

Kudan Inc. (4425)



### **Corporate Information**

Exchange	TSE Mothers
Industry	Information and communications
Managing Director & CEO	Daiu Ko
Address	2-10-15 Shibuya, Shibuya-ku Tokyo
Year-end	March
URL	https://www.kudan.io/

### **Stock Information**

Share Price	Shares Outstanding		Total market cap	ROE Act.	Trading Unit
¥3,865		7,680,800 shares	¥29,686 million	-135.3%	100 shares
DPS Est.	Dividend yield Est.	EPS Est.	PER Est.	BPS Act.	PBR Act.
0.00	-	-	-	¥189.32	20.4x

\*The share price is the closing price on June 11. Each number was taken from the financial report for FY 3/21.

### **Earnings Trend**

Fiscal Year	Sales	Operating Income	Ordinary Income	Net Income	EPS	DPS
Mar. 2018 (Actual)	204	-3	4	3	0.57	0.00
Mar. 2019 (Actual)	376	123	103	103	15.35	0.00
Mar. 2020 (Actual)	456	9	-12	-29	-4.17	0.00
Mar. 2021 (Actual)	127	-451	-1,575	-1,608	-214.97	0.00
Mar. 2022 (Estimate)	300-350	-	-	-	-	0.00

\*Unit: yen, million yen. Net income is profit attributable to owners of the parent. Hereinafter the same shall apply. The earnings forecasts are that of the company. Only for sales, the estimated range was indicated, considering the unclear outlook for the business environment and the uncertainties over the progress of existing and new transactions.

This report briefly describes Kudan Inc., the financial results for the term ended March 2021, growth strategies, and includes the interview with CEO Ko, etc.



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### **Key Points**

- Kudan Inc. is a company that carries out research and development of deep technology specializing in the algorithms for artificial perception (AP), which corresponds to the "eyes" of machines (computers and robots). Its strengths and characteristics include the capability of flexibly responding to the growth of diverse demand, which is expected in the future, and a group of professionals in AP. The company has secured a firm position based on the alliance with Artisense Corporation, which is led by Professor Daniel Cremers, who has produced globally recognized research results as a pioneer in self-driving technologies.
- By underpinning a variety of advanced technologies in addition to the applications whose applied development has already progressed, AP technologies are expected to be applied and integrated in many fields, and put into practice faster than expected. In such a market environment, the company will fuse AP technologies with AI and IoT, and cultivate applicable domains in a multistage manner. The company will keep developing products through the projects of clients so far, disseminate its technologies in the market by distributing clients' products, and increase revenues from commercial licenses, with the aim of expanding profit considerably.
- For the term ended March 2021, sales were 127 million yen, down 72.0% year on year. Due to the spread of COVID-19 and the delay in some R&D projects mainly with Artisense, the budgets for projects were reduced, frozen, or put off, and the company concentrated on the business domains and large-scale projects for discussing Simultaneous Localization and Mapping (SLAM) technology evaluation and commercialization. Accordingly, continuous transactions decreased. An ordinary loss of 1,575 million yen was posted. The equity-method investment loss was posted in the section of non-operating expenses, due to the devaluation of investments and loans toward Artisense and the posting of interim loss. Although sales dropped, the company reshuffled the portfolio of projects and enriched the lineup of technologies, including those of Artisense, for the purpose of increasing transactions and developing clients' products from the next term.
- For the term ending March 2022, sales are estimated to be 300 to 350 million yen. Sales are expected to grow, as the recent recovery trend will continue mainly thanks to the increase of projects for developing clients' products. The estimate is a sales range, because there are uncertainties over the progress of existing projects and the increase of new projects at each foothold around the world. The estimated profit is still to be disclosed, because the company will conduct investment swiftly and flexibly for business integration with Artisense and recruitment, while considering the impact of COVID-19, the expansion of business development, etc.
- We interviewed Mr. Daiu Ko, who is the Managing Director & CEO of Kudan, about the company's competitive advantage, growth strategies, issues, his message toward shareholders and investors, etc. He said, "We recognize that our company has the most advanced AP technology in the world. Based on the alliance with Artisense, the foundation has been laid to further solidify our position in the market in the future. Due to COVID-19, our performance has been stagnant recently, but we will carry out our business with a grand vision with the aim of increasing sales and profit explosively in a shortest way in the medium/long term. Please look forward to it."

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• The scope of application of AP technology is expected to grow further. We would like to expect a lot from the growth potential and possibility of the company, which has already secured the position as the company with the world's most advanced AP technology. Meanwhile, what investors want to know is when the company will achieve a 5-fold and 10-fold growth. One of their problems to be solved before commercialization is the fact that not only the company's AP technology, but also clients' technology needs to be completed, for embodying actual devices and products. This cannot be controlled by the company alone, but they will deal with it by improving the quality of the clients' portfolios. We would like to wait for the release of their products, which is expected in this or next term, while having mid-term expectations toward them.

### 1. Company Overview

Kudan Inc. is a company that carries out R&D of deep technology (or deep tech), specializing in algorithms for artificial perception (AP) which acts as the eyes of machines, such as computers and robots.

Working in pairs with artificial intelligence (AI), which serves as the brain of machines, to complement each other as deep tech, AP helps machines evolve to function autonomously. The company operates business based on its unique milestone model focused on deep tech that has impact on a wide range of industries through highly sophisticated technological innovations.

### [1-1 Corporate history]

Mr. Tomohiro Ohno, currently serving as a Managing Director, became convinced of the future prospects and growth potential of the AP technology when working at Andersen Consulting (currently Accenture PLC) and set up Kudan Limited in the United Kingdom in January 2011, at which he pursued his own research and development on the Simultaneous Localization and Mapping (SLAM) technology that provides a basis for the AP technology.

In November 2014, he established Kudan Inc. with the aim of extending the administrative department through business expansion while moving further ahead with his research and development. The company started offering evaluation software for demonstration of the Kudan SLAM technology in December 2016 and officially began to provide Kudan SLAM in the term ended March 2018.

It got listed on the Market of the High-Growth and Emerging Stocks (Mothers) of the Tokyo Stock Exchange (TSE) in December 2018. Consisting of three inside directors, Managing Director & CEO Daiu Ko, who joined the company after working for Toyota Motor Corporation and McKinsey & Company, Managing Director Tomohiro Ohno, and Director & CFO Ken Iizuka, who entered the company after working at Ernst & Young ShinNihon LLC, Kudan's management team places a heavy emphasis on swiftness.

### [1-2 Corporate philosophy]

Kudan's corporate philosophy is "to stand alone, and dare to create what is new and different."

The philosophy guides the company into avoiding following suit and daring to challenge the generally accepted wisdom. Embracing the philosophy, the company aims to expand its business and research and development, raise shareholder interests, and become a one-of-a-kind company in the market by formulating policies that enable them to stand out from all other companies.

While adopting a corporate vision to "Eyes to the All Machines," Kudan aims to become a player that offers technology essential for full autonomy and automation, goals that all kinds of machines and devices will strive to reach.

### [1-3 Market environment]

In recent years, the increasing needs for automation of operations in every industry and advancement of hardware technology, including sensors and semiconductors complementary to algorithms, have been rapidly spreading and practically utilizing the AP algorithms.

In addition, the impact of the spread of COVID-19 has resulted in soaring demand for saving labor and working remotely for operations that require neither human interaction nor group work in all the industries. The growth of demand for automation technology, such as robotics, autonomous driving, and drones, is significant particularly in the fields of logistics, manufacturing, construction, retail, etc.

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The material for the 10th meeting for discussing new governance models for realizing Society 5.0 held on October 6, 2020 by the Ministry of Economy, Trade and Industry (METI), which was titled "Reference material 2: Case studies for estimating the economic impact of advanced technology," provides estimates for the economic impact of Internet of Things (IoT), artificial intelligence (AI), autonomous driving systems, and drones as follows:

Technology/device	Economic impact
IoT	Real GDP boosted by the increase in use of IoT and AI is estimated at 132 trillion yen in 2030.
	The number of people in employment in 2030 when use of IoT and AI is promoted is facilitated further is estimated to be 63 million, up 7,390,000 compared to the number of people employed
	when use of IoT and Ai is not promoted.
AI	GDP in 2030 is expected to be 9.8% (11.2 trillion dollars) to 14% (15.7 trillion dollars) higher with an impact of AI than without.
Autonomous driving systems	It is projected that the passenger economy (*) will stand at 800 billion dollars in 2035 and 7 trillion dollars in 2050 globally when autonomous cars are put into practice.
	The economic impact is broken down into Mobility as a Service (MaaS) for consumers (3.7 trillion dollars), MaaS for businesses (3.0 trillion dollars), and newly emerging driverless vehicle services (0.2 trillion dollars).
	*The passenger economy: economic and social value realized by level-5 fully autonomous cars
Drones	The market scale of the drone business in Japan is forecasted to be 193.2 billion yen in FY 2020, up 37% from the year before, and reach 642.7 billion yen in FY 2025 (about 3.3 times larger than that of FY 2020).
	Drone services were the strongest market in FY 2019 with a 68% year-on-year increase to 60.9 billion yen followed by the drone body market that grew 37% year on year to 47.5 billion yen and the drone peripheral services market which showed a 46% year-on-year rise to 32.6 billion yen.
	These three markets are expected to continue booming, with the market scales for FY 2025 are estimated at 442.6 billion yen (about 7.3 times greater than that of FY 2019) for the services market, 122.9 billion yen (about 2.6 times greater than that of FY 2019) for the body market, and 77.1 billion yen (about 2.4 times greater than that of FY 2019) for the peripheral services market, respectively, in descending order.

\*Created with reference to "Reference material 2: Case studies for estimating the economic impact of advanced technology" used at the 10th meeting for discussing new governance models for realizing Society 5.0 as posted on METI's website. The red and bold parts were provided by Investment Bridge Co., Ltd.

As the AP technology can be applied and integrated into myriad industries in which it underpins a wide variety of advanced technologies besides the aforementioned practical applications that have already incorporated AP, it is predicted that the AP technology will be implemented in society at a higher-than-expected speed.





(Taken from the reference material of the company)

The company expects that the applications of AP and fusion of it with AI and IoT will result in strong markets of both applications and technology.



(Taken from the reference material of the company)



### [1-4 Business content]

Kudan has issued a license for Kudan SLAM, a software for integrating such algorithms as SLAM, that is the mission-critical technology of AP, into hardware, and grants it to customers.

It is essential to learn about AP and SLAM to understand the business and technological superiority of Kudan. Below are descriptions of AP and SLAM.

### <What is AP?>

Artificial perception (AP) is a technology put forward by Kudan Group that is carrying out research and development thereof.

Following the recent advancement of AI, a technology that substitutes the human brain, machines such as computers and robots, which have worked only under the instruction and command of humans for many years, are believed to evolve to function autonomously independently of people's control.

The technologies crucial for this evolution are AI that is the brain with which machines can make decisions and AP, one of the advanced technologies that acts as the eyes of machines with which they can perceive their surroundings.

Coordinating and complementing mutually with AI which is the brain, AP as the eyes helps machines (robots and computers) work and function autonomously.



(Taken from the reference material of the company)

As mentioned above, AP is a technology that imparts advanced visual capabilities to machines just like the human eye. What plays a central role to enable AP to fully demonstrate the required capabilities, is SLAM.

#### <What is SLAM?>

Simultaneous localization and mapping (SLAM) is a computer-based technology that draws a three-dimensional map while localizing a moving body in a reality environment.

Taking a car applied with the SLAM technology as an example, the technology localizes the car based on a computer program of mathematically processing the distance that the car has travelled, camera images, and sensor information provided by LiDAR, which is a sensor using laser light, and outputting three-dimensional information (such as the direction, distance, and size) and kinesthesia (such as the location and movement) on a real-time and precise basis and, at the same time, makes a three-dimensional map based on data on the surroundings amassed by the sensors.

In the case of cars, SLAM enables drivers to obtain basic information for safe travel by car by using a three-dimensional map drawn from time to time by the technology while driving cars, even if they have no information in advance on road conditions (such as the location of cars driving in the front, back, left, and right of their cars, how fast the cars in all directions drive, the road width, and the number of road lanes).

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SLAM is the most critical technology for AP, and what are extremely important are precision and processing speed when it comes to ensuring the safety in autonomous cars. Such technological issues have been pointed out as obstacles to using SLAM for general purposes.

In this regard, Grand Kudan SLAM offered by the Kudan Group is comprised of three different SLAM algorithms, each of which has its own unique strengths.

### **<sup>®</sup>kudan & ∧≂⊤ו⊆≡⊓⊆≡** GrandSLAM software

Direct Visual SLAM	Artisense Visual Inertial Navigation System (VINS)
Camera Indirect Visual SLAM	Kudan Visual SLAM (KdVisual)
((1)) JD-Lidar SLAM	Kudan 3D-Lidar SLAM (KdLidar)

Kudan Indirect Visual SLAM, for example, is capable of processing information over 10 times faster with less processing power than the most prominent open-source software of camera-based SLAM technology. Compared to other solutions that can generally give only centimeter-level localization precision, such as 5 cm, the precision of Kudan Indirect Visual SLAM can be as small as millimeters. By combining these algorithms, etc., the company aims to further improve the function with higher speed and higher precision both

indoors and outdoors, using multiple sensors, such as cameras and LiDAR, together by integrating the systems through clock synchronization between the sensors (a process called tight coupling).

This technological superiority has been enhanced further by the acquisition of Artisense Corporation as its subsidiary as mentioned later.

Kudan began offering Kudan Indirect Visual SLAM under the name of Kudan SLAM in the term ended March 2018. Then, it started to provide Kudan 3D-Lidar SLAM in March 2020. The company has been striving to broaden the customer base in the following three areas:

Area	Example customers			
Augmented reality (AR) and virtual reality	Optical sensor manufacturers, optical equipment manufacturers, mixed reality			
(VR) application area	(MR) glasses manufacturers, telecommunications equipment manufacturers,			
	electrical equipment manufacturers, e-commerce platforms, computer ga			
	producers etc.			
Robotics and IoT area	Optical equipment manufacturers, heavy industrial and industrial robot			
	manufacturers, electrical equipment manufacturers, transportation equipment			
	manufacturers, signal processing internet protocols (IPs), etc.			
Application area targeting cars and maps	Car components manufacturers, digital map companies, spatial information			
	consulting companies, etc.			

#### <Growing number of fields in which AP can play roles>

Using one of the existing technologies called computer vision (a set of base technologies of sensor and image processing mainly on a two-dimensional basis) as the foundation after reconstructing it, Kudan has developed its own unique AP technology.

As AP is the base technology necessary for every kind of device that uses cameras and three-dimensional sensors, the company expects that it will be the base technology adopted to diverse next-generation solutions on a cross-cutting basis.



It has been a technology essential for automatic control of all autonomous machines as robotics in a broad sense, including industrial robots, domestic robots, next-generation mobility such as cars, and flying machines such as drones, just to name a few.

It will also be required for spatial perception in AR and VR that will serve as user interfaces of next-generation computers. In addition, the technology will be applied to an extremely wide range of purposes as the base technology for next-generation digital maps, dynamic maps (a dynamic mapping system that swiftly reflects the conditions of the reality environment), digital twin (information on the virtual space synchronized with the reality environment on a real time basis), and the like.

Aiming at technological integration with not only SLAM that is the mission-critical technology of AP but also such related technologies as AI and IoT, the company is currently forging ahead with its research and development regarding machine perception, deep perception, and neural perception networks as it hopes to expand the areas to apply the technology.



(Taken from the reference material of the company)

#### [1-5 Business strategies]

Kudan focuses on carrying out research and development and offering AP algorithms, such as SLAM, which is a deep tech that is equivalent to the base technology locating at the lowest level of the AP technology pyramid, under solutions, finished products, and application technology of various industries.

Kudan's business strategy is aimed at maintaining and further increasing its monopolistic market share as a special and independent company in the AP market by forging alliances on a global basis with multifarious players of all the levels of the pyramid, which are solutions, finished products, and application technology, and enticing them as customers while maintaining its position without relying on any specific company in terms of business development and finance.

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(Taken from the reference material of the company)

### <Acquisition of Artisense Corporation as a subsidiary and business alliance therewith>

One of the most noteworthy points of the Kudan Group's business strategies is the acquisition of Artisense Corporation (whose headquarters are based in the United States) as a subsidiary and a business alliance with the company.

### (Overview of Artisense Corporation)

With such fields as autonomous driving, robotics, AR and VR, and drones being its application areas, Artisense Corporation provides AP algorithms that perceive the space and location, taking pride in its capability of putting camera-based visual SLAM into practice on a commercial level.

Artisense Corporation was founded in 2016 jointly by Professor Daniel Cremers, who has delivered the world's best research results as the leader of the Technical University of Munich (TUM) that has a world-leading research group in AI and computer vision and as a leading expert on the autonomous driving technology, and Mr. Andrej Kulikov, a serial entrepreneur.

The Artisense Group consists of three global companies, which are the parent company that is based in Silicon Valley, California, U.S., a German company engaging in research and development in collaboration with TUM and the European auto industry, and a Japanese company devoted to business development in the Asian region.

Artisense conducts research and development on AI and computer vision and offers technology related thereto in the field of the spatial and location perception technology, in which Kudan operates business, and the strength of its direct visual SLAM, in particular, lies in the algorithms developed through approaches different from those taken by Kudan.

### (Purposes of the acquisition of Artisense Corporation as a subsidiary)

Although Artisense Corporation is a direct competitor, Kudan entered into a contract with it in January 2020 for gradually getting its shares with the intention of acquiring it as a subsidiary.

Kudan is aiming to take an overwhelmingly large market share by including Artisense, a major company in the oligopoly AP technology market besides Kudan, in its group companies.

In addition, the technological alliance between the companies is expected to complement their respective specialty technologies, synergistically improving the performance of their technologies, and realizing more precise spatial and location perception in more complex environments, which will eventually enable Kudan to further grow the markets of autonomous driving, robotics, AR and VR, and drones on a technology-driven basis.

Kudan concluded a business alliance with Artisense in May 2020.

Specifically, in research and development, Kudan aims to develop and put into practice its unique Grand SLAM, an algorithm that is as most sophisticated as one can theoretically think of by achieving a breakthrough with integration of the direct SLAM that Artisense uniquely possesses as a next-generation technology into Kudan's indirect SLAM, or into Kudan's LiDAR SLAM technology, and Artisense's deep learning-based AI technology called Deep Feature.

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Regarding business development, the company will further enhance its sales structure globally in Asia, including Japan and China, Europe, and North America.

As mentioned earlier, it also strives for dramatic medium- and long-term growth through such efforts as to forge ahead with further development and investment in deep tech, as well as to retain and enrich researchers and engineers specializing in SLAM, whose recruitment will be more difficult because the number of such experts is believed to become limited, enrich personnel engaging in business development in global sales locations, invest in partner companies for expanding product and solution development, and develop and put into practice Grand SLAM.

The purposes and achievements of the merger and acquisition so far are as follows:

Purpose	Overview		Achievements		
To secure experts	-Prof. Daniel Cremers of Artisense is an		-Prof. Daniel Cremers of Artisense is an		Successfully retained existing human resources.
whose number is	internationally respected authority on research				
getting small	into AI and autonomous driving systems.	_	Continuously secured engineers from TUM's pool of		
		$\rightarrow$	top engineering talent.		
	-About 20 leading engineers are engaged in				
	research and development under Prof. Cremers.				
To secure next-	-Direct SLAM, which is more similar to human		Successfully made next-generation technology into		
generation	perception.		products and launched them onto the market.		
technologies		_			
	-Integrating SLAM with deep learning, which	~	Verified the effectiveness in the market through		
	will be essential for putting finished products		multiple PoC(*) projects.		
	into practice.				

\*PoC

PoC stands for Proof of Concept, which is verification and demonstration in a preliminary step before prototype development with the aim of verifying new concepts, theories, principles, and ideas.

#### (Process of the subsidiary acquisition)

The share transfer agreement entered into in January 2020 stipulates that Kudan acquires all the shares of Artisense held by the seller not in a lump in an early stage but through three closing steps.

The contract was so designed to provide Artisense's officers and employees, who are the members of the seller, with stronger incentives to continuously getting involved in the operations of Artisense and improvement of its business performance, as well as to control the risks that Kudan will face, by designing a step-by-step acquisition. In addition, the agreement allows to motivate the seller to continuously improve Artisense's business performance by flexibly adjusting the third closing date and payment of the acquisition to the business result of a certain period.

Artisense Corporation has become an equity-method affiliate of Kudan following the first closing (in which Kudan acquired about 1,490,000 shares accounting for 12.0% of the total number of issued shares in January 2020) and the second closing (in which the company took about 3,230,000 shares making up 26.0% of the total number of issued shares in July 2020).

Kudan plans to make Artisense its consolidated subsidiary after the third closing, but when the third closing is held has not been decided yet.

### [1-6 Competitive superiority]

### (1) Technological features

Kudan believes that its AP technology has enormous advantages in taking in not only the existing demand for product development but also demand for research and development on highly novel and complex future technologies, because the AP technology can help the company strategically take in technological demand fueled by continuous advancement and wider applications of the technology in mid-/long-term.

According to the company, the AP technology has the following five features.

Kudan can flexibly fulfill future demand, which is expected to grow and be diverse, by combining their sophisticated and flexible research and development capabilities that they cultivated by focusing on the AP field:

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Feature	Overview				
(1) Uniqueness of the	The Kudan Group possesses diverse families of technologies that consist of uniquely developed				
algorithms	algorithms.				
	Regarding how to perceive image feature points (fairly noticeable local areas in an image) that				
	provide the basis for perceiving three-dimensional geometric structures at an advanced level, for				
	example, the company has developed a unique, high-speed and greatly precise method by				
	integrating and hybridizing a high-speed perception method and a highly precise and stable				
	perception method.				
	Furthermore, the density of feature points perceiving within an image can be adjusted flexibly to				
	optimize the precision of perceiving three-dimensional structure (a set of three-dimensional feature				
	points) and the processing speed, according to the practical application environment.				
	In addition, a wide range of unique mathematical models that guarantee the feasibility of the				
	technology are integrated, including optimized calculation that increases the precision of a group of				
	three-dimensional feature points perceived sequentially in a three-dimensional manner, and a high-				
	speed matching method with already-known, stored data.				
(2) Flexibility and powerful	The uniqueness of the algorithms allows high-speed processing (with a light calculation load) as				
performance	well as realizes great perception precision (which means that deviation from a true value is slight)				
	and robustness (which indicates that the technology performs stably regardless of the environment				
	and conditions in which it is used).				
	In addition, the AP technology will be able to deliver strong performance that is optimized for a				
	myriad of practical applications as it is designed in a manner that allows users to make detailed				
	adjustments to the perception precision, robustness, processing speed, data size, and other				
	individual functions according to the conditions under which the technology is used and required				
	specifications.				
(3) Flexibility in sensor use	As limiting the number of sensors can narrow the scope of applications of the AP technology, the				
	Kudan Group's technology is designed to be compatible with various sensors.				
	Specifically, it can function with a variety of cameras, the technology can be adjusted flexibly				
	according to the number of cameras (such as monocular cameras, binocular cameras, and multiple				
	cameras), and the data read format of optical sensors (such as whether to read data sequentially or				
	simultaneously).				
	Besides cameras, the technology can also be combined with a multitude of sensors, including				
	three-dimensional sensors (such as LiDAR and Time of Flight (ToF)), internal sensors (such as				
	inertial measurement unit (IMU) and machine odometry), and position sensors (such as the Global				
	Positioning System (GPS) and Beacon), which will allow advanced application of the technology				
	while taking advantage of the strengths of each sensor.				
(4) Flexibility in arithmetic	Flexibility in arithmetic processing platforms is also an important factor for applying the AP				
processing environments	technology to a wider range of fields.				
	As the Kurden Casura's technology on weak in anytiferious withouting an opening anyting any incompany it.				
	As the Kudan Group's technology can work in mutuatious anumetic processing environments, it				
	can be compared with an kinds of processor designs and thus can speed up calculation processes				
	unit (CDL), a digital signal processor (DSD), and a graphics processing unit (CDL).				
	It can also function in a wide range of system environments through porting a software to major				
	operating systems (such as Linux Windows MacOS iOS and Android)				
(5) Flavihility in using nort of	Complex fusion with other technologies is necessary for advanced emplications of the AD				
(3) Flexibility in using part of	toohnology. Dorte of the function (coffware modules) of the Vietar Crown's tooknology and the				
ule function	technology. Parts of the function (software modules) of the Kudan Group's technology can be				

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selected so that they are flexibly integrated into customers' existing software.

The degree of dependence on processor designs (the degree of abstraction of software) of each part
(software module) of the technology's function varies, and therefore it can be optimized flexibly
either at a semiconductor level (with a lower abstraction degree) or at a software application level
(with a higher abstraction degree).

### (2) Group of experts on AP

Kudan has laid a firm technological and business foundation as a group of experts in AP.

Many of Kudan's existing customers are companies in Fortune 2000 that lists global good-standing companies, which indicates that Kudan has been highly acclaimed by world's innovative companies.

### (3) Outstanding business achievements and customer awareness

Companies specializing in SLAM and ones whose core technology is SLAM are decreasing in number due to successive mergers and acquisitions by big tech companies.

Under these circumstances, Kudan and Artisense pull far ahead of other companies in terms of the range of technologies that they offer, business results that they have delivered, and customer awareness.

### [1-7 Business model]

In the development phase, Kudan generates revenue from algorithms' customization, addition of new functions, technological consulting services, etc. through joint research and development, as well as by granting the license for the algorithms of Kudan SLAM.

The algorithm license is comprised of the development license and the commercial license, and the type of license granted will be changed from the development license to the commercial license according to the progress achieved by each customer with commercialization of its product under development.

Based on such calculations as the cost of a product multiplied by the quantity of products, the company expects that revenue from the commercial license will rise dramatically as products covered by the license spread out.

In addition to expanding its existing AP business, the company aims to enhance deep tech and raise the number of application areas through increased merger and acquisition activity.

Revenue	Project phase in re	spective client		
model	R&D		Commercialization	
	Partnership start	Milestone progress	Client productization	Client product penetration
	Development license fee beginning	Development license fee scaling	Commercial license fee beginning	Commercial license fee scaling
Track record	Licensing technologies to around 40 clients	Fee rate increase by +100~200% through milestone achievements	1 commercialized product, 5 commercial license and some negotiation for shift to commercial license	N/A
FY2030 Target	Full client base penetration in Forbes 2000 class tech companies	Development license fee for 40+ million JPY per project	Commercialization in 20-30% of total client base	Scaled commercial fee for 200+ million JPY in average and +50 accumulated project number



# 2. Fiscal Year ended March 2021 Earnings Results

	FY 3/20	Ratio to sales	FY 3/21	Ratio to sales	YoY	Forecast
Sales	456	100.0%	127	100.0%	-72.0%	100–160
Gross Profit	416	91.2%	37	29.3%	-91.0%	-
SG&A	406	89.1%	488	382.1%	+20.1%	-
Operating Income	9	2.1%	-451	-	-	-
Ordinary Income	-12	-	-1,575	-	-	-
Net Income	-29	-	-1,608	-	-	-

### [2-1 Overview of the consolidated results]

\*Unit: million yen

### Sales dropped, and investment loss on equity method was posted.

Sales declined 72.0% year on year to 127 million yen. Due to the spread of COVID-19 and the delay in some R&D projects mainly with Artisense, the budgets for projects were reduced, frozen, or put off, and the company concentrated on the business domains and large-scale projects which seek commercialization among projects that are discussing SLAM technology evaluation and commercialization. Accordingly, continuous transactions decreased. These results are within the forecasted range. An operating loss of 451 million yen was posted. SG&A augmented 20.1% year on year to 488 million yen, due to the global expansion of systems.

An ordinary loss of 1,575 million yen was posted. The equity-method investment loss amounted to 1,232 million yen due to the devaluation of investments and loans toward Artisense and the posting of interim loss was posted in the section of non-operating expenses (For details, see Section 2-3).

Although sales dropped, the company reshuffled the portfolio of projects and enriched the lineup of technologies, including those of Artisense, for the purpose of increasing transactions and developing clients' products from the next term.

	FY 3/20	FY 3/21	Composition ratio	YoY
Personnel	155	206	42.2%	32.2%
expenses				
Expenses and	165	184	37.7%	11.2%
depreciation				
R&D costs	85	98	20.1%	15.4%
SG&A	406	488	100.0%	20.1%

#### Breakdown of SG&A

\*Unit: million yen



### [2-2 Financial standing and cash flows]

#### O Balance sheet indicating major items

	End of	End of Mar.	Increase/		End of	End of Mar.	Increase/
	Mar. 2020	2021	decrease		Mar. 2020	2021	decrease
Current Assets	691	1,359	+667	Current	313	81	-231
				Liabilities			
Cash and deposits	496	1,230	+734	ST Interest-	43	-	-43
				Bearing Debts			
Noncurrent Assets	710	180	-529	Noncurrent	164	-	-164
				Liabilities			
Tangible Assets	6	0	-6	LT Interest-	164	-	-164
				Bearing Debts			
Investment, Other	704	180	-523	Total Lightlitian	478	81	-396
Assets				Total Liabilities			
Investment	305	1	-303	Net Assets	923	1,458	+534
Securities							
Total Assets	1,402	1,540	+138	Capital	510	1,620	+1,110
				Retained	-119	-1,755	-1,636
				Earnings			
				Total Liabilities	1,402	1,540	+138
				and Net Assets			

\*Unit: million yen

Due to the increase in cash and deposits, the decrease in investment securities, etc., total assets rose 138 million yen from the end of the previous term to 1,540 million yen.

Due to the drop in deposits payable, the repayment of short and long-term debts, etc., total liabilities decreased 396 million yen from the end of the previous term to 81 million yen.

Through the procurement of funds by issuing new shares, capital and capital surplus increased, and retained earnings decreased. Consequently, net assets grew 534 million yen from the end of the previous term to 1,458 million yen.

As a result, capital-to-asset ratio rose 28.5 points from the end of the previous term to 94.4%.

© Cash I	Flow
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	FY 3/20	FY 3/21	Increase/decrease
<b>Operating Cash Flow</b>	-130	-349	-219
<b>Investing Cash Flow</b>	-739	-705	+33
Free Cash Flow	-869	-1,055	-185
<b>Financing Cash Flow</b>	503	1,777	+1,274
Cash and equivalents	496	1,230	+734

\*Unit: million yen

Thanks to an income of 2,210 million yen through the issuance of shares, the surplus of financing CF increased. The cash position improved.

### [2-3 Highlights and topics of the term ended March 2021]

#### O Artisense: Investment loss on equity method was posted

By acquiring Artisense Corporation, the company secured technological advantages, growth potential, etc. in global markets, but Artisense's increase of sales was stagnant in the latest term ended December 2020, deviating from the initial business plan, due to the impact of COVID-19 and the delay in release of their new technology, VINS. In addition, the company posted the devaluation of investment securities and loans to Artisense, which is an equity-method affiliate, considering the uncertainty over the market recovery due to the lingering effects of COVID-19. As a result, an equity-method investment loss of 1,232 million yen was posted in the section of non-operating expenses, while considering the interim profit/loss of Artisense.

🦰 Bridge Salon

According to the current business plan, the sales of Artisense are estimated to keep growing from the next term (FY 2023) onward, but this time, accounting valuation has been conducted conservatively, without assuming the growth from the next term.

The sales growth and profit earning of Artisense have been delayed for about a year, but thanks to the advanced goodwill amortization, the company does not need to post goodwill amortization from FY 2022, so its cost structure will improve and the synergy of sales growth is perceived to contribute to profit.

Investment loss was posted, but the company has attained the purposes in acquiring Artisense, which is to secure rare personnel including globally respected ones and to secure complementary next-generation technologies.

Its mid/long-term growth potential and intrinsic corporate value are unchanged, and it is expected to contribute significantly to the growth of sales and profit, after the release of the new product, VINS.

#### **O** Progress of business activities

The progress of existing projects was stagnant in 2020, due to the steep slowdown of the market because of COVID-19 and the delay in release of the new product VINS, but considering these situations as a chance, the company reshuffled its project portfolio for increasing growth potential and concentrated on the development of essential technologies.

After the release of new products, sales started recovering in the fourth quarter (Jan. to Mar.).

The company has already enriched its project portfolio and technology lineup with high growth potential.



(Taken from the reference material of the company)

#### ◎ Variation in the cumulative number of projects

In the term ended March 2021, the cumulative number of projects grew 55 from the previous term to 108. The increasing number 55 is much larger than the previous term's number 29.

The number of projects for Artisense increased 24 from the previous term and the number of projects for LiDAR rose 11 from the previous term, enriching the technology lineup. The reshuffle of the client portfolio is expected to increase development projects and clients' products.

The company keeps the mid/long-term strategies of growing the cumulative number of projects stably (15 per year and 150 in total) and developing a total of 50 products of clients through large-scale projects between 2020 and 2030.







\* The number of Artisense projects are totaled up until December 2020. All projects are counted in FY21 due to Artisense joining the Kudan group

(Taken from the reference material of the company)

#### Outlook for development of clients' products

In each target market, evaluation and development are ongoing, while looking ahead to commercialization in the market timeline. It is currently estimated that the full-scale release of products will start in the term ending March 2022.





#### **O** Participation in NVIDIA Partner Network

In March 2021, the company participated in NVIDIA Partner Network as a preferred partner of NVIDIA Corporation in the field of embedded edge computing.

Through this participation, Kudan aims to actively form a technological alliance with NVIDIA, and further expand business opportunities with SLAM software, which is indispensable as an embedded technology, while offering high-precision SLAM in NVIDIA Partner Network.



### (Outline of NVIDIA Corporation)

Founded in 1993. In 1999, it invented a graphics processing unit (GPU), which is a semiconductor chip for computing required for rendering images, such as 3D graphics. Since then, it has led technological development as a foremost provider of visual computing and one of the most important players in the field of the innovative technologies, including VR, AI, and autonomous driving.

In the term ended January 2021, sales were 16.68 billion US dollars (about 1.8 trillion yen) and net profit was 4.33 billion US dollars (about 467.6 billion yen) (taken from the Annual Report of the company).

### (NVIDIA Partner Network)

In the program of NVIDIA Partner Network, partner enterprises can use the solutions, platform, and diverse advanced technologies of NVIDIA. Its objective is to help provide end users with globally top-level solutions and support.

### (Ideals of Kudan)

By participating in NVIDIA Partner Network, the company aims to increase the popularity of its SLAM software, expand its targets, and increase business opportunities among not only the clients of NVIDIA, but also all of partner enterprises.

Managing Director & CEO Ko commented, "Based on the partnership with NVIDIA, I'm looking forward to offering the cutting-edge SLAM software utilizing GPUs for robotics and automobile products, which require precise and reliable point-group maps and locational information."

NVIDIA commented, "With Kudan and Artisense being members of NVIDIA Partner Network, I expect that for solutions, clients will be able to utilize the innovative SLAM algorithms based on the effective embedded computing function, which is offered by the edge AI platform of NVIDIA Jetson."

### 3. Fiscal Year ending March 2022 Earnings Forecasts

#### [3-1 Earnings forecasts]

	FY 3/21	FY 3/22 Est.	YoY
Sales	127	300–350	+173-+223
Operating Income	-451	-	-
Ordinary Income	-1,575	-	-
Net Income	-1,608	-	-

\*Unit: million yen. The forecasts were those released by the company.

# Sales are expected to grow, as the recent recovery trend will continue mainly thanks to the increasing number of projects for developing clients' products.

#### Sales are estimated to be 300 to 350 million yen.

The estimate is a sales range, because there are uncertainties over the progress of existing projects and the increase of new projects at each foothold around the world, as COVID-19 is still expanding mainly in overseas.

The estimated profit is still to be disclosed, because the company will conduct investment swiftly and flexibly for business integration with Artisense and recruitment, while considering the impact of COVID-19, the expansion of business development, etc.

### [3-2 Outlooks and initiatives]

The recent recovery trend is thought to continue mainly thanks to the increase of projects for developing clients' products.

From the term ending March 2023, it is expected that the acceleration of business development with Artisense and the enhancement of support for clients' development will accelerate sales expansion and commercialization, and the investment business, etc. will improve performance.



FY23

FY24

FY25

(Taken from the reference material of the company)

127 FY21

(Result)

### 4. Growth Strategy

Net sales million yen

In the innovative technology field, the company aims to achieve the high levels of profitability, stability, and competitiveness with its unique hybrid model combining multiple effective business models according to the users' process, and lead the growth of the market.

		kudan				
	Technology Laboratory					
Business model	Monetization before commercialization	Client retainment based on technological capabilities	Distribution in the deep layer of the industry			
	[Bio/drug development]	[AI/tech]	[Semiconductor]			
	Milestone model	Retainer model	Technology IP model			
	Monetization of R&D	Stability and continuity	High revenues and non-competitiveness			
User's	Research phase					
process		Development phase	Commercialization phase			

300~350

FY22

(forecast)

(Taken from the reference material of the company)

As mentioned in [1-3 Market Environment], by underpinning a variety of advanced technologies in addition to the applications whose applied development has already progressed, AP technologies are expected to be applied and integrated in many fields, and put into practice faster than expected.

In such a market environment, the company will fuse AP technologies with AI and IoT, and cultivate applicable domains in a multistage manner.







The company aims to increase profit steeply by increasing revenues from commercial licenses through the dissemination of technologies in the market by distributing clients' products in addition to the continued commercialization in clients' projects.



(Taken from the reference material of the company)



# 5. Interview with CEO Ko

We interviewed him about the company's competitive advantage, future growth strategy, challenges, and message to shareholders and investors.

### Q: "Please tell us about your company's competitive advantage."

I think it all comes down to the overwhelming superiority of AP technology and the world's leading development team that can make it happen.

Since our founding, we have always been digging deep into areas where our competitors could not.

As we work on AR, competitors entered the market, so we developed applications to run AR, rather than dealing with AR itself. When competitors entered the application development market, we developed a software engine called Software Development Kit (SDK) that makes it easier to create the app. As competitors begin to enter the SDK market, we developed algorithms that are one step deeper, and so on. Like this, we developed while turning competitors into customers again and again, and we continued to deepen our technology. This is exactly why we define ourselves as a deep tech research and development company.

The deeper we dig into the technology, the more versatile the technology becomes.

On the other hand, the closer you get to the surface, the less versatile the software becomes, as you are forced to develop software for each situation, such as considering how to express CG and how to run it on a smartphone with given version of OS.

Our technology is characterized by the uniqueness of our algorithms, flexibility and high performance, flexibility in the use of sensors, flexibility in the computing environment, and flexibility in the use of partial functions. As a result of our pursuit of deep tech, we have achieved extremely high levels of versatility and flexibility, which make it possible for us to respond to the diverse and enormous demands for AP in the future.

We will continue to refine this technology to be an outstanding company that cannot be compared with any other company, as stated in our corporate philosophy, "to stand alone, and dare to create what is new and different," and the driving force for this is our world's leading development team.

Currently, we and the acquired company Artisense have a total of about 40 SLAM engineers, and I believe that we and the U.S. Big Tech companies (GAFA) are about the only companies that have this amount of SLAM engineers, including those with master's and doctoral degrees.

The fact that we were able to conclude a capital and business alliance with Artisense is extremely significant in this regard.

Artisense's Professor Daniel Cremers is a world authority on AI and automated driving research, and by building a relationship with the world's most renowned laboratory led by him, we can continue to secure talented and rare engineers.

In fact, Artisense has received an offer from one of the Big Tech companies (GAFA) in the U.S. To be honest, I was surprised that we beat the competition, but I think it was because our corporate philosophy and Professor Cremers's dream and passion to change the world with SLAM technology resonated with each other.

As I mentioned earlier, we have an overwhelming advantage in AP technology and one of the best development teams in the world that can realize it. This positioning is a powerful competitive advantage that we have been able to establish.

#### Q: "Please tell us about your future growth strategy and the challenges you face in achieving it."

Our AP technology is capable of meeting diverse and enormous demand due to its versatility, and we will continue to develop application areas in a multistage manner by integrating AP technology with AI and IoT technologies.

We are currently working with our customers to develop products for the following key markets: automated driving, automated robots, drones, AR/VR, and mapping surveys, and we currently expect to begin full-scale product launches in this term ending March 2022.

# BRIDGE REPORT

Due to the impact of the COVID-19 pandemic, etc., the progress of existing projects stagnated during 2020, but we took this situation as an opportunity and started to replace our project portfolio to increase our growth potential.

Our revenue model is as follows: in the development phase, we provide the algorithm license of Kudan SLAM and receive compensation for the customization of the algorithm, addition of new functions, and technical consultation through joint research and development; and in the commercialization phase, we receive commercial licenses based on product unit price multiplied by the number of products.

What we are targeting is the commercialization phase, where sales and profits will increase 5 or 10 times.

The key is how to focus on projects with higher growth potential.

Before the outbreak of COVID-19, many companies embarked on development in the form of new businesses rather than their core business, but there were many projects that were temporarily frozen due to COVID-19. However, automakers will not stop the trend of automated driving, and industrial machinery manufacturers will not stop robotics to save workforce and make their machines unmanned. Evaluating the potential of each project, we reshuffled the portfolio, focusing on clients that work on projects earnestly with a team of elites.

As a result, although we made some downward revisions to our financial results for the previous term, we believe that we have been able to build a more robust portfolio that will allow us to expand our projects and commercialize them for customers in the current term and beyond.

One of the challenges we face to accelerate our growth is when completing the actual device or product, not only our AP technology but also the technology of our customers' needs to be completed.

For example, in automated driving, even if the AP can grasp the situation, the AI, which is the brain, may misjudge signals or obstacles. In some cases, customers will also need to invest in infrastructure development and regulatory compliance, which may become a bottleneck for commercialization.

We intend to address these issues by further strengthening our efforts to develop application areas in a multistage manner through technology integration with AI and IoT, as well as by raising the quality of our customer portfolio, as I mentioned earlier.

### Q: "Thank you very much. In closing, please give us a message to your shareholders and investors."

I believe that we are at the top of the world in AP technology.

The alliance with Artisense has laid the groundwork to further solidify this position in the future.

Despite the recent stagnation due to the impact of the COVID-19 pandemic, we are aiming for explosive growth in sales and profits over the medium to long term and will continue to push forward with our business with a strong vision to reach that stage in the shortest possible time. Please look forward to it.



### 6. Conclusions

The scope of application of AP technologies is expected to grow further. We would like to expect a lot from the growth potential and possibility of the company, which has already secured the position as the company with the world's most advanced AP technology. Meanwhile, what investors want to know is when the company will achieve a 5-fold or 10-fold growth. One of their problems to be solved for commercialization is the fact that not only the company's AP technology, but also clients' technology needs to be completed, for embodying actual devices and products. This cannot be controlled by the company alone, but they will deal with it by improving the quality of the client portfolio. We would like to wait for the release of their products, which is expected in this or next term, while having mid-term expectations toward them.

### <Reference: Regarding Corporate Governance>

### Organizational form and compositions of directors and auditors

Organizational	Company with audit and supervisory committee
form	
Directors	7 directors, including 4 outside ones
Auditors	-

### ◎ Corporate Governance Report

Last updated on Jun. 23, 2020

<Basic Policy>

Our company recognizes that it is indispensable to establish corporate governance, in order to improve our corporate value, maximize the profits of shareholders, and foster good relationships with stakeholders.

Under this recognition, the Managing Directors, other Directors, and employees of our company will strive to tighten corporate governance by understanding their respective roles and developing and operating internal control systems.

<Reasons for not following the principles of the corporate governance code> We follow all the basic principles of the corporate governance code.

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