

Global Leading Edge A.I. Solution Provider





Mindtronic AI

INVESTMENT HIGHLIGHT

Innovation, Research and Productlization

- ◆ Proven ultra-lightweight A.I. solutions to be embedded on mainstream auto SoC platforms
- ◆ Key building blocks for the cockpit and ADAS domain, assisting carmakers to save 1/3 of development cost and time under new electrical/electronic (E/E) architectures
- ◆ No. of Patent filed: 143 (49 granted), leading position in HMI and ADAS IP portfolios



Cockpit / ADAS ECU



Product Design Kit





BRIGHT FUTURE FOR AUTO ELECS MARKET

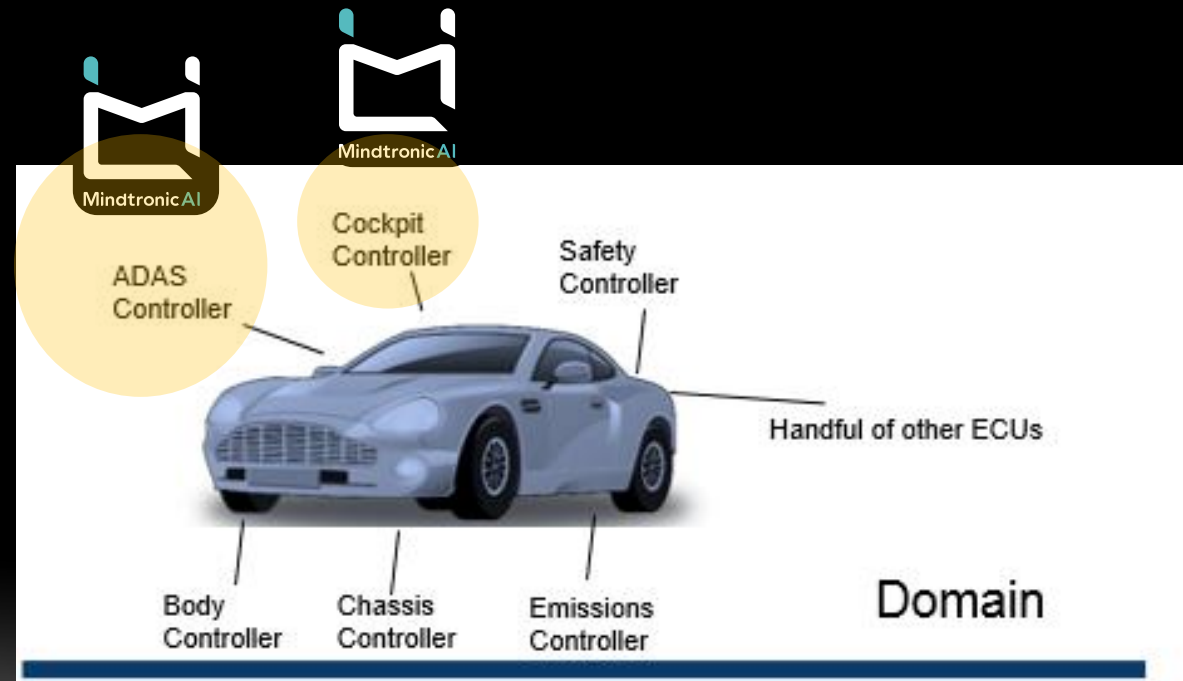
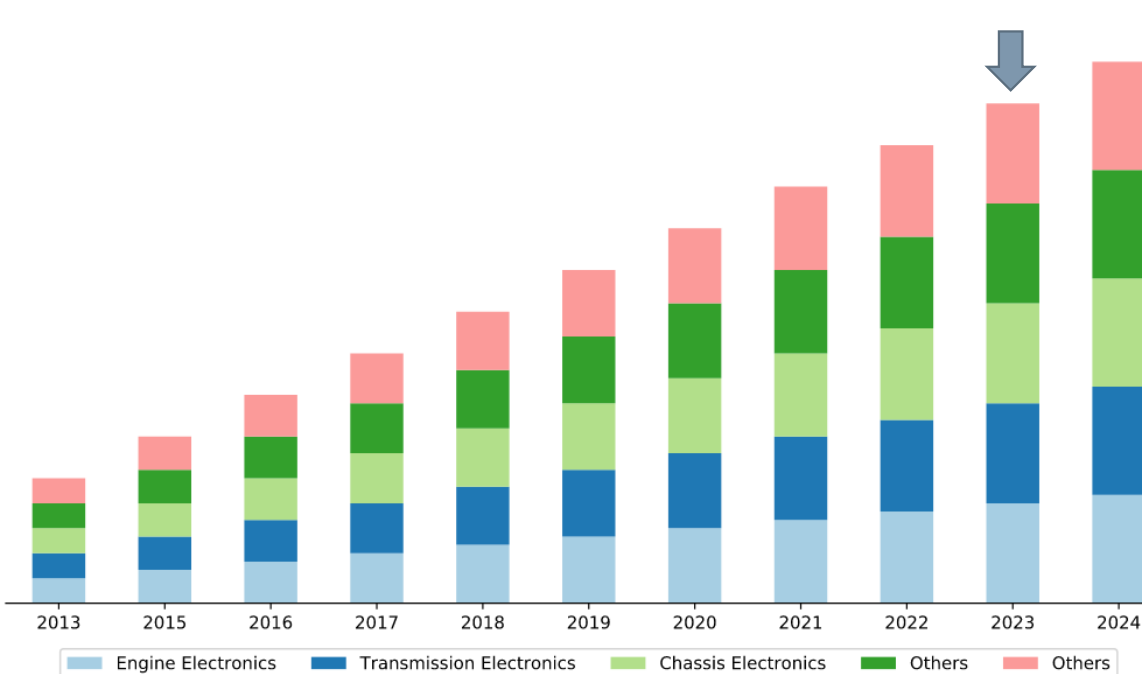
Hardware- to Software-defined Vehicles

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- Global automotive electronics market will reach \$353B by 2023, according to Global Market Insight.
- MAI target segments: cockpit & ADAS domain, the two markets combined reach nearly \$200B.

Global Automotive Electronics market size, by product, 2013-2024 (USD Million)
www.marketintellica.com

353B USD



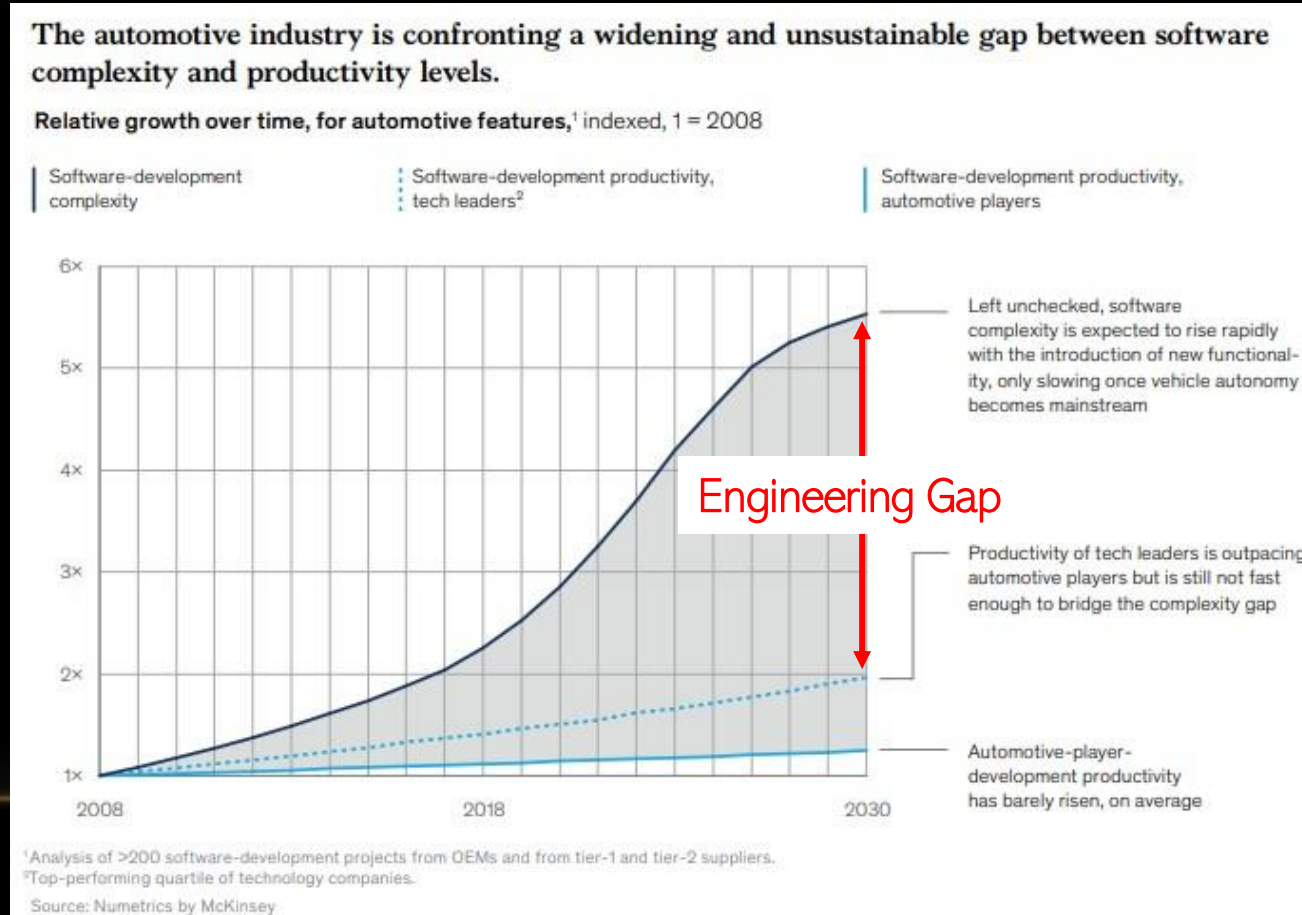


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THE COMPLEXITY OF INTEGRATION

OEM is Trapped in a Maze of Complexity

According to McKinsey's report, OEMs and suppliers have difficulty dealing with software complexity because their productivity is not increasing at the rate needed to sustain innovation.





DIGI COCKPIT / ADAS EVOLUTION

MAI Provides Solutions for the Migration

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CONSOLIDATION



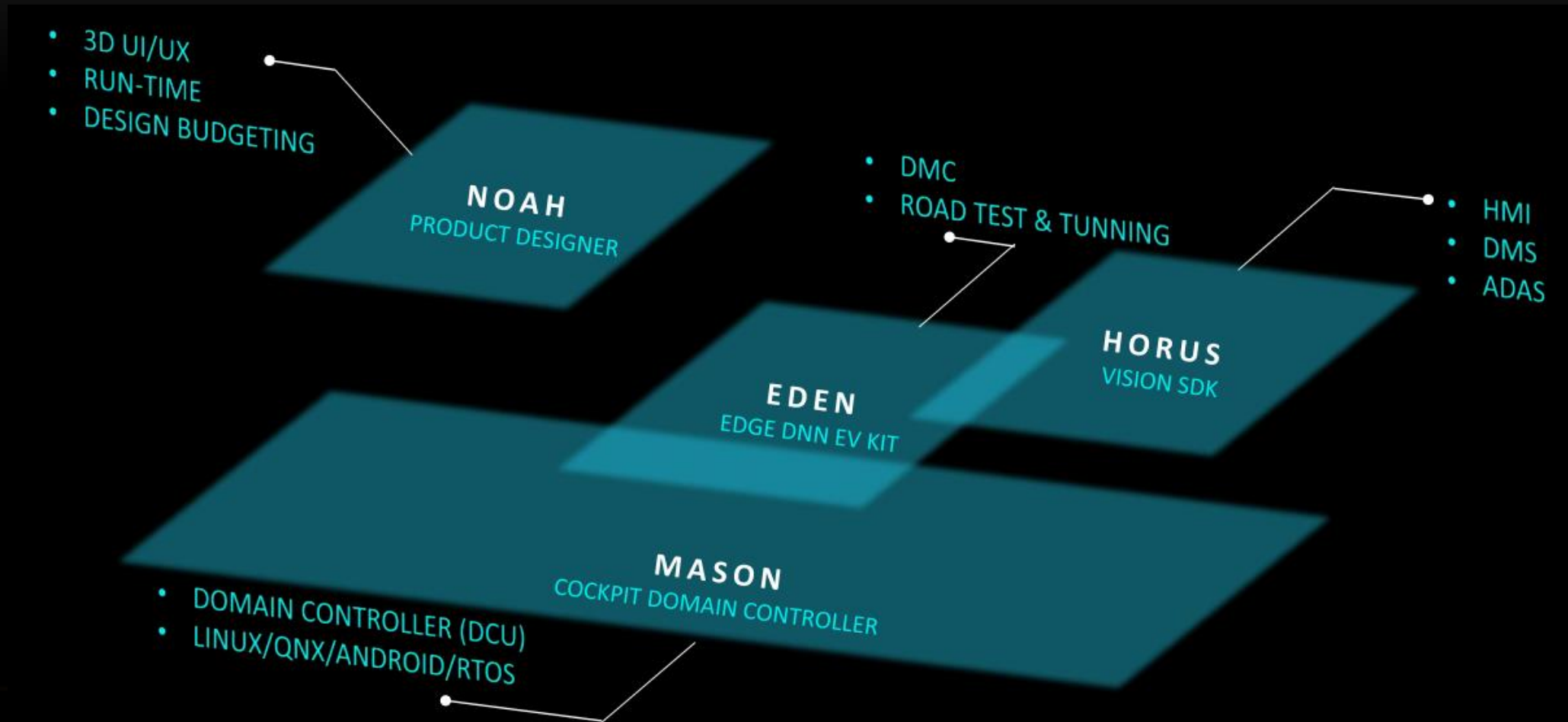
A.I. ENABLEMENT



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MAI Development Platform

Key Building Blocks for Cockpit & ADAS Domain

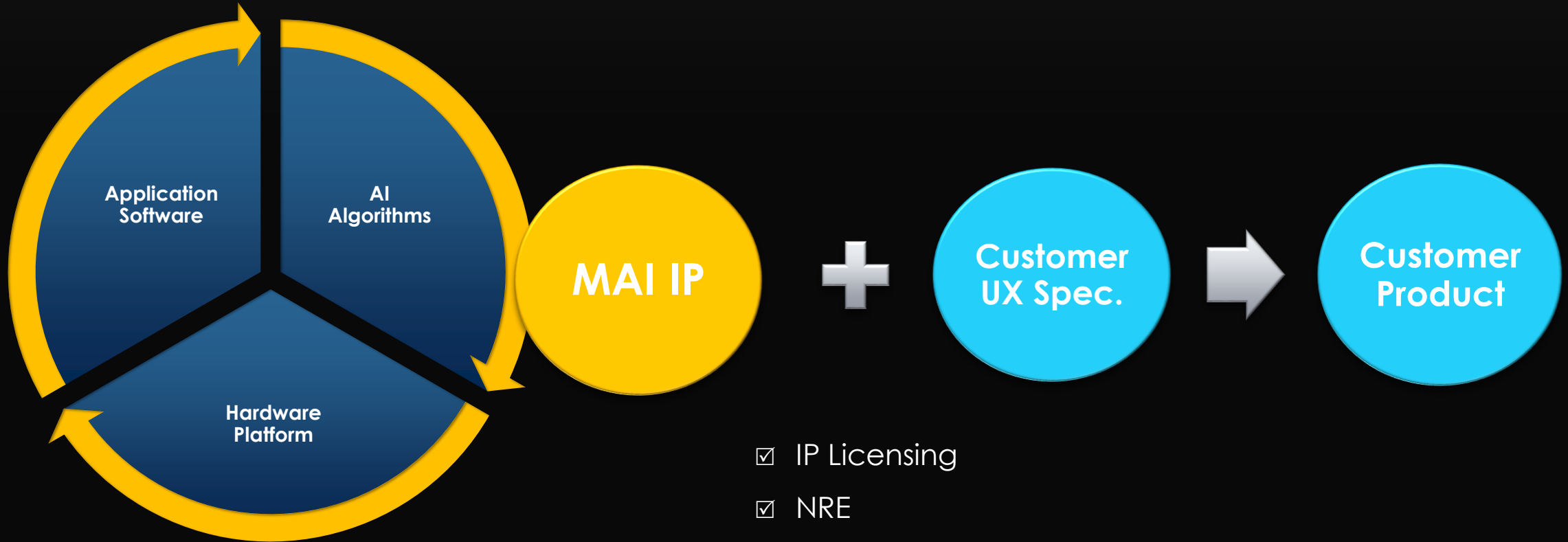




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MAI BUSINESS MODEL

Flexible for Partnerships



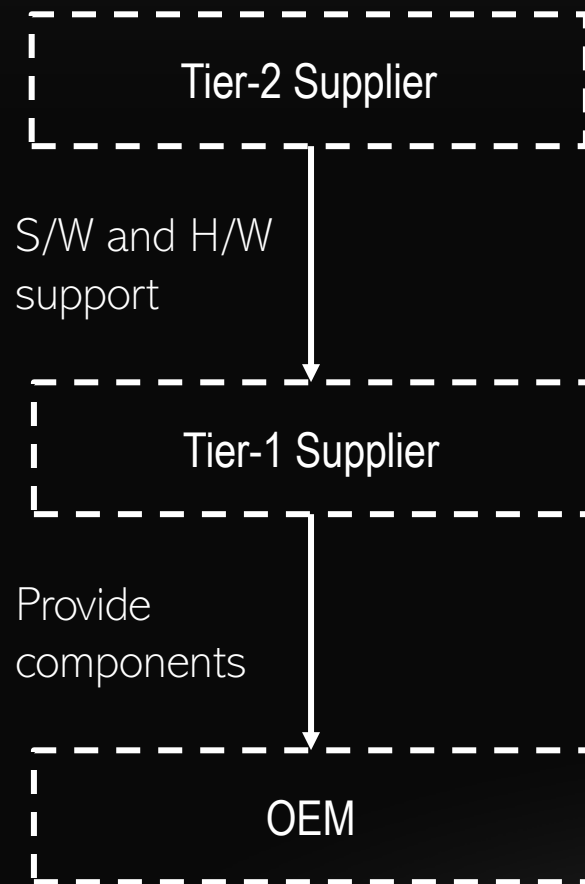
- ☑ IP Licensing
- ☑ NRE
- ☑ Validation Services
- ☑ Turnkey
- ☑ Profit Sharing



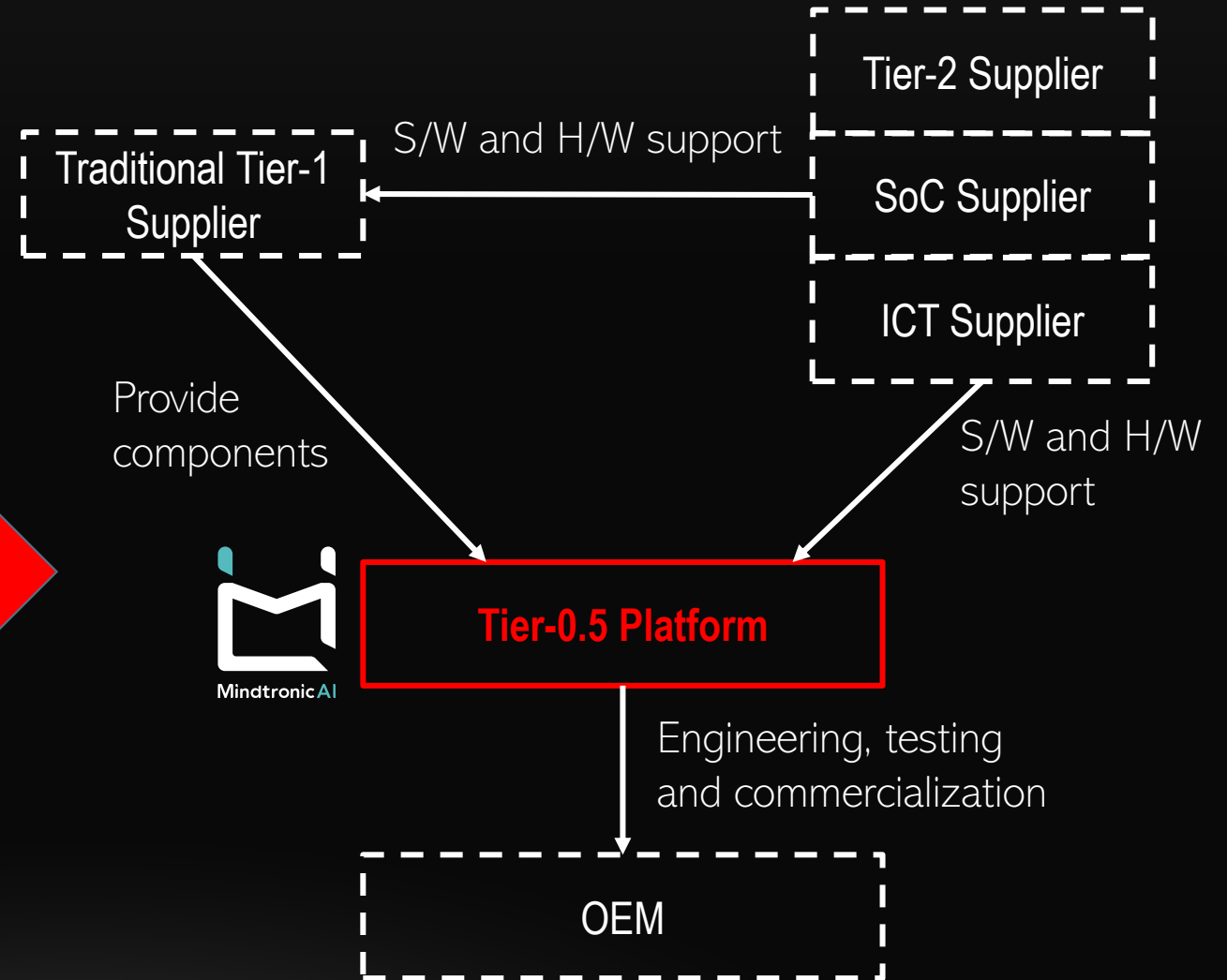
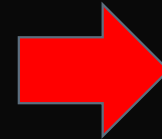
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NEW VALUE CHAIN DISRUPTIONS

The Tier-0.5 Supplier



Traditional Supply Chain



New Automotive Value Chain



DEEP LEARNING FRAMEWORK

Realize Real Time Training and Inference at the Edge

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Provides a platform for parallel computing in deep learning

Frameworks	Features		Full-featured framework			Specialized Inference engines	MAI
			Tensor Flow	Pytorch	MXNet	Tencent NCNN / XiaoMi Mace / Alibaba MNN	BCNN
Training Engine	Python wrapper		Yes			No	Yes (yet less scalable than full-featured framework)
	GPU						
	Distributed training						
Converter	Graph matching		Needed			Needed	Not needed
	Graph optim						
Lightweight Inference Engine	Back-ends		Tensor Flow Lite	Caffe2	Amalgamation / Compiler stack (TVM)	Yes	Yes
		Arm CPU	Yes	Yes	3 rd -party	Yes	Yes
		OpenCL	No	No	3 rd -party	Yes	In dev
		Vulkan	No	No	No	Yes	No
	Runtime optim	Multi-thread	Yes	Yes	3 rd -party	Yes	Yes
		SIMD	Yes	Yes	3 rd -party	Yes	Yes
		Memory optim	Yes	Yes	Yes	Yes	In dev

BCNN is an ultra lightweight, full feature DL framework that is transparent between training and inference



	MobilenetV1		
	1 Cores	2 Cores	4 Cores
Tensor Flow	68	54	44
BCNN	31	18	11
Tencent NCNN	56	30	17

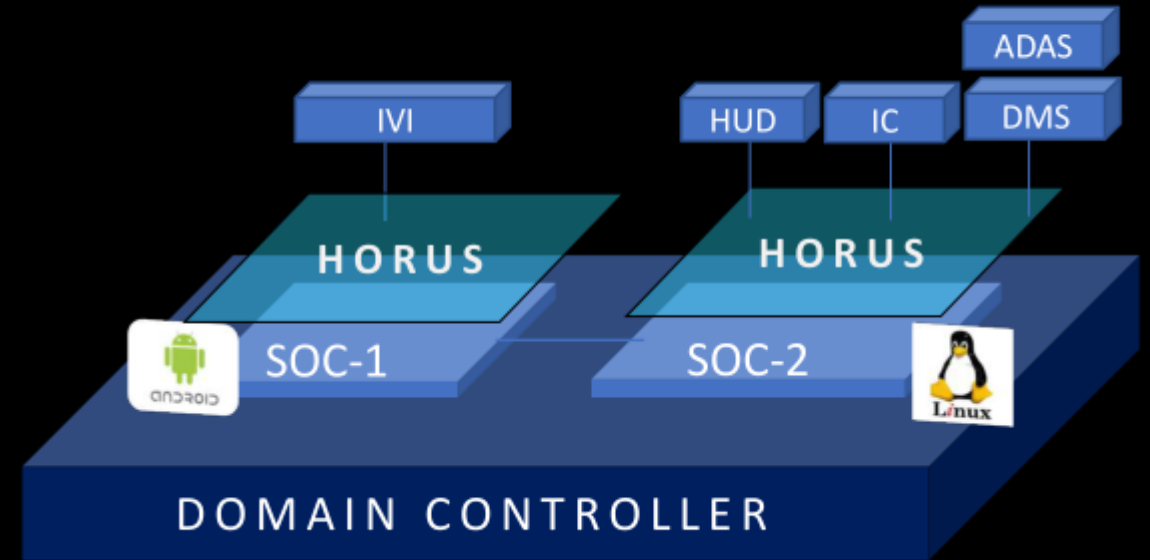
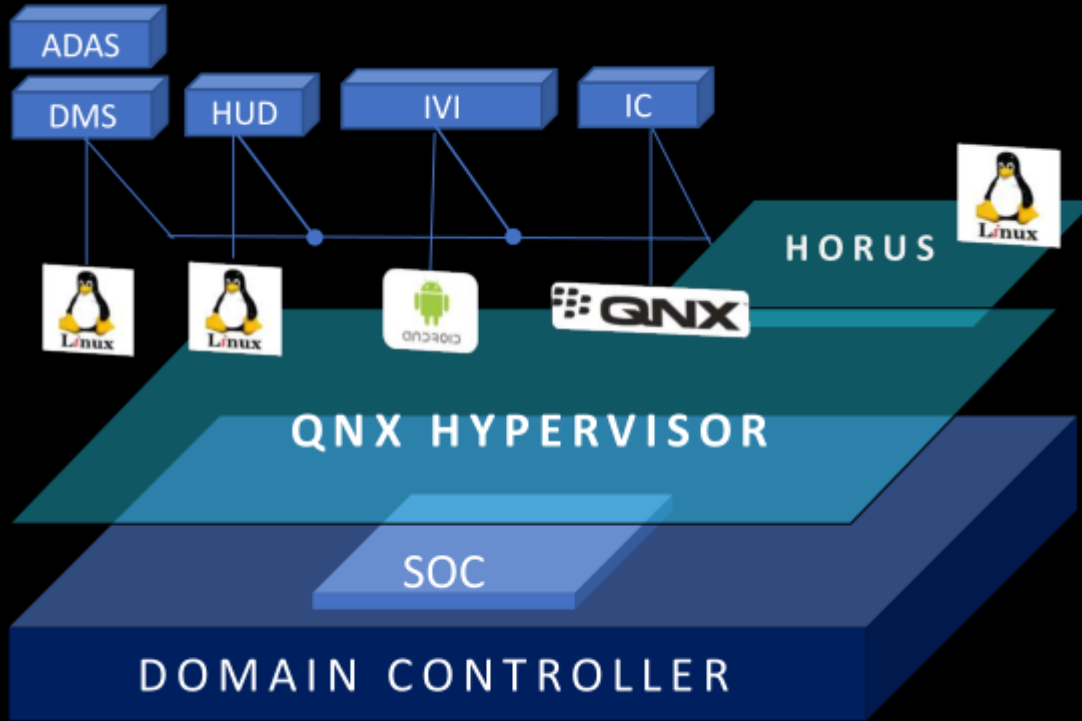
* The comparison is done on Intel CPU but the same trend could be observed on ARM CPUs as well. Timings are in msecs / image so the lower the better.



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MAI HYPERVERSOR & DOMAIN CONTROLLER

The World 1st Hypervisor with A.I. embedded





MAI SMART TOURING

Fusion Technology for CV and DL

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- SMART TOURING is MAI's patented technology for inferring driver's target of interest by learning from driver's gaze and driving behavior.
- Inferred target is automatically connected to dashboard and driver's handset.
- Automatic search from Internet regarding target of interest details.



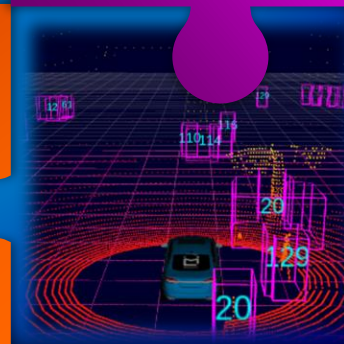
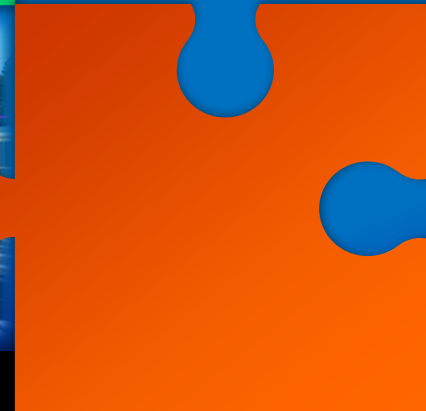
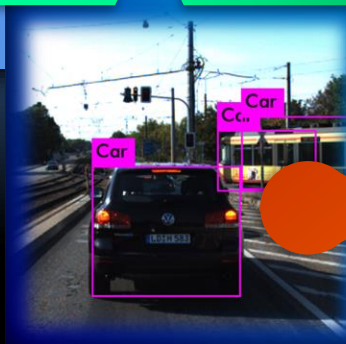
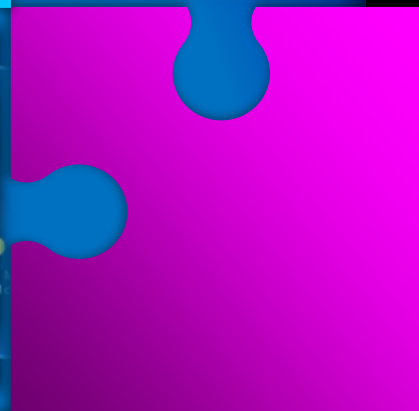
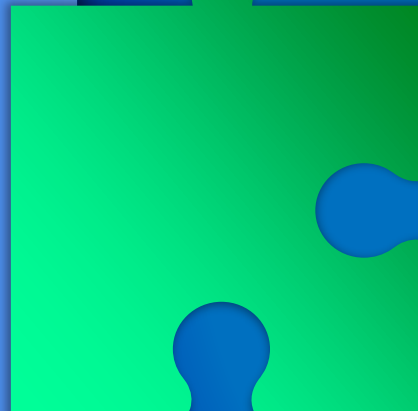
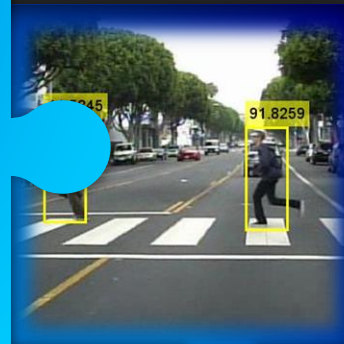
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MAI Shared Autonomy

Human Robot Co-pilot

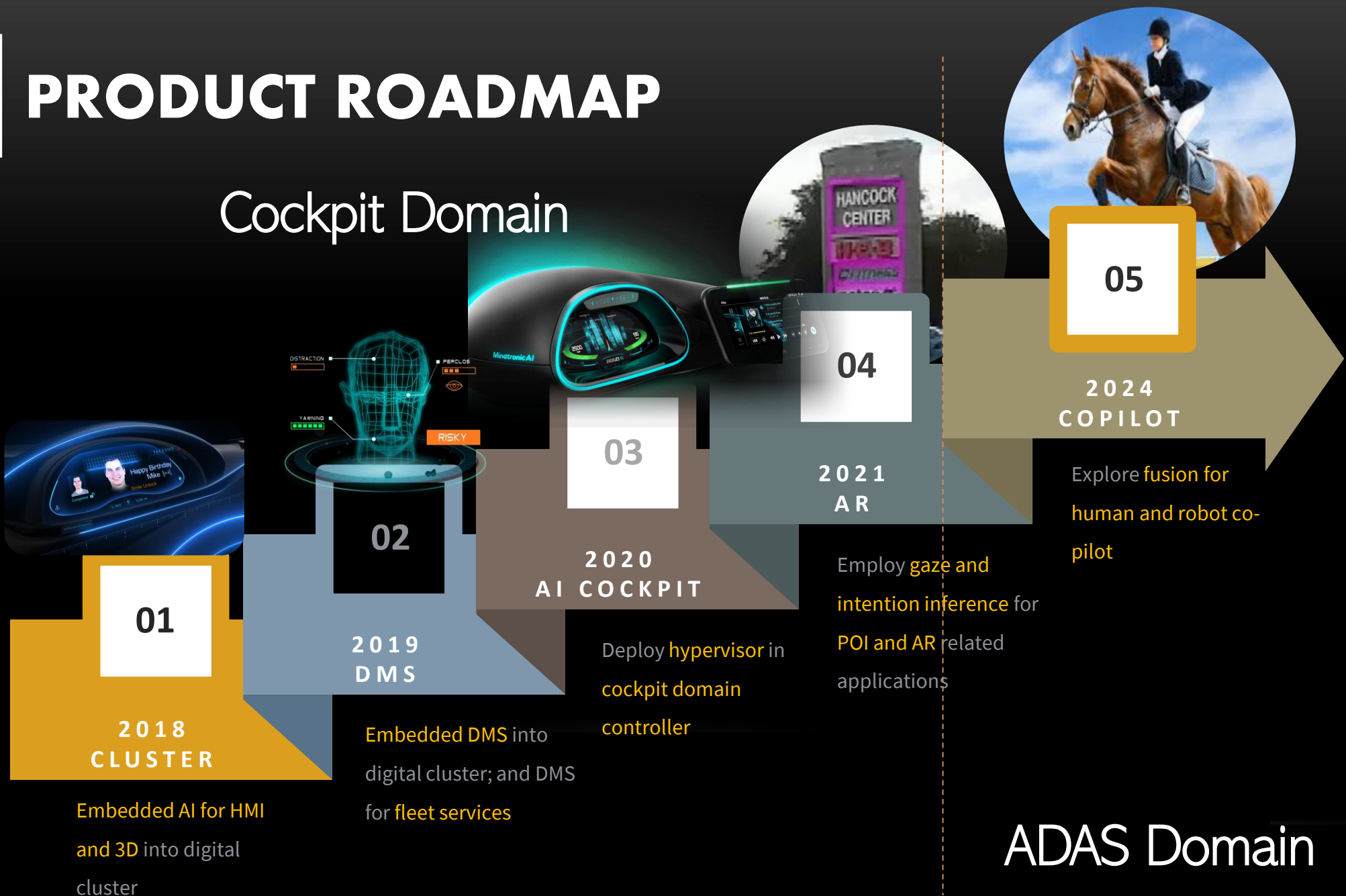


DMS + ADAS



PRODUCT ROADMAP

Cockpit Domain





INNOVATICE TECHNOLOGY

A.I. for AUTOMOTIVE

Biometric Vision

- Face Recognition (IR imaging)
- Dynamic Facial Passcode
- Face Expression
- Gender / Age / Emotion Recognition
- Palm Print ID
- Gaze Tracker

Edge Learning

- BCNN: online learning edge framework
- Intention Inference
- Driver Cognition Aware

Autonomy

- Perception
- Sensor Fusion & Persistent
- SLAM & planning algorithms

SOFTWARE

Instrument Cluster
In-vehicle Infotainment
HMI/UX Design
Car Link & Connectivity
Cloud data processing

SYSTEM / HARDWARE

ECU domain controller
BSP QNX/AGL/Android/RTOS
Hypervisor / AUTOSAR
OTA / Cyber-security



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COMPETITION ANALYSIS

Company	MAI	Eyesight	Seeing Machines
DMS Price	License + Royalty	License + Royalty	High
Product readiness	Sep-19	Dec-19	Sep-18
Business Model	B2B, solution provider	B2B, SDK provider	B2B, product provider
Key Technology	In-house DL framework and unique algorithm for faceID, POI, palmer and copilot	Biometrics algorithm for face and gesture recognition	CV image processing
Accuracy	High	High	Medium
Platform Applicability	High	Low	Low



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MAI Partnerships

SoC Partners



Auto Partners



DMS Partners





OUR TEAM

Mindtronic AI CEO Sharon Jiang

- NTU Electrical Engineering
- UT Austin AI Professional
- Author of POI inference and copilot
- 100GHz millimeter wave system chip (State-of-the-art in 2008 IEEE Microwave and Wireless)
- AAAI, RO-MAN, ICMI, IEEE International Journal of AI and Autopilot



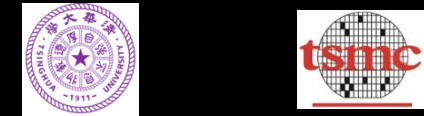
CTO MJ Huang

- NCU Electrical Engineering
- TSMC's global R&D ranked No.1 in innovation
- Head of TSMC China R&D design center
- ARM Asia Pacific CSO
- 65 global patents, 20 years of experience in hardware and software



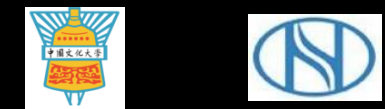
Co-founder YL Tai

- NTHU PH. D in computer science
- NCTU MS degree of science and technology law
- TSMC 16-28nm technology project leader
- More than 20 years of project management



Co-founder YC Zhang

- PCCU BS degree of German language and literature
- Founder of Fukaihe Photovoltaic
- Independent director of Hirosawa
- VP of Shanghai Sunkun Co., Ltd
- 15 years of marketing experience



System and hardware engineer Ealin Chiu

- NCKU Engineering Science
- Director of application engineering, Raydium Semiconductor
- SA, Ali Tech
- Author of Embedded System and PMP
- 23 years of experience in embedded product development



Computer vision engineer Jean-Noel Braun

- Author of deep learning framework BCNN
- Winner or top-3 in fingerprint recognition algorithms benchmark (FBI IAFIS, Nist ELFT, Nist Minex)
- 10 years experience Computer Vision in Biometrics (Fingerprint and Iris recognition)



Automotive software engineer Rigel Chen

- NTU Electrical Engineering
- Garmin navigation senior software engineering
- More than 10 years of in automotive application software and IoT wearable product development



BD Director of China Ran Gao

- 20 years of experience in automotive industry
- Ford, Marelli, Fiat, Mercedes-Benz market analysis and marketing





THE BEST EDGE AI ENABLER

INNOVATION

4 CES Innovation Award 2018, 2019, and 2020
1 German Design Award 2019

RESEARCH

In-house DNN framework
143 patents, 49 granted
Over 10 years staff seniority in average

PRODUCTLIZATION

Trustworthy executive & multicultural talents
Algorithm, software, hardware, system, and vehicle engineering

MINDTRONIC AI DIFFERENTIATION

