Ambarella

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Forward-Looking Statements

This presentation contains forward-looking statements that are subject to many risks and uncertainties. All statements made in this presentation other than statements of historical facts are forward-looking statements, including, without limitation, statements regarding Ambarella's strategy, future operations, financial targets, future revenues, projected costs, prospects, plans and objectives for future operations, future product introductions, future rate of our revenue growth, the size of markets addressed by the company's solutions and the growth rate of those markets, technology trends, our ability to address market and customer demands and to timely develop new or enhanced solutions to meet those demands, our ability to achieve design wins, our ability to build and deliver products to customers, and our ability to retain and expand our customer and partner relationships.

In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "could," "would," "expects," "plans," "anticipates," "believes," "estimates," "projects," "predicts," "potential," or the negative of those terms, and similar expressions and comparable terminology intended to identify forward-looking statements. We have based forward-looking statements largely on our estimates of our financial results and our current expectations and projections about future events, markets and financial trends that we believe may affect our financial condition, results of operations, business strategy, short term and long-term business operations and objectives, and financial needs as of the date of this presentation. Although these forward-looking statements are based upon information available at the time the statements are made and reflect management's good faith beliefs, forward-looking statements inherently involve known and unknown risks, uncertainties and other factors that may cause actual results, performance or achievements to differ materially from anticipated future results. Important factors that could cause actual results to differ materially from expectations are disclosed in Ambarella's annual reports on Form 10-K and quarterly reports and Form 10-Q filed with the Securities and Exchange Commission (the "SEC"), particularly in the sections titled "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations." You should not place undue reliance on forward-looking statements, which speak only as of the date on which they are made. We do not undertake to update or revise any forward-looking statements after they are made, whether as a result of new information, future events, or otherwise, except as required by applicable law. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this presentation may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

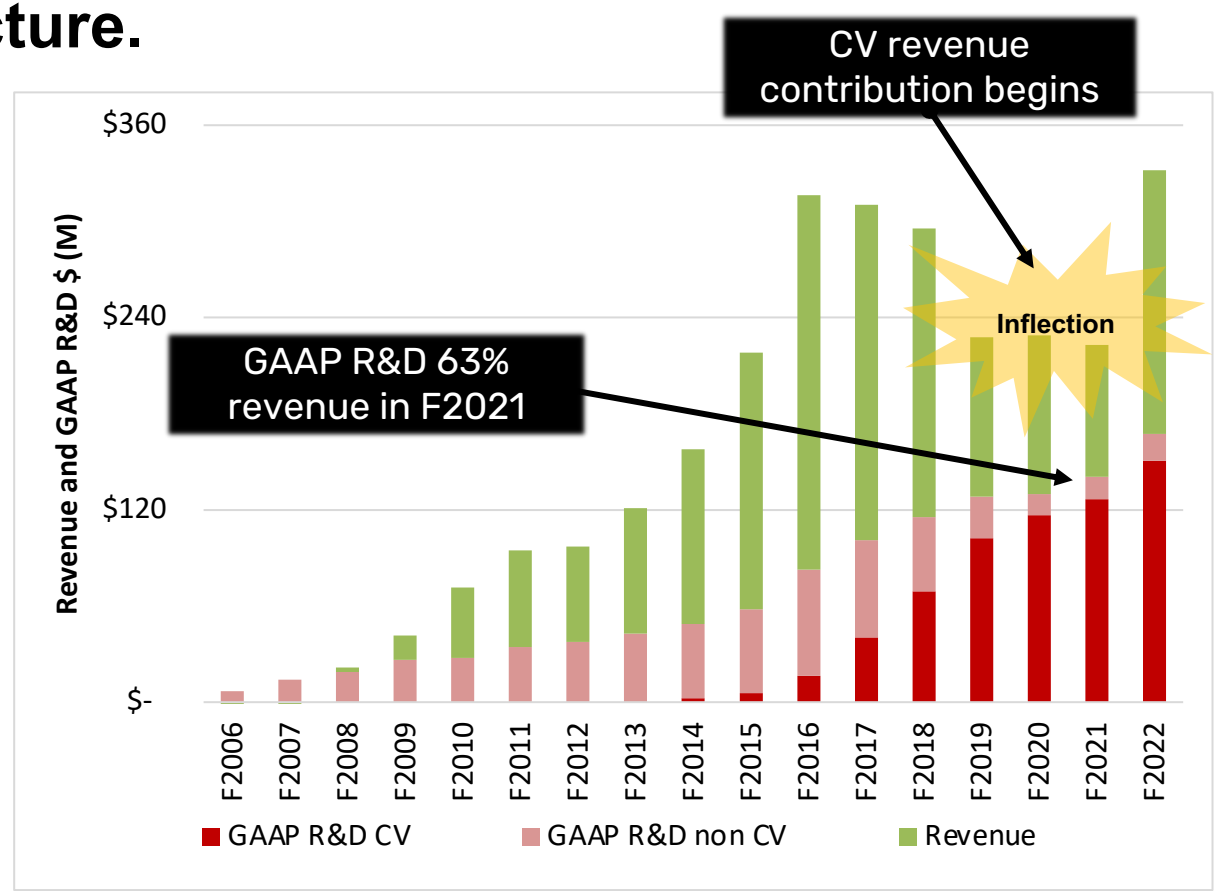
Before you invest, you should read the annual and quarterly reports and other documents Ambarella has filed with the SEC for more complete information about the company and its ordinary shares. Additional information will also be set forth in Ambarella's future quarterly and annual reports and other filings made with the SEC from time to time. You may access these documents for free by visiting EDGAR on the SEC web site at www.sec.gov.

Ambarella is an Artificial Intelligence Semiconductor Company

Introducing advanced hardware and software technology

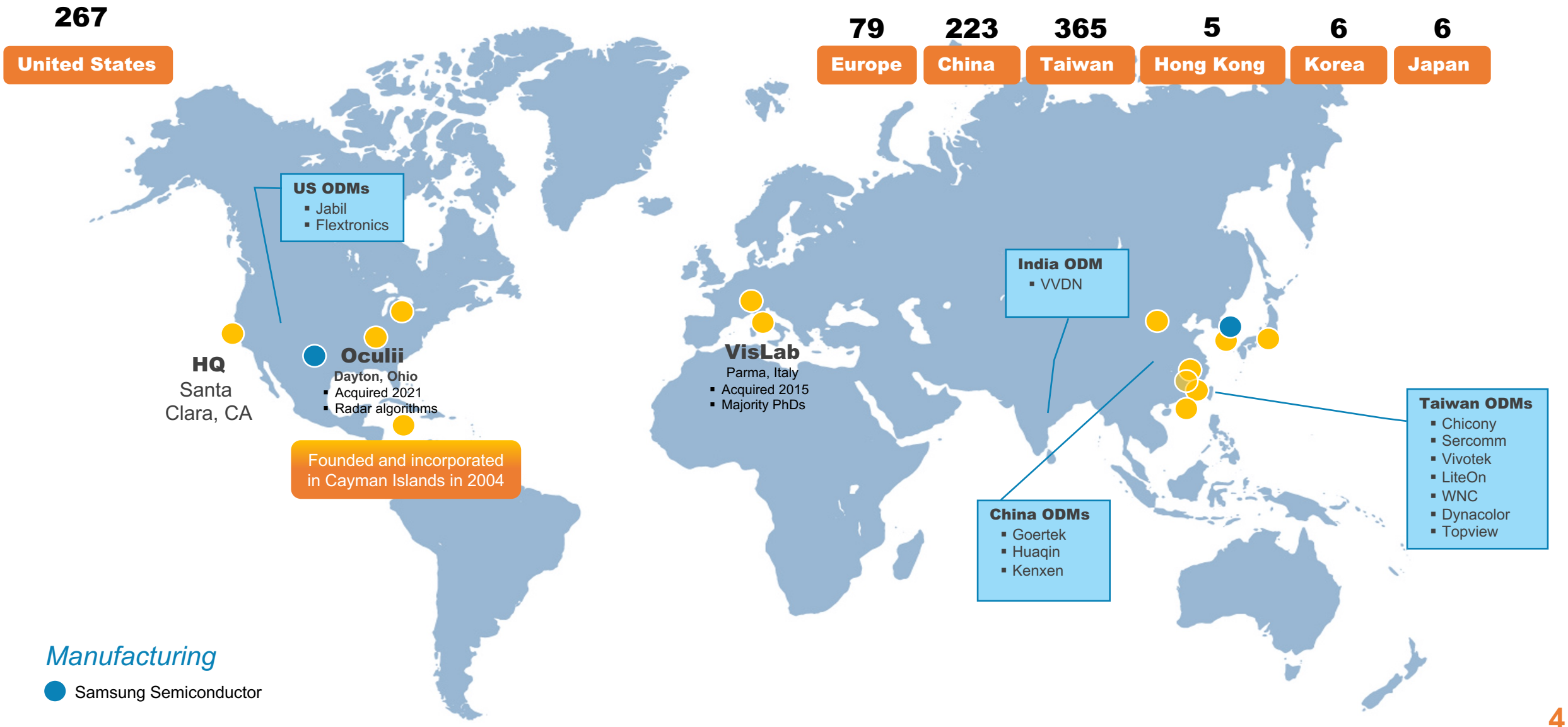
- **Since our founding in 2004, we have been focused on digital video applications, always with the premise that video is a unique type of data requiring an optimized chip architecture.**

- **First 12 years**. Initially targeted human viewing applications with low-power and high-resolution video processing SoCs for the consumer and security camera markets.
- **The last 5+ years.** Intensive R&D investment led to the development of a deep neural network AI processor targeting IoT endpoints. When combined with the existing video processor, the integrated computer vision ("CV") system-on-a-chip ("SoC") enables machines to perceive their environment and make intelligent decisions, facilitating higher levels of automation in multiple industries.
- **We are expanding our processing beachhead** beyond video perception and into new markets with the introduction of CV3 and the acquisition of Oculii.



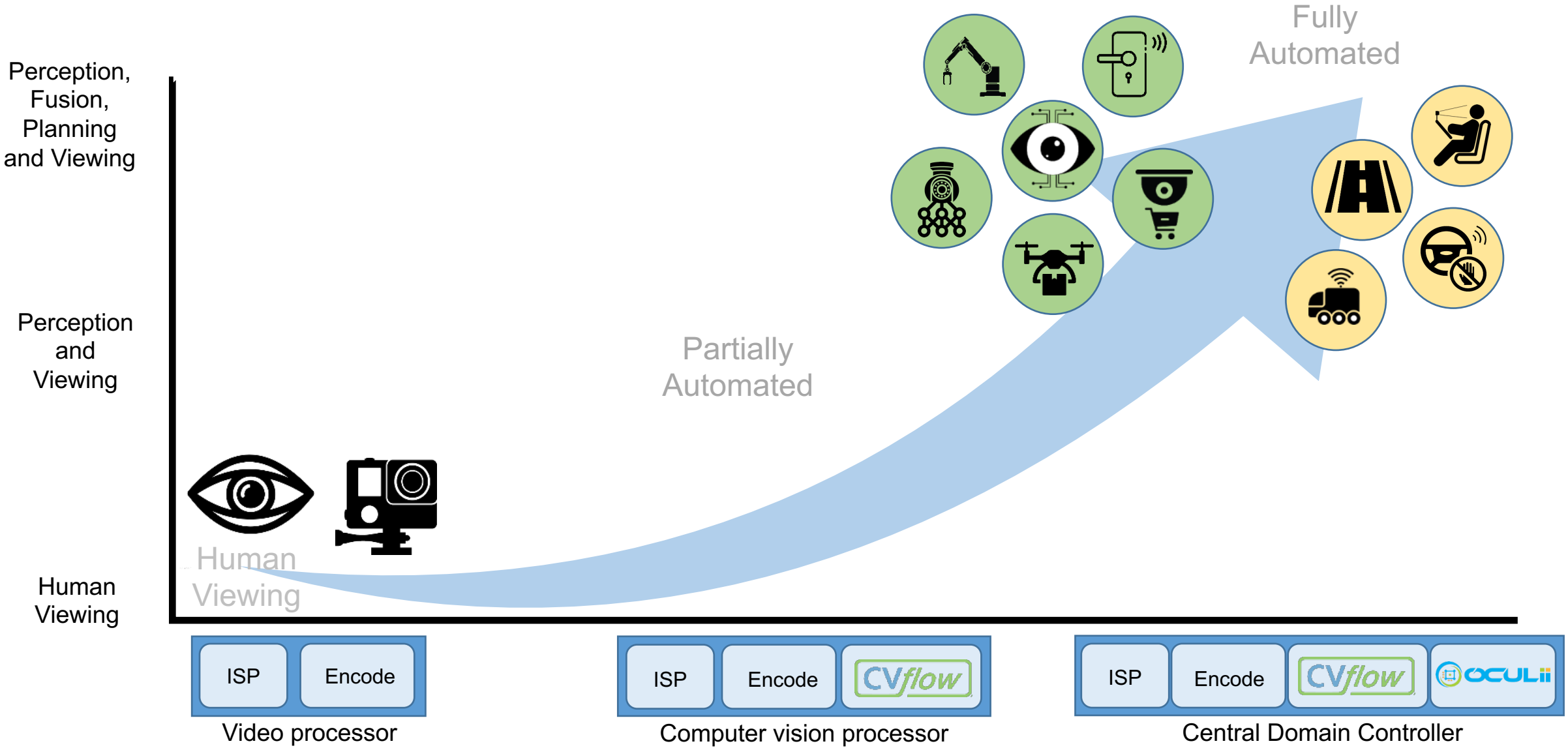
Global Footprint 951 vs. 824 a Year Ago

~81% of employees are engineers and ~70% of the engineers are focused on software/algorithms



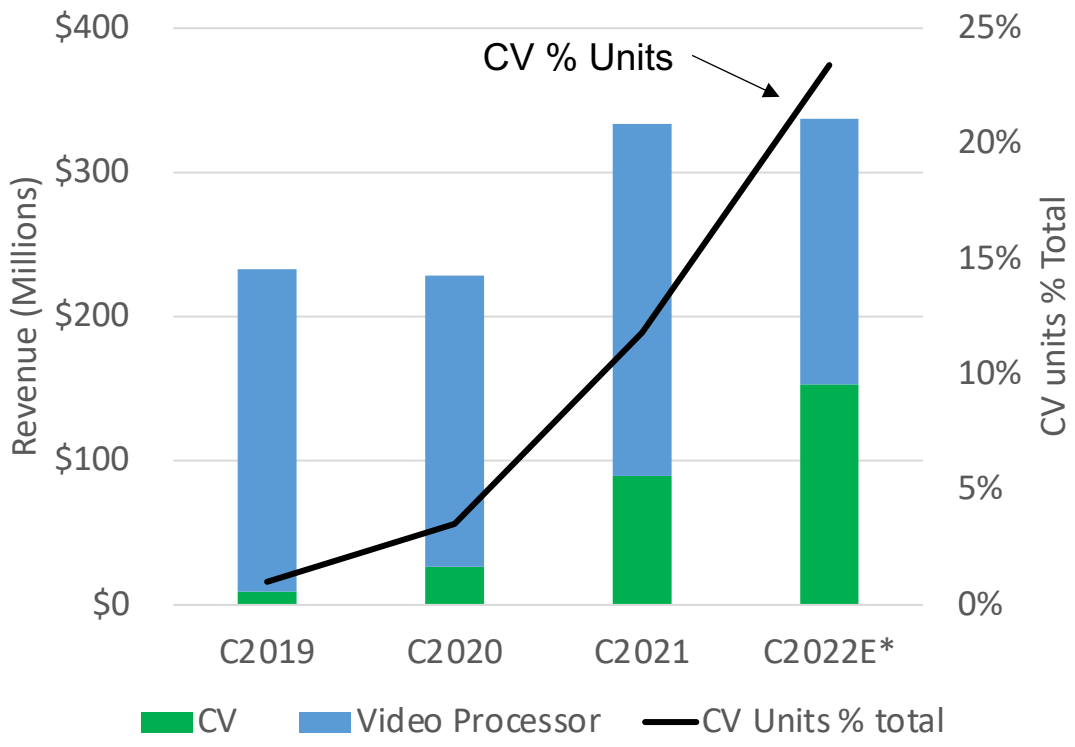
CVflow a New Foundation for Growth

Successfully leveraging human viewing heritage into machine sensing



Early Evidence of Success

Targeting CV to be ~45% of total F2023 revenue



**C2022E based on the mid point of Q4 F2023 guidance. Using F2023 as proxy for C2022*

- >275 unique CV customers*
- >100 unique CV customers have reached production*
- >150 unique CV products have reached production*
- CV SoC portfolio, software tools, and platforms are stable, mature and under continuous improvement

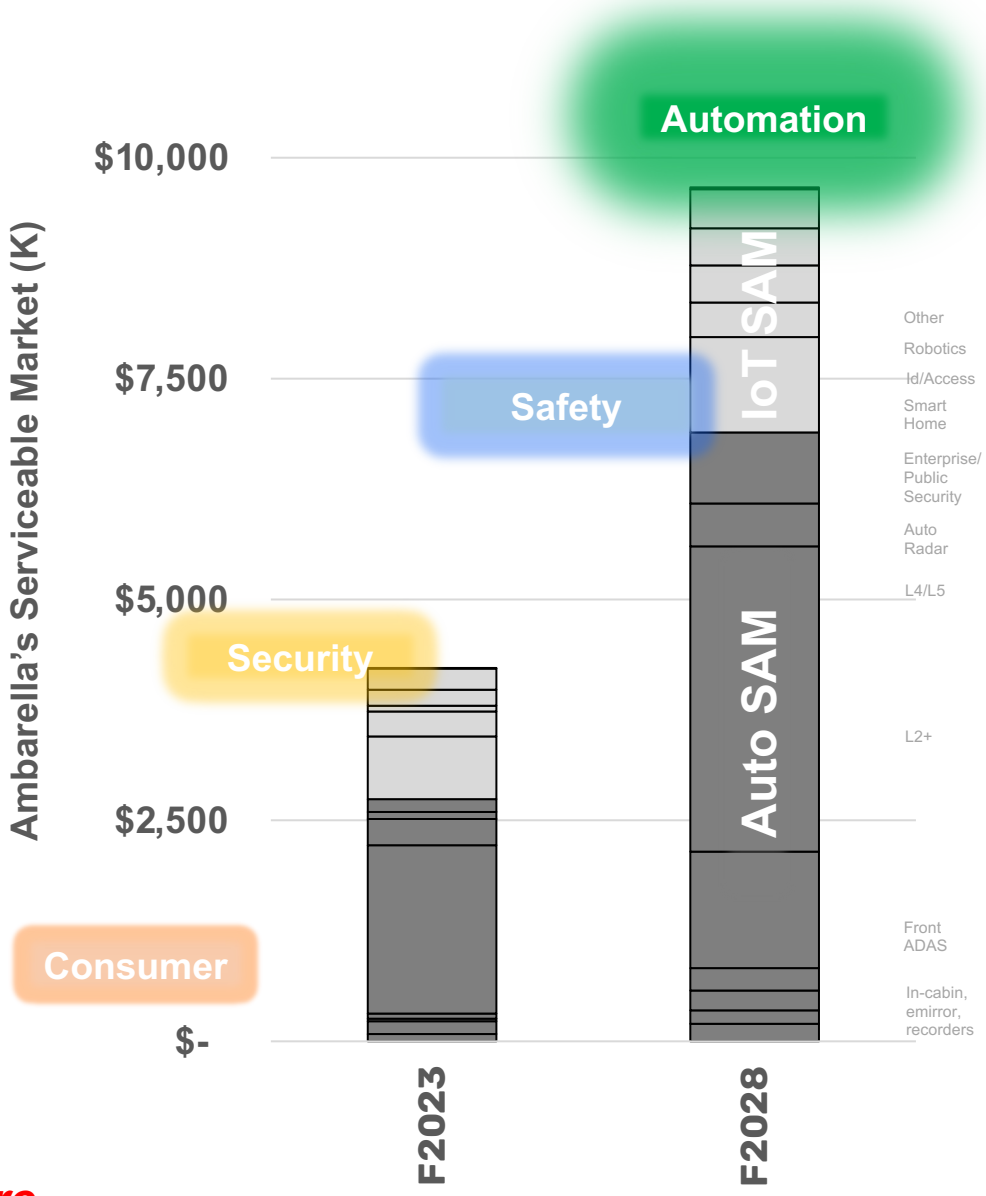
**cumulative, as of January 31, 2022*

AI computer vision is becoming pervasive, we are embedding AI in all our new products and there is strong and growing evidence of market acceptance

Large and Growing Markets

Serviceable market ("SAM") revenue CAGR in the high teens

- **F2022 revenue was ~25% Auto and ~75% IoT**
- **F2028 revenue SAM estimate ~70% Auto and ~30% IoT.**
- **We are focused on IoT end point applications** where a majority of the decision making originates from data collected from high bandwidth sensors (cameras and high definition radar)
- **We address security, safety, and automation megatrends**
- **Enabling electronic systems to perceive the world and make intelligent decisions is now the major driver of our business**; human viewing business will decline as a proportion of revenue
- CV has triggered **new product cycles** in existing IoT markets and **entirely new opportunities** in the auto and IoT markets
- ***SAM estimates do not yet include automotive application software***



Source: Ambarella, ABI, Gartner, IHS, Strategy Analytics

Ambarella's "Algorithm First" Approach

Superior Image Quality - - - - - - - - - - - - - - - - *leveraged into* - - - - - - - - - - - - - - - - AI-based Computer Vision & Radar Processing

"Algorithm First" Approach
Programmable AI Platform
with Optimized Acceleration

Image Processing & Compression

Autonomous Driving

Radar Processing

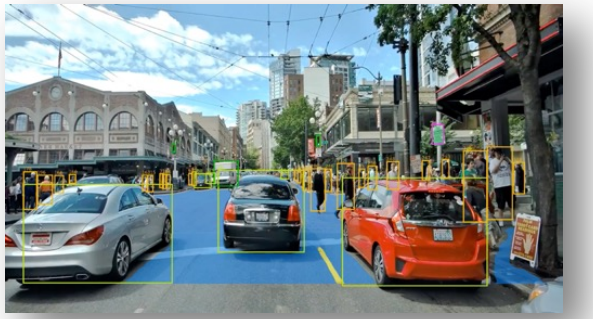
CVflow - Deep Neural Network AI processor

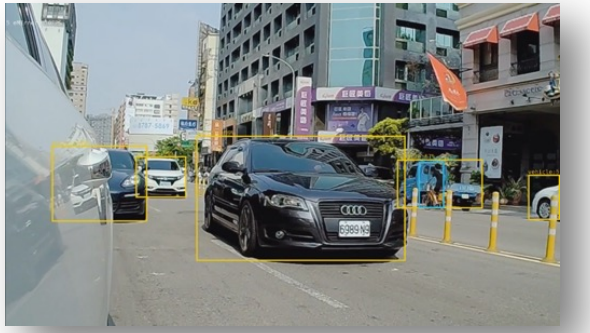
17 years of Image Processing and Compression Experience

25 years of Autonomous Driving Experience

Oculii Patented Adaptive AI Radar Algorithms

CVflow® - Superior AI Performance Per Watt





CV3 the Latest Addition to Our Scalable AI Portfolio

Superior performance per Watt and performance per dollar

New family of CV SoCs

		Ambarella CV28	Ambarella CV25	Ambarella CV22	Ambarella CV22FS	Ambarella CV2	Ambarella CV2FS	NEW Ambarella CV5	NEW Ambarella CV52	NEW Ambarella CV3-High
		CV28	**CV25**	**CV22**	**CV22FS (ASIL B)**	**CV2**	**CV2FS (ASIL B)**	**CV5**	**CV52**	**CV3 (ASIL B)**
	Availability	Announced November 2020	Announced January 2019	Announced January 2018	Announced January 2020	Announced March 2018	Announced January 2020	Announced January 2021	Announced June 2021	Announced January 2022
	Availability	Production revenue February 2021	Production revenue July 2019	Production revenue December 2018	Production April 2021	Production revenue August 2019	Production April 2021	Production July 2022	Sampling	Sampling
	Availability	Samsung low power 10nm process						Samsung 5nm		
Computer Vision	Video Processing	Up to 3x cameras*		Up to 2x cameras*	Up to 3x cameras*	Up to 6x cameras* and stereo support	Up to 3x cameras* and stereo support	Up to 14x cameras*	Up to 14x cameras*	Up to 20x cameras
Computer Vision	Video Processing	5 MP sensors at 30 frames per second**	8 MP sensors at 15 frames per second**	8 mega pixel (MP) sensors at 30 – 60 frames per second**				32 MP sensors up to 30 FPS**	8 MP sensors up to 60 FPS**	
Computer Vision	AI Processing	CVflow® Deep Neural Network AI Processor (software tools port from TensorFlow, Caffe, ONNX, etc.)								
Computer Vision	AI Processing	¼ of CV22 AI	½ of CV22 AI	Baseline (CVflow DNN AI)		4x CV22 AI	2x CV22 AI	3.5x CV22 AI	3.5x CV22 AI	160x CV22 AI

VisLab: 25 Years of CV and Autonomous Driving

VisLab Today

- ***Algorithm first* approach** applied to Computer Vision
- Continuous research benefits **future Ambarella chips**

1998: Mille Miglia 2000+km on Italian highways 94% autonomous steering

2005, 2007: DARPA Grand and Urban Challenge. 100% AD

2010: VIAC 15K km cross-continent drive AD following

2013: PROUD: Braive drove 13km in Parma, Level 4 demo 100% driverless AD

2014: DEEVA, 13 stereo camera systems; CV integration; 100% AD

2015: Ambarella acquires VisLab

CES 2018: camera perception stack demonstrated on CV1

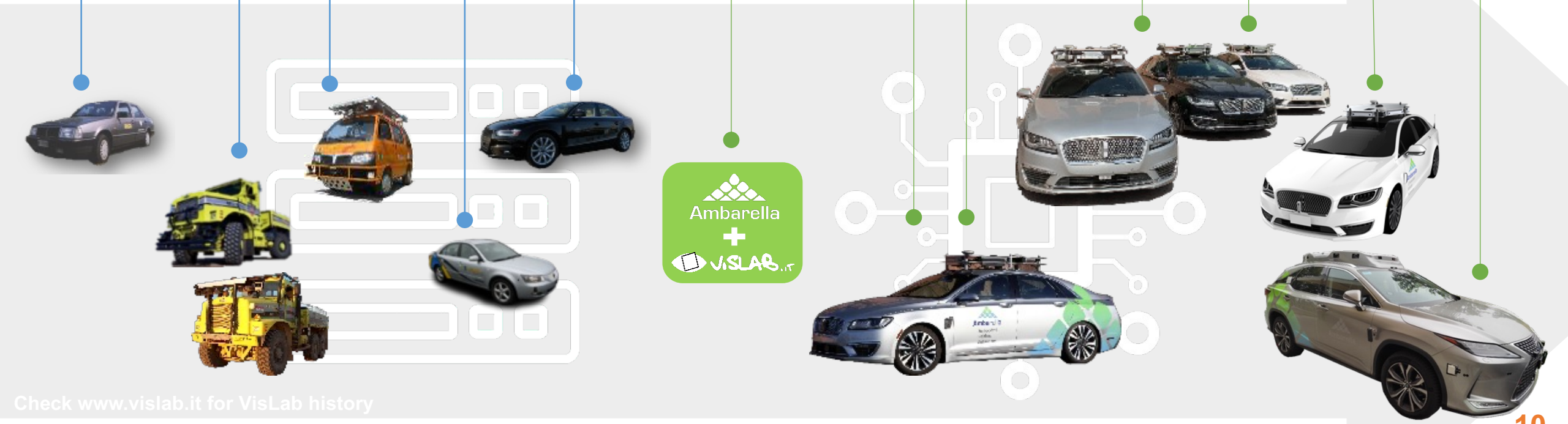
2018: AD demonstration in Santa Clara office

CES 2019: AD driving on the roof track of Lingotto building in Turin

CES 2020: L4 autonomous driving demo in Las Vegas with automatic parking. CV2-based

2021: Testing fleet set up to be used beside development fleet

CES 2022: L4 autonomous driving demo and new Oculii-based sensing suite.



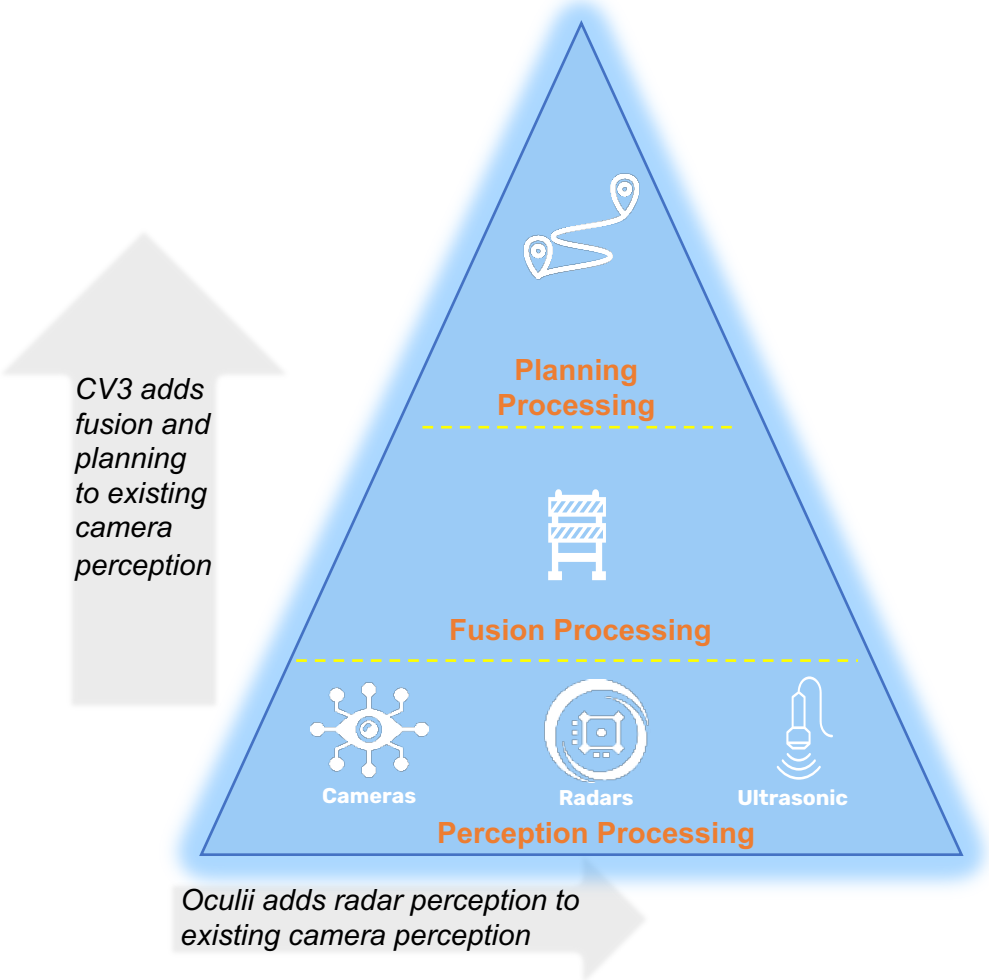
Check www.vislab.it for VisLab history

Mobility Strategy: Capture More Value

~25% of F2022 revenue

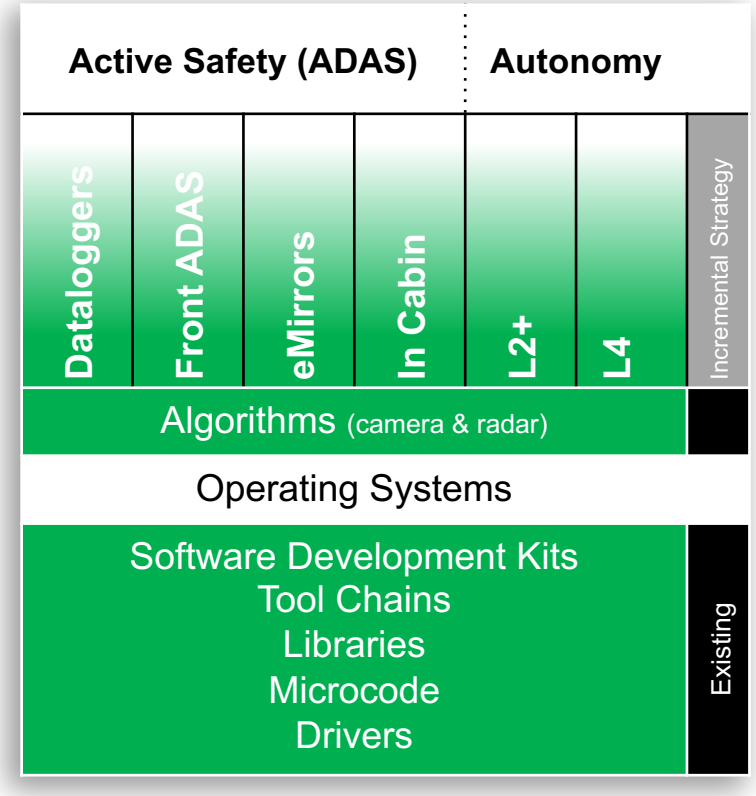
SoC Strategy

Horizontal and vertical processor consolidation



Software Strategy

Module portfolio expanding "up-the-stack"



Existing

New SW modules higher in the stack

Mobility SoC Portfolio

Products differentiated with superior efficiency and scalability

A12	H22	H32

← *View / Record (Non-CV)*

CV2 family	CV2FS family	CV5 family*

← *CV*

Edge, Zonal & Domain Control →

CV3 family*

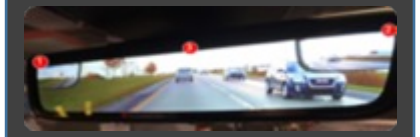
Drive Recorders

Multi-Channel Recorder

Electronic Mirror

Side-View E-mirror

Combined View



Front ADAS

Single Camera System

Stereo NCAP+

In-Cabin Monitoring

L2+ / L4 Perception

Rivian

Motional

Inceptio

CV3

AI Domain Controller for ADAS and L2+ to L4 Autonomous Vehicles

* 5 nm process node

Modeling the Mobility Opportunity

ADAS, L2+, and L4 market penetration commenced in F2022

Ambarella	Recorders/Dataloggers		Forward-Facing ADAS	eMirrors		In-Cabin	L2+	L4/L5 Part-time + Full-time Autonomous
	Enabling T1s to differentiate with combo viewing/ADAS products on 1 SoC							
C2021 SAM C2027 SAM	~$200M ~$450M		>$1.5B >$2.2B				~$200M >$3.6B	~$60M ~$600M
Penetration into new vehicle production C2021	7% to 8%		55% to 60%	~2%		~2%	1%+	<0.1%
Ambarella F2022 Revenue	Increasingly driven by T1/OEM (versus aftermarket)		New F2022 penetration began	New increasing activity		New heavy RFI+RFQ activity	New	New
							Major long-term opportunities	
Products (Examples)	A12 H22	CV25, CV5	CV22/FS CV2/FS CV3	A12 H22	CV22/FS CV2/FS CV5	CV28 CV22/FS CV2/FS	CV2AQ CV2FS CV3	CV22FS CV2FS CV3
Target Customers	Retail (aftermarket)	Tier 1s (pre-install)	Tier 1s	Tier 1s		Tier 1s	OEMs / Tier 1s	OEMs / Tier 1s
HD Radar			✓		✓	✓	✓	✓
Incremental SW Opportunity		✓	✓		✓		✓	✓

✓ Incremental radar opportunity

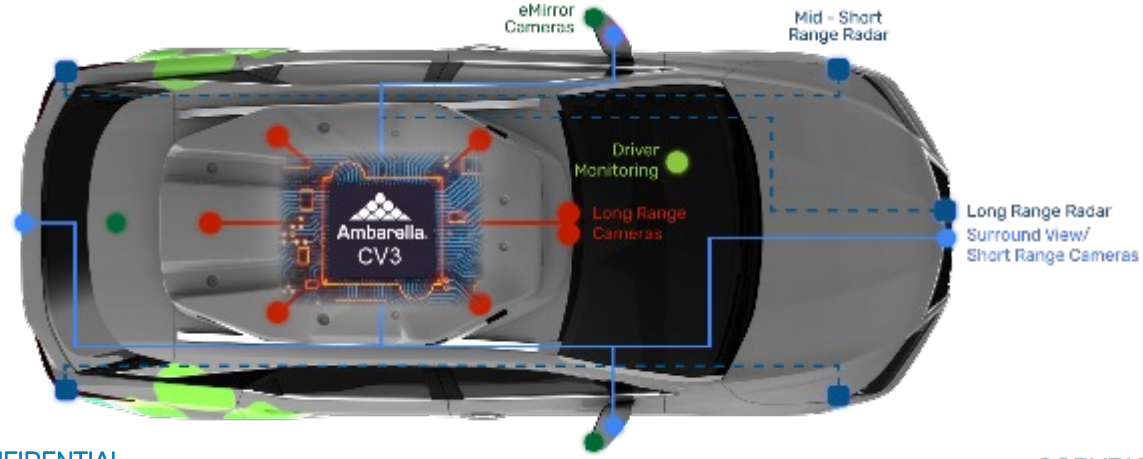
✓ Incremental SW opportunity

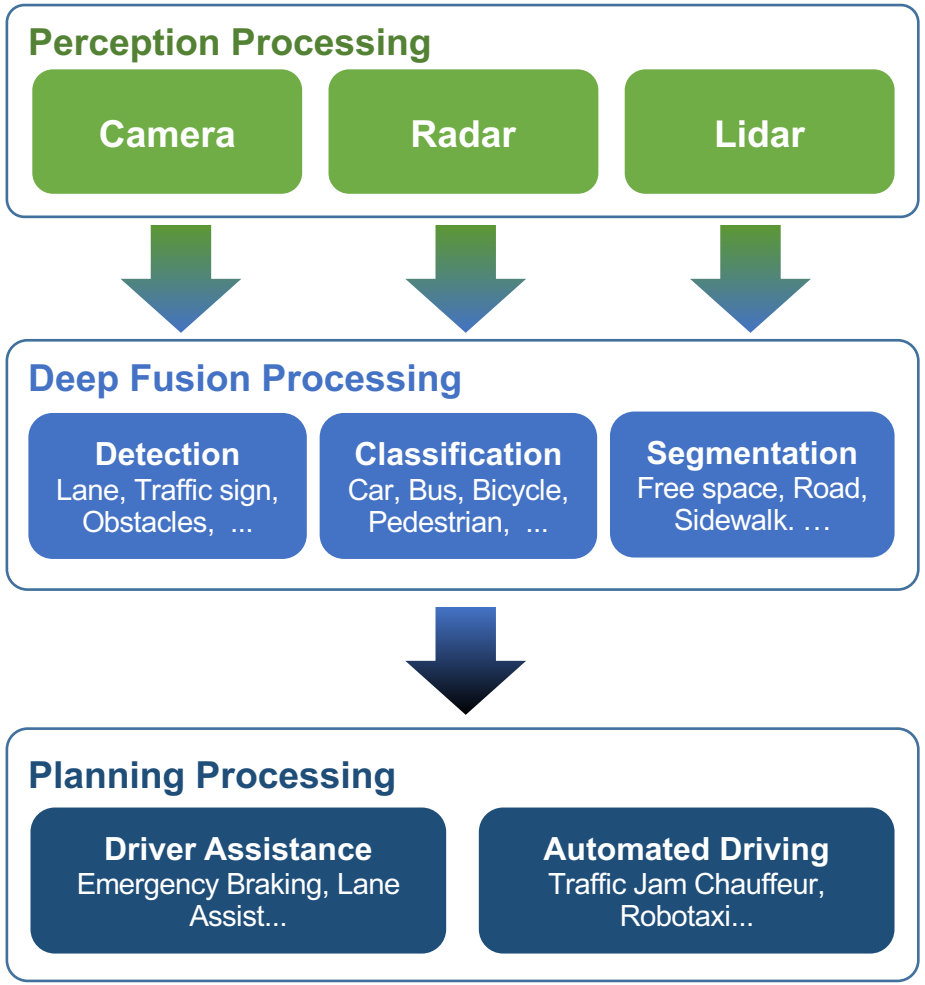
Source: TSR, Strategy Analytics, Ambarella

CV3 SoC Family

Single-Chip Processing for L2+ to L4 AVs

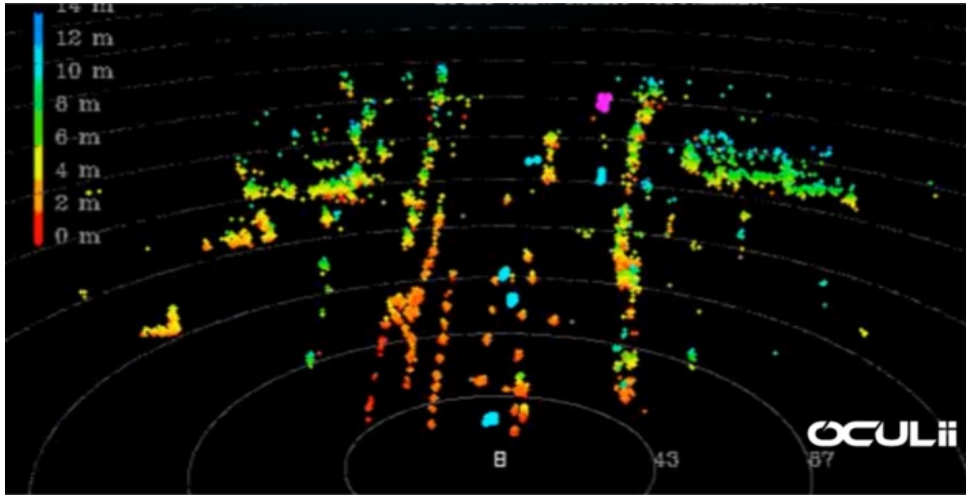
- **Scalable** family for ADAS, and L2+ to L4 AVs
  - Covers edge, zonal and central domain architectures
  - Multi-sensor perception, fusion and path planning
- Based on analysis of hundreds of algorithms
  - open-source, internal and customer
- **3-4x CVflow® Power and DRAM efficiency** over CV2
- Improved security with **hardware security module**
- **5nm** process technology



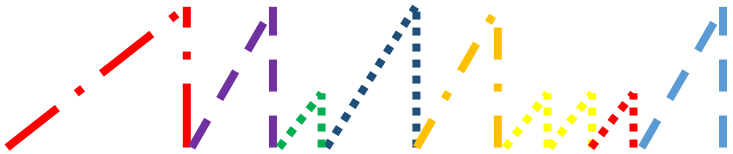


Radar Perception - Oculii

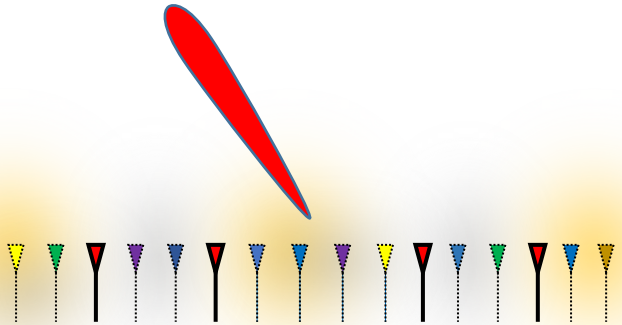
- Patented adaptive AI software technology breakthrough
- Improves resolution of any radar up to 100X
- Scalable from ADAS to AV
- Deep partnerships with leaders in automotive radar



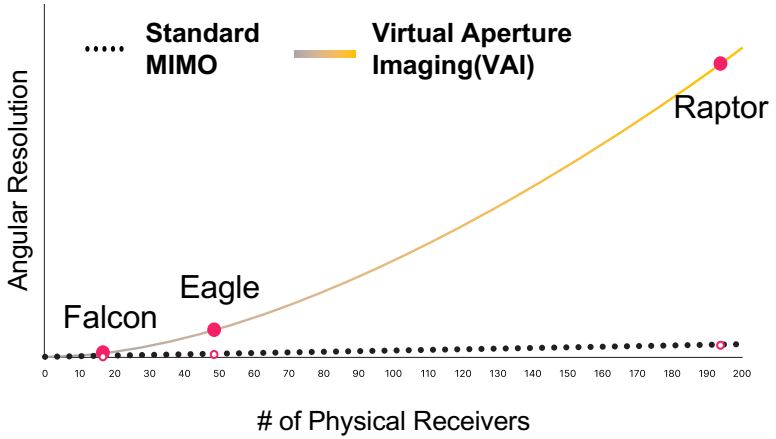
Oculii Virtual Aperture Waveform



Dynamic Waveform that Uses AI to Learn from the Environment and Adapt

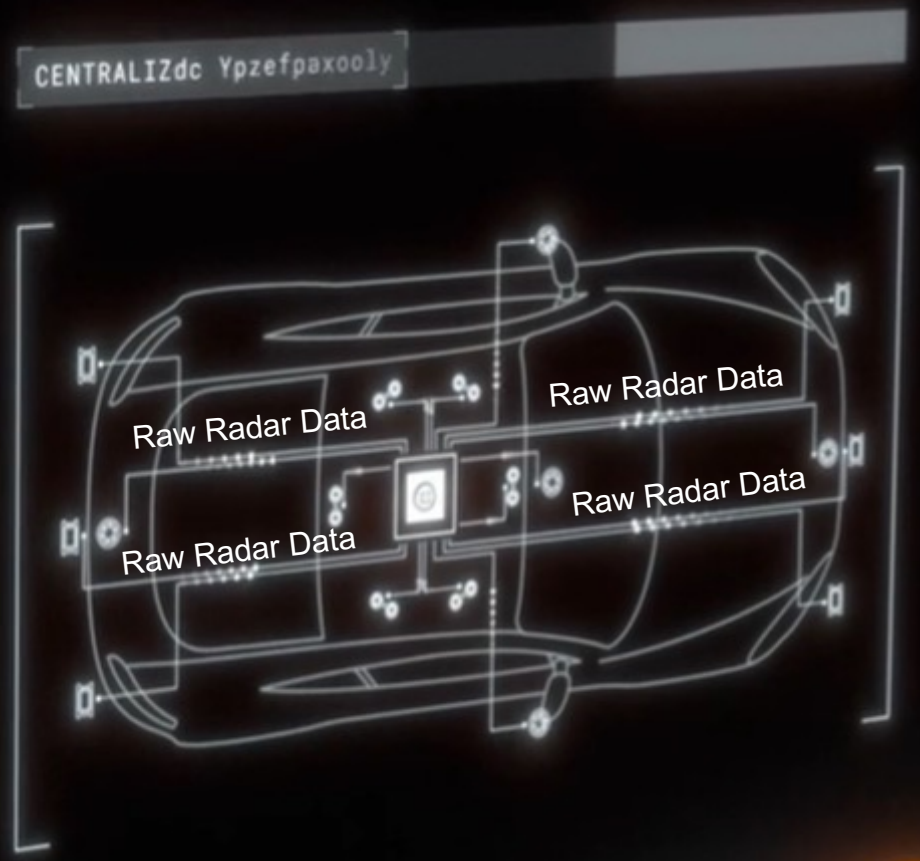


Resolution Increases with Intelligent Software



Oculii's Software Scales with Moore's Law

Introduction to Central vs. Edge 4D Imaging Radar



Centrally Processed Radar	Edge-Processed Radar
MMIC in “radar head”	MMIC + Radar MCU module
Stream raw radar data out	Radar detection processing in radar module
Radar detection processing in central processor (CV3)	Output detection point cloud

Ambarella®
AI envisioned™

Advantages of Centrally Processed Imaging Radar

Edge Processed Imaging Radar

- **Compute capabilities are limited to larger process nodes** due to the need for higher junction temperatures, affecting density and sensitivity.
- **Fixed compute** must be provisioned for the worst case scenarios, even though it might not be necessary in scenarios.
- **Higher radar module costs** as processing must be located at the edge and edge processing is more expensive.
- **Basic sensor fusion** occurs on object level data from the radar and optical sensing systems.

Centrally Processed Imaging Radar

- **Significantly higher performance and efficient process nodes** can be utilized, leading to greater angular resolution, density and sensitivity.
- **Processing capabilities can be dynamically shifted** between radars around the car, depending on the scenario.
- **Lower radar module costs** as a single processing element can process all radar modules.
- **Deep, low-level sensor fusion** is enabled with both raw data streams processed concurrently.

Automotive Customers

Mercedes-Benz

NISSAN

Ford

RENAULT

TOYOTA

DONGFENG
DONGFENG MOTOR CORPORATION

YUTONG

RIVIAN

HYUNDAI MOBIS

BYD

HYUNDAI

DENSO TEN

Continental

BOSCH

长城汽车
Great Wall Motors

Motional

Panasonic

GARMIN

ARRIVAL

长安汽车
CHANGAN

SAIC
上汽集团

GENTEX
CORPORATION

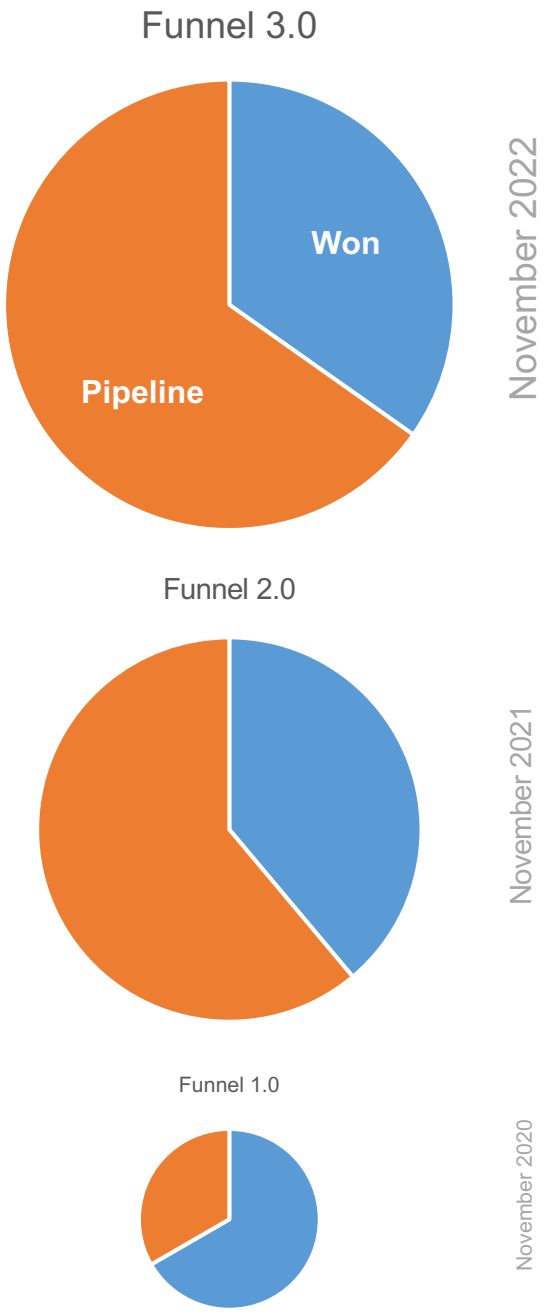
Auto Revenue Funnel 3.0 ~$2.3B

$800M + $1.5B Pipeline = 6 Year F2024-F2029 Automotive Revenue Funnel

- **Funnel 3.0 grew ~28% from funnel 2.0**
    - Radar included
    - SW stack/IP not included

- **Vast majority of funnel is CV2 and increasingly CV3 family of SoCs**
    - **Distribution of funnel revenue is exponential in shape**
        - Assumptions for auto funnel ASP to rise with time
        - Rising adoption of new technologies in vehicles produced
        - Series production SoP can be ~3 years from award

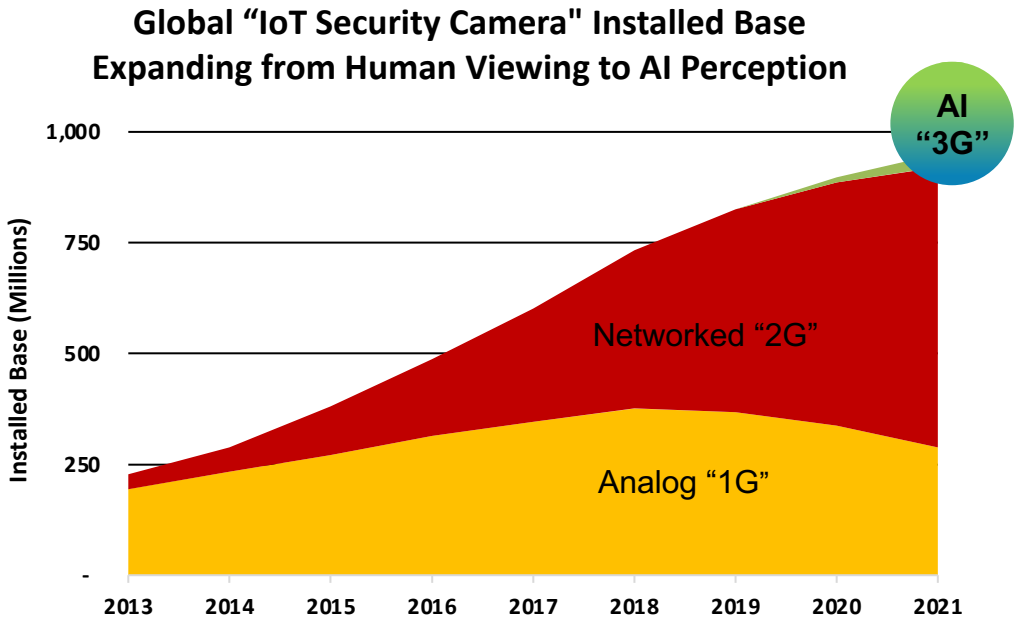
- **Methodology**
    - Pipeline: in the bidding process with 2 discount factors: (1) probability of winning design and (2) confidence in customers' revenue forecast
    - Won: notified we have been awarded. 1 discount factor: confidence in customers' revenue forecast

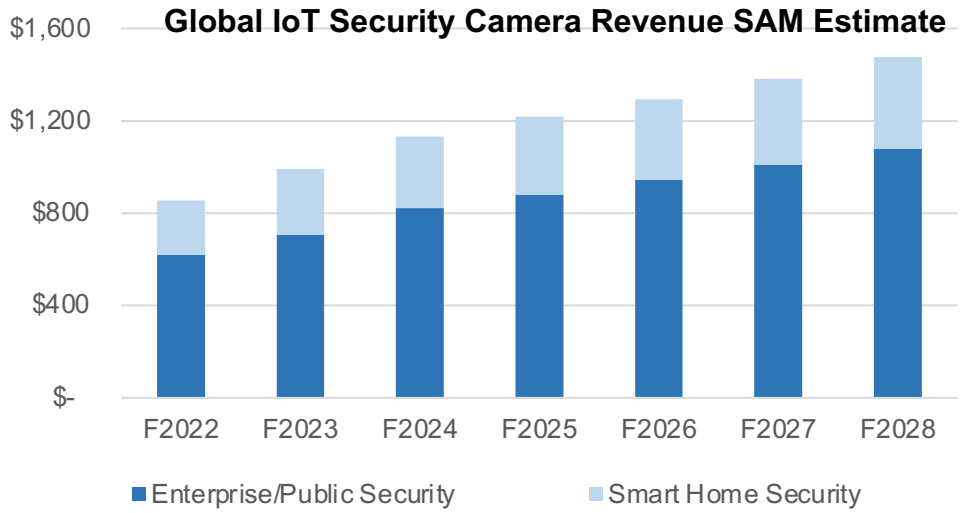


IoT (non-Auto) Market

~75% F2022 revenue; mostly security/viewing - new AI sensing applications emerging

- **Security market transformation**
  - The security camera market is the largest AIoT market today (Gartner)
  - AI enabled cameras enable video analytics plus human viewing
  - Customer software on our CVflow AI SoCs enables new data driven camera applications and new business models for our customers
- **~900M "security camera" installed base C2021**
  - Installed base today is almost all human viewing ("2G") primarily deployed for security applications; ~75% enterprise/public
  - The human viewing installed base is expected to continue to grow while the installed base for AI-based perception is just beginning
  - Installed base replacement rate estimated between 4 to 6 years
- **Security camera unit shipments ~260 million in C2021**
  - "3G" CV SoCs command a ~2x ASP versus a similar 2G video processor
  - "1G" analog camera market shrinking – we do not serve this market
  - Ambarella security SAM focusing on higher value market segments
  - Includes Enterprise/Public (majority of installed base) and smart home
- **"Other" ~15% of IoT and includes important new markets**
  - Today a majority is wearables, AR/VR, aerial drones, and action cameras
  - Also new AI sensing markets such as access control, sensing cameras, fixed robotics and mobile robots for the enterprise and home





Ambarella's Global IoT Footprint

Enabling most major enterprise, smart city and smart home IoT camera companies

IoT – Enterprise/Public

Security – Retail – Transit Systems - ITS - Smart Parking - Schools

FLIR
Canon
AXIS COMMUNICATIONS
motorola avigilon
PELCO
BOSCH
alhua TECHNOLOGY
VERKADA
Johnson Controls tyco
Panasonic i-PRO
Honeywell
Hanwha Techwin
VIVOTEK BUILT WITH RELIABILITY
STANLEY
Milesight
DYNACOLOR
UNISINSIGHT
FSAN
IDIS
KEDACOM
HIKVISION

IoT – Smart Home

Security – Access Control - Automation - Delivery Services

amazon ring
ALARM.COM
ADT
BOSCH
The Blackstone Group
vivint.
nanit
comcast xfinity
LUNI
logitech
LifeSHIELD
SimpliSafe
VIVOTEK BUILT WITH RELIABILITY

New IoT Opportunities Open with CV

Moving beyond traditional "human viewing security" to include camera and radar perception processing, sensor fusion processing (of many sensing modalities), as well as central domain controller processing

Robotics platform announced at CES 2020 – mobile and fixed robotics

- Robotic software development kit ("SDK") is a unified software infrastructure targeting home and enterprise robotics for assistance, automation, cleaning, delivery, surveillance, warehouse, etc.
- SDK provides access and acceleration for common robotic functions including stereo, object detection, key points tracking, occupancy grid, visual odometry.

ID/Authentication for access control and smart lock applications

- Use of biometric technology (e.g. face ID) to identify and authenticate individuals for access control in enterprise, home and public applications including panels, smart locks and payment terminals
- Low cost single-camera fusion of multiple sensors for optimal accuracy

Sensing and counting cameras

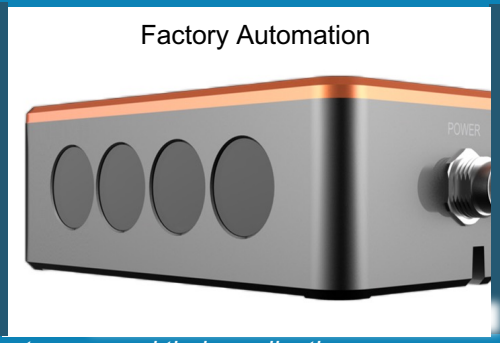
- Analyze capacity, monitor elderly, customer patterns, foot traffic, line counting, social distancing, property management, and HVAC energy efficiency while maintaining privacy and not recording

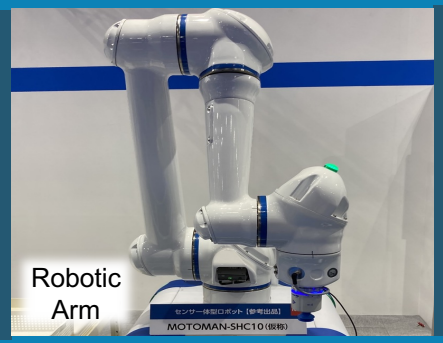

Warehouse Automation

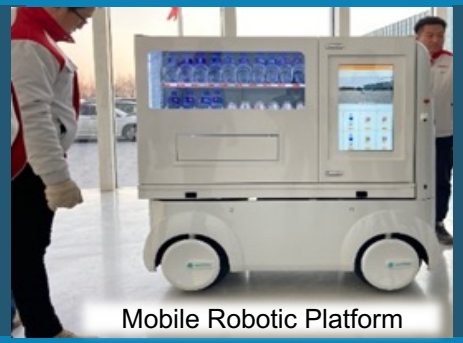

Robotic Vacuum

Access Control


Sensing Camera


Factory Automation


Robotic Arm


Mobile Robotic Platform


Retail Store

Images represent potential customers and their applications

Competitive Landscape Fragmented

Ambarella's AIoT processing expertise scales across multiple markets

✓ Access to leading edge manufacturing technology suspended 9/15/2021

	IoT			Automotive					
	Enterprise Security	Home Security	Robotics	Recorders	Forward-Facing ADAS	eMirror	In-Cabin	L2+	L4 and L5
Ambarella	✓	✓	✓	✓	✓	✓	✓	✓	✓
HiSilicon (Huawei)	✓	✓ China only		✓ Aftermarket					
Mobileye (Intel)					✓ (SW from Mobileye+SoC from STM="black box")			✓	✓
Nvidia	(Server based architectures not deep learning in the IoT end point)		✓					✓ Mostly fusion and planning	✓
NXP							✓		
Qualcomm	✓	✓	✓	✓	✓ Reselling Veoneer's IP	✓	✓	✓	✓
Renesas					✓	✓	✓		
SigmaStar	✓	✓							
Texas Instruments			✓		✓	✓	✓		
Xilinx (AMD)			✓		✓	PLDs utilized early in a product life cycle ✓	✓		✓
(IP Cores) Incomplete solution Cadence, CEVA, etc.	✓	✓			✓				✓
(Others)	AMLogic, Fullhan, Goke, Ingenic, Novatek, Socionext, Will , *(Custom ASICs)*			AIT, Novatek, iCatch	*Horizon Robotics, (Custom ASICs)*			*Horizon Robotics, (Custom ASICs)*	*Horizon Robotics, (Custom ASICs)*

Focus appears to be increasingly analog & mixed signal (not digital processing/SoC)

Q4 (January) F2023 Outlook and Q3 F2023 Recap

Q4 fiscal 2023 outlook and Q3 fiscal 2023 results provided December 1, 2022

Q4 F2023 (January, 2022) Outlook

- Our Q4 revenue guidance is in the range of $81.0 million to $85.0 million (consensus estimate ~$86.3 million as of November 21st)
- Q4 non-GAAP gross margin estimated to be 63.0% to 64.0% (consensus 63.3%) with non-GAAP operating expense $46.0 to $49.0 million (consensus $45.7M)

Q3 F2023 (October, 2022) Results

- Revenue of $83.1 million was at the mid-point of our guidance range of $81.0 million to $85.0 million (consensus estimate ~$83.1 million.).
- Non-GAAP gross margin was 63.5% versus the consensus estimate of 63.4% and non-GAAP operating expense was $43.5 million (consensus $45.1M)
- Non-GAAP EPS were $0.24 versus the consensus estimate of $0.20

Despite the challenges we continue to make progress in our multi-year transformation

- AI computer vision is becoming pervasive, we are embedding it in all our new products and we have growing evidence of market acceptance
- We see a wide variety of risks outstanding, including pandemic, geopolitical and supply chain factors. These risks include*:
  - risks associated with the COVID-19 pandemic
  - potential export regulations on advanced technologies
  - the risk customers in China continue to take actions to reduce their dependence on components they believe could be subject to new export controls, including the creation of dual China/non-China supply chains
  - changes to tariffs and/or the Entity List
  - market share shifts between our customers
  - supply chain issues such as long leadtimes, shortages of materials, components, electricity and manufacturing capacity, and adverse weather conditions
  - customers' appear to be reducing their levels of inventory, most likely due to the contraction in component leadtimes

**Potential risk factors that could affect our financial results are more fully described in the documents that we file with the SEC, including annual reports on Form 10-K and quarterly reports on Form 10-Q.*

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