, and ICT construction.

Moreover, the mapping dev kit, in conjunction with KudanStudio software, offers a user-friendly interface and streamlined workflows, making it accessible to users of all levels. This intuitive design allows anyone to conduct proper data collection and swiftly generate highly accurate 3D point clouds with precision up to 1cm, without the need for specialized skills. Moreover, the system supports detailed parameter settings in data post-processing, facilitating the creation of optimal 3D point clouds with varying densities and sizes for specific use cases, while preserving the original raw data for reusability. Additionally, the inclusion of the map handling function automates the seamless merging of multiple point cloud data, ensuring efficient point cloud maintenance and data utilization across wide areas.

※Loop closure: refers to the process of detecting and correcting the accumulated errors in the estimated trajectory and map when revisiting a previously visited location.



2. Overview of business alliance partner

(1) Name	VECOW Co., Ltd.	
(2) Address	12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 236658 , Taiwan (R.O.C.)	
(3) Name and position of representative	Chairman, Nen Chi Tsay	
(4) Content of business operation	AI-ready Inference Systems, AI Computing Systems, Fanless Embedded Systems, Vehicle Computing Systems, Robust Computing Systems, Single Board Computers, Multi-Touch Computers, Multi-Touch Displays, Frame Grabbers, Embedded Peripherals and Design & Manufacturing Services	
(5) Capital	50,000,000 NTD (225 million JPY) (Converted at 1 NTD = 4.51 yen (exchange rate as of August 4, 2023))	
(6) Date of establishment	July 28, 2006	
(7) Major shareholders and held share percentages	AIS Cayman Technology Group.	100.00%
(8) Relationship with Kudan	Capital ties	None
	Personnel ties	None

	Transactional relationships	Kudan and our consolidated subsidiary Artisense Corporation partner Vecow in a united solution with AI and robotic control functions to accelerate AMR Applications
	Related party connections	None

※“Financial performance and fiscal status of the company over the past three years” is not disclosed due to the request of the company.

3. Schedule

Launch date of this product	August 7, 2023
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4. Special expenditure for the products release

There was no special additional expenditure for the release of the new products and they were mainly research and development expenditure such as personnel costs, etc.

5. Future outlook

This product release will only have a minor impact on the company’s financial performance at this time. As the company's financial performance will be affected by the future product sales, we will promptly make an announcement if any event arises that is expected to have a significant impact on the company’s financial performance such as increased customer orders.

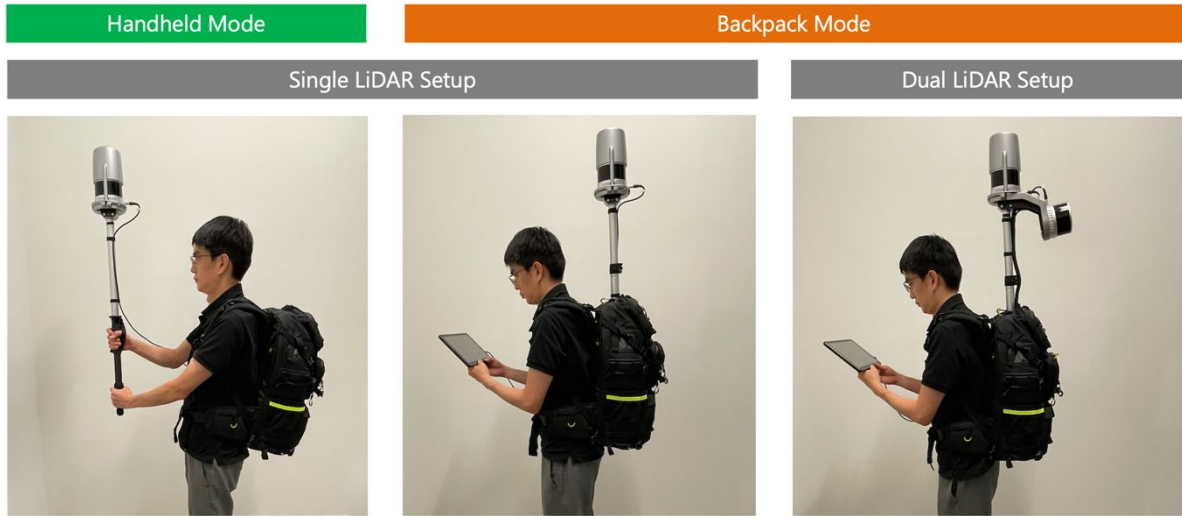
6. Comments on this product release

“Through our collaboration, it is not limited to a single hardware or software; rather, it encompasses a complete solution of software and hardware integration, showcasing the technical strength of both parties,” said Alex Liu, BDM of Vecow. “Vecow's time synchronization technology will be combined with Kudan's SLAM of 3D-Lidar mapping and sensor fusion capabilities, aiming to enhance the accuracy and robustness of sensor data for outdoor autonomous mobile robots and vehicles. We are excited about the prospects of further business alliances with Kudan.”

“The release of this joint mapping solution stands as a remarkable exemplar of the potency of collaboration and the value in integrating cutting-edge technologies,” said Tian Hao, Director & COO of Kudan. “Featuring a sophisticated algorithm and advanced sensor fusion capabilities, Kudan SLAM can serve versatile applications across various industries. Together with Vecow, we are committed to continuing to empower the industry by leveraging the partnership with technologies from both parties. We believe that innovation knows no bounds when visionary companies unite.”

(Reference)

Other detailed information on this product

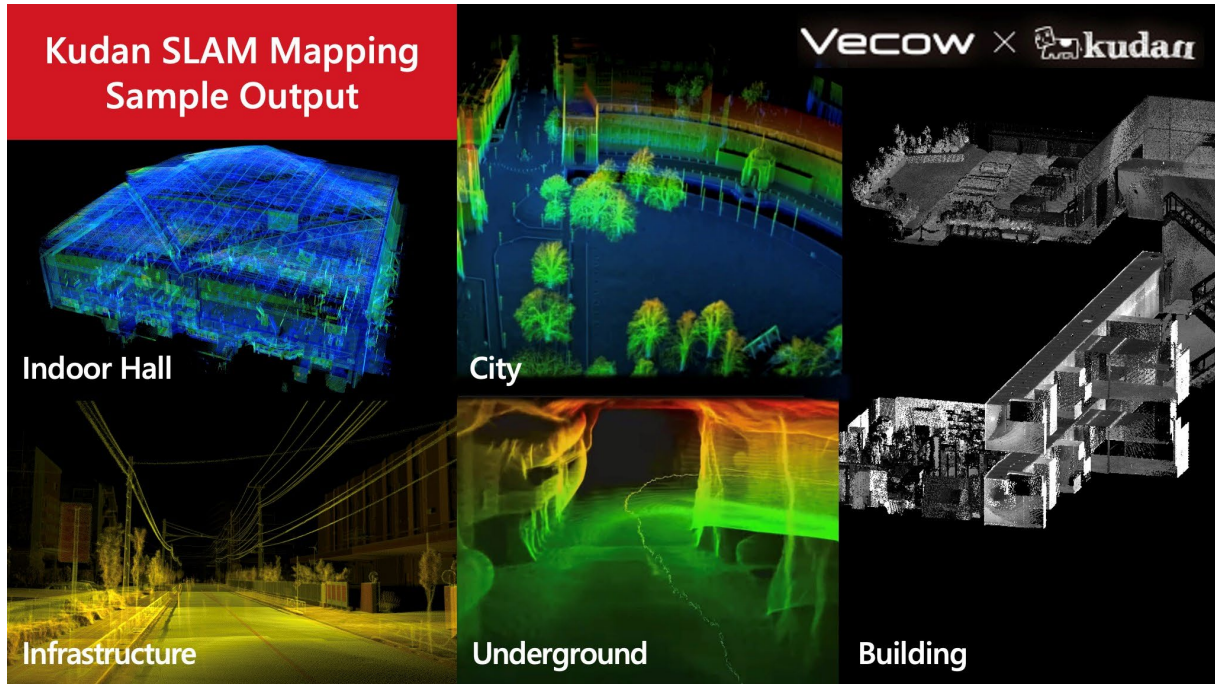


※ The LiDAR mounting pole is telescopic and can be stored in the backpack when not in use.

End-to-End Workflow

Vecow × kudarn





Kudan - Vecow Mobile Mapping Dev Kit Specification:

	Single Setup	Dual Setup
Relative Accuracy	1 - 10 cm	1 - 5 cm
FoV (H X V)	360° X 31°	360° X 360°
Sensing Range	0.05 ~ 120 m (80m@10% ref)	
Points per Second	1,280,000 pts/sec	2,560,000 pts/sec
Storage	2TB SSD	
Raw Data Size	About 3GB/min	About 6GB/min
Processing	Point Cloud Preview: Real-time Point Cloud Generation: Post-processing	
Battery	V-Mount DC 6875mAh X 2 units, Hot-Swappable	
Working Hours	About 2 - 2.5 hours	About 1.5 - 2 hour
Recommended Continuous Recording Time	30 minutes	30 minutes
Weight (during Data Collection)	9.6kg	10.4kg
Operating Temperature	- 20°C ~ 60°C / - 4°F ~ 140°F	
Protection Class	IP54	

- Features
- ✓ Supported
 - ✓ Planned
 - ✓ Real-time point cloud display and confirmation (preview function)
 - ✓ GNSS Data Integration / Point Cloud Output in Global Coordinates
 - ✓ Point Cloud Merge
 - ✓ Ground Control Point Integration
 - ✓ Point Cloud Colorization (2H.2023)

To learn more about Vecow VCM-1000 series, please see [here](#).

About Vecow.

Vecow is a team of global embedded experts and we aim to be your trusted embedded business partner. Vecow is committed to designing, developing, producing, and supplying high-quality AIoT solutions with trusted reliability, advanced technology, and innovative concepts. Our products include AI-ready Inference Systems, AI Computing Systems, Fanless Embedded Systems, Vehicle Computing Systems, Robust Computing Systems, Single Board Computers, Multi-Touch Computers/Displays, Frame Grabbers, Embedded Peripherals and Design & Manufacturing Services for Machine Vision, Autonomous Vehicle, Smart Robotics, Digital Rail, Public Security, Transportation & V2X, Smart Factory, Deep Learning, and any Edge AI applications.

Vecow is a subsidiary of Ennoconn Corporation (6414. TW) in Taiwan, a global leader of industrial hardware systems and solutions provider to various vertical market applications. Ennoconn Corporation is a member of the Foxconn Group.

For more information, please refer to Vecow's website at

https://www.vecow.com/dispPageBox/vecow/VecowHp.aspx?ddsPageID=VECOW_EN.

About Kudan Inc.

Kudan is a deep tech research and development company specializing in algorithms for artificial perception (AP). As a complement to artificial intelligence (AI), AP functions allow machines to develop autonomy. Currently, Kudan is using its high-level technical innovation to explore business areas based on its own milestone models established for deep tech which provide wide-ranging impact on several major industrial fields.

For more information, please refer to Kudan's website at <https://www.kudan.io/>.

■Company Details

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Representative: CEO Daiu Ko

■Contact Information

For more details, please contact us from [here](#).