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NEWSLETTER

EMBEDDED VISION

TECHNOLOGY

February 2020



Market Overview

- Computer Vision Technology (CV) will find myriad applications in several industries and reach an estimated market size of \$28 billion by 2030, up from \$3.5 billion in 2019, according to GlobalData.
- 2019 saw embedded vision continue to become an enabling technology across numerous market verticals. From agriculture to autonomous vehicles and from healthcare to retail. The CV applications generating the most revenue in 2019 were consumer electronics, automotive, medical, robotics, sports and entertainment, and food & beverage.
- In retail, Amazon Go has now attracted a raft of competitors while Walmart has embraced vision technology to combat theft and to take inventory via vision equipped robots.
- The automobile industry has fully embraced embedded vision across multiple applications including AEB, driver monitoring, and autonomous vehicles. While fully autonomous vehicles may take a while to arrive, vision will continue to grow in automotive. The Tesla 3 has no fewer than 8 cameras embedded in the vehicle.
- According to ABI Research, total shipments for machine vision sensors and cameras will reach 16.9 million units by 2025, creating an installed base of 94 million machine vision systems in industrial manufacturing. Of that installed base, 11% will be deep learning-based.
- Privacy concerns increased over facial recognition technology. San Francisco became the first city to ban the use of facial recognition by the police and other agencies.
- In healthcare, oncology/radiology/pathology are becoming increasingly automated as AI/DL algorithms continue to improve. CV can already do a better job at diagnosing pathology in a CT or MRI scan than most radiologists.
- VC investment in computer vision technology firms increased four-fold from 2016-2018 exceeding a total of \$8 billion with 1,400 deals during this three-year period. Chinese investors investing in Chinese companies are dominating the space accounting for over 56% of overall dollars invested and 8 of the 10 biggest deals.
- Computer vision continued to be a critical enabling technology in robotics. However, the long-predicted market for domestic robots has still not materialized (stay tuned for a mobile Alexa device from Amazon that can recognize household members and respond accordingly?)
- There are now over 60 semiconductor startups chasing the market for specialized AI processors. Most of these devices are low power and designed to operate at the edge of the network (“edge devices”). Smart Cameras (cameras that can extract useful information from a live video stream without accessing the cloud) are a key target market for many of these AI semiconductor companies.
- Within the consumer electronics market, computer vision has seen adoption in mobile phones (e.g. Apple iPhone’s FaceID) and Drones (collision avoidance). Next up domestic robots?

Embedded Vision Stock Market Performance

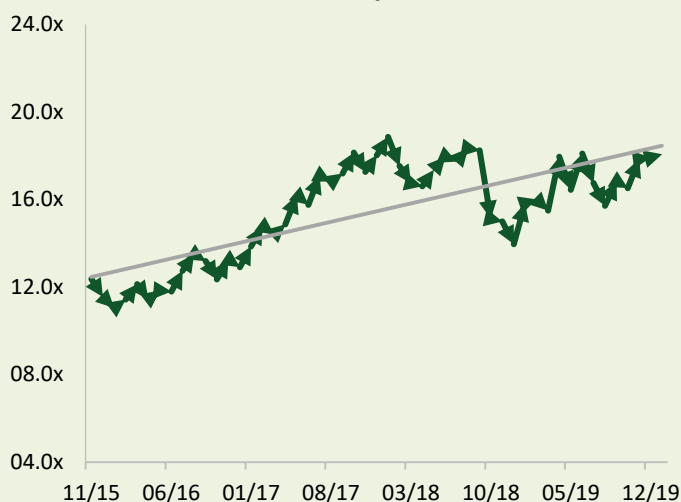
February 14, 2020

(Dollars in millions, except per share data)

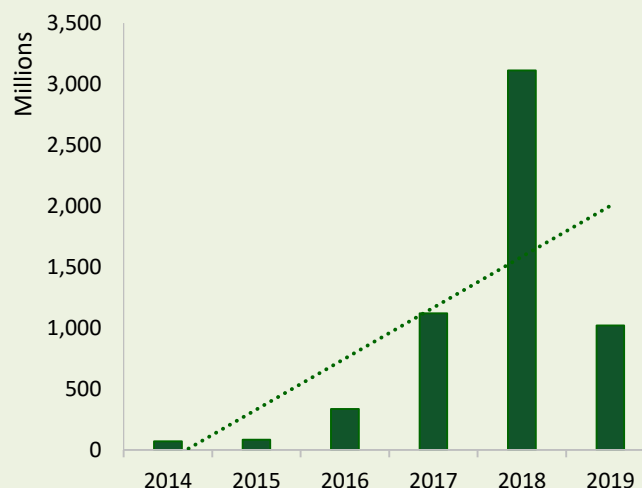
Company	Ticker	EV \$M	Sales \$M	\$	% 52 week	EV/EBITDA
AMS AG	SWX:AMS	4,759	1,944	44.59	60.6%	7.6x
Ametek	NYS:AME	25,564	5,125	101.44	28.4%	22.1x
Basler AG	FRA:BSL	608	177	60.90	5.1%	19.1x
Bruker	NAS:BRKR	8,088	2,022	50.59	33.3%	22.6x
Cognex	NAS:CGNX	8,739	749	53.46	5.4%	41.1x
Datalogic S.p.A.	MIL:DAL	1,087	706	18.53	(34.0%)	10.1x
Faro Technologies	NAS: FARO	858	390	56.40	19.6%	72.7x
Kapsch TrafficCom AG	WBO: KTCG	538	859	27.19	(30.6%)	8.1x
FLIR Systems	NAS: FLIR	8,336	1,846	58.79	12.2%	20.9x
Hamamatsu	TKS:6965	5,900	1,326	42.68	17.7%	17.0x
Hexagon AB	STO:HEXA B	23,901	4,114	58.51	11.2%	18.1x
Isra Vision	ETR:ISR	1,198	174	54.7	68.7%	21.1x
Jenoptik AG	ETR: JEN	1,731	944	29.14	(19.6%)	13.1x
Keyence Corp	TKS:6861	78,055	5,117	354.3	27.1%	29.7x
Novanta	NAS:NOVT	3,677	623	98.60	31.6%	38.2x
Nynomic	ETR:M7U	129	69	21.86	(27.2%)	10.1x
Olympus Corporation	TKS:7733	24,742	7,410	18.38	68.7%	17.7x
Oxford Instruments	LON:OXIG	1,193	450	20.89	65.2%	14.7x
Renishaw plc	LON:RSW	3,841	685	53.48	(3.3%)	29.6x
Stemmer Imaging	FRA:S9I	169	131	30.45	(9.9%)	18.0x
Teledyne Technologies	NYS:TDY	14,948	3,078	392.02	65.8%	30.2x
TKH Group NV	AMS:TWEKA	2,351	1,889	53.77	6.6%	14.7x
Mean					18.3%	22.6x
Median					14.9%	18.6x

Embedded Vision Trends

Median EV/EBITDA



Funding Amount Computer Vision



2019 Notable Investments

Date	Company Name & Location	Investor(s)	Stage	Amount (\$M)	Valuation (\$M)	Business Description
8/26/2019	Face++, China	-	IPO	500.00	-	Developer of a facial recognition technology aimed at providing powerful and cross-platform virtual detection solutions.
9/17/2019	TuSimple, United States	Sina	Series D	215.00	1215.00	Developer of a camera-based computer vision technology intended to optimize self-driving truck systems.
8/21/2019	PlusAI, United States	Lightspeed Venture Partners	Series A	200.00	1000.00	Developer of self-driving technology designed for large scale autonomous commercial fleets.
8/22/2019	Aeva, United States	Audi, Porsche Automobile Holding	Series B	60.00	460.00	Developer of self-driving car sensors designed to measure velocity.
9/11/2019	Healthy.io, Israel	Corner Ventures	Series C	60.00	-	Developer of urinalysis mobile application designed to help users perform home-based urine test.
4/3/2019	Red Points, Spain	Summit Partners	Series C	38.00	-	Provider of a brand and content protection software designed to detect counterfeit goods being sold online.
7/25/2019	Standard Cognition, United States	EQT Ventures	Series B	35.00	535.00	Developer of autonomous checkout technology intended to streamline operations for brick and mortar retailers.
10/28/2019	Ghost Locomotion, United States	Founders Fund	Series C	32.75	210.00	Developer of an automated driving device intended to provide installation of self-driving functionality to any car.
6/19/2019	UVeye, United States	Toyota Tsusho, Volvo Cars Technology Fund, W.R. Berkley	-	31.00	-	Developer of vehicle inspection system designed to detect threats or modifications to vehicles.
12/3/2019	Accel Robotics, United States	SoftBank Group	Series A	30.00	-	Developer of a 360-degree visual intelligence platform intended to improve customer experiences.
10/28/2019	Prophesse, France	European Investment Bank	-	28.00	-	Developer of neuromorphic vision system designed to improve the efficiency and intelligence of video processing.

2019 Notable M&A Transactions

Deal Date	Buyer(s)	Target	Transaction Value (\$M)	EV/Rev Multiple	EV/EBITDA Multiple	Description
4/2/2019	Appen	Figure Eight	300.00	-	-	Provider of an artificial intelligence based platform designed to generate customized training data
12/26/2019	Snap	AI Factory	128.10	-	-	The company engages in developing unique computer vision and AR products with focus on image and video recognition, analysis and processing.
4/26/2019	Strateos	3Scan	-	-	-	Developer of microscopy medical imaging device designed to automate the process of tissue sectioning and imaging.
5/3/2019	Ellips BV	Aris B.V.	-	-	-	Developer and provider of installation and equipment services of advanced robotic & machine vision systems within the AgriFood sector.
6/17/2019	Elbit Systems, Koito Manufacturing	BrightWay Vision	-	-	-	Developer of multi-functional vision and ranging system designed for the automotive industry
4/10/2019	Amazon.com	CANVAS Technology	-	-	-	Developer of computer vision technology designed to provide end-to-end autonomous transport of goods that can power driving.
2/23/2019	Walmart	Daturks	-	-	-	Developer of a collaboration platform designed for teams to collaborate and annotate data for ML projects.
10/10/2019	Standard Cognition	DeepMagic	-	-	-	Developer of a technology platform intended to automate physical store access, check out and security.
5/31/2019	Konica Minolta	Eines Systems	-	-	-	Manufacturer of vision sensors for the auto industry.
12/12/2019	Waymo	Latent Logic	-	-	-	Provider of a machine learning technology intended for autonomous vehicles and traffic modeling applications.
4/15/2019	DoorDash	lvI5	-	-	-	Developer of HD mapping and computer vision software designed to assist in the process of the localization of self-driving vehicles
9/6/2019	Matrox Electronic Systems	Matrox Electronic Systems	-	-	-	Developer of specialized graphic solutions, HD and SD digital video hardware and software



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About the Author

Rudy is a leading expert on M&A transactions within the technology sector. As the founder of Woodside Capital, he focuses on computer vision and imaging companies within the autotech, security, CE, and digital health sectors.

Prior to Woodside Capital Partners, Rudy was the founding CEO of the MIT Media Lab Europe, a joint venture between MIT and the Irish government. He currently serves on the board of Seeing Machines plc (AIM: SEE) and the advisory board of AutoSens.

Rudy holds degrees from Yale (BSc and MSc in EE) and Cambridge (PhD in Digital Imaging).

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About Woodside Capital Partners

Woodside Capital Partners is a global, independent investment bank that delivers world-class strategic and financial advice to emerging growth companies in the technology and healthtech sectors. With a strong track record in M&A, strategic partnerships and private placements, Woodside Capital Partners has been providing worldwide investment banking services since 2001 with leading domain experience in software, Internet services, electronic communications and materials, and healthcare. Woodside Capital Partners is headquartered in Silicon Valley. Securities offered through Woodside Capital Securities LLC, member FINRA/SIPC. For more information, please visit www.woodsidecap.com

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