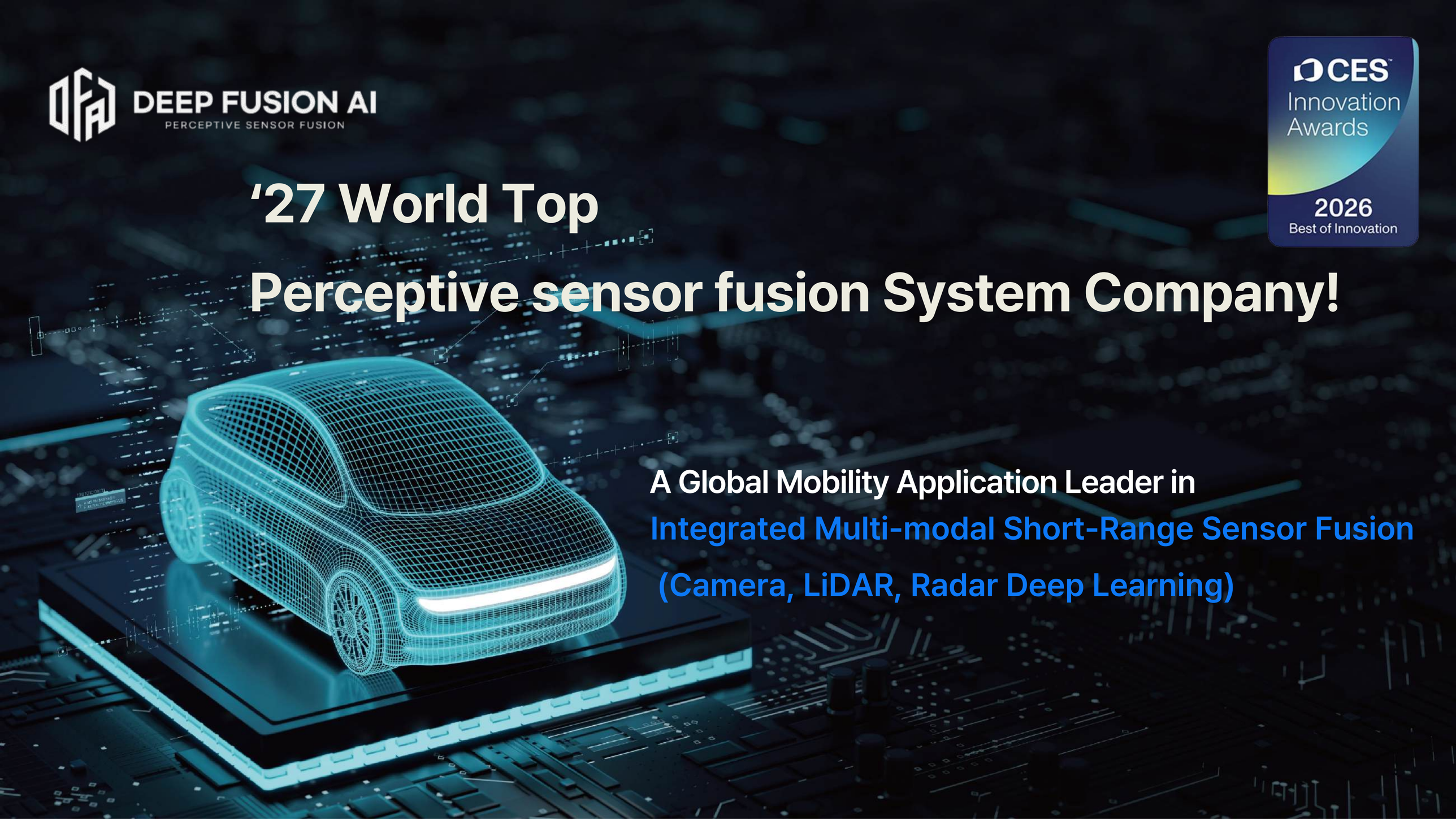
DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

CES Innovation Awards 2026 Best of Innovation

‘27 World Top Perceptive sensor fusion System Company!



A Global Mobility Application Leader in

Integrated Multi-modal Short-Range Sensor Fusion

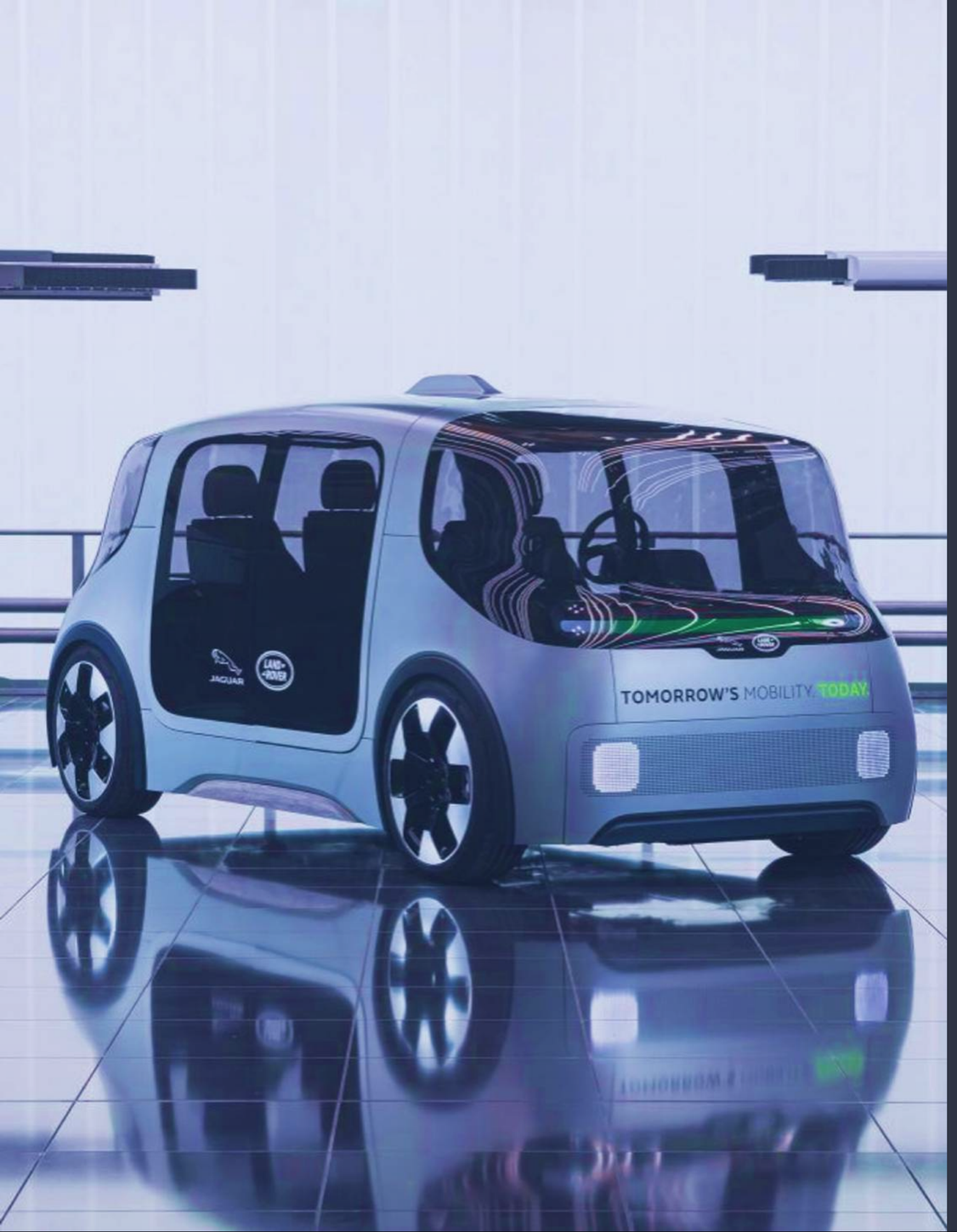
(Camera, LiDAR, Radar Deep Learning)

Contents

Company Overview (IR)

DEEP FUSION AI

PERCEPTIVE SENSOR FUSION



Chapter 1

Trend and Market

1. Major Sensor Deep Learning
2. Demand for short-range integrated perception (Optics + RF Sensors)
3. Unmanned Vehicle Market Outlook

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

Major Deep Learning Sensor

DEEP FUSION AI

Optics Sensor

CAMERA

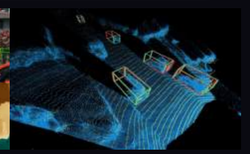
Main Sensor

- Vehicles, pedestrians, lanes, and road sign
- Sensor Quality Standardization

Camera DL

Mainstream

Depth Map

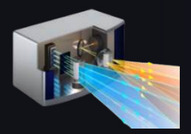


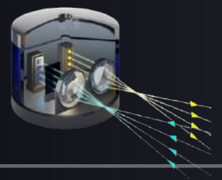
Pseudo-LiDAR

LiDAR

High cost sensor for Robot taxi

- Vehicle, Pedestrians, road surface
- Low-end (400$ ↓)
- High-end (2,000$↑)





LiDAR DL

Becoming Mainstream

Standardized Dataset & High-accuracy Pre-trained Model

RF Sensors

79Ghz Radar

Core fusion Sensor

- Vehicle/Pedestrian Distance Measurement
- 3D radar price drop→ Red ocean (30$↓)
- Increasing the RF Chip Antenna number
  - Naming as 4D Imaging Radar
  - Provide accurate Elevation Data
  - LiDAR level of Point Cloud output

Transition from 3D Radar →4D Radar

Emerging Deep Learning areas

Quality varies by Manufacturer
No standardized dataset available

Mid-range X-band Radar

300m~10Km

Long-range ASEA Radar

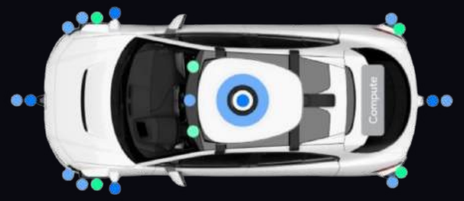
~100Km above

Demand for Short-range Integrated Perception (Optical + Radio)

DEEP FUSION AI

Optical and Radio Sensors Fusion is essential (Perceptive sensor fusion)

Robot taxi



- LiDAR
- Camera
- Radar

Stops operating in adverse weather conditions

Unmanned Surface Vessel (USV)

- X-Band radar
- LiDAR
- EO/RGB, IR
- GPS/AIS

X-band radar shadow areas under 300 m
LiDAR Performance degraded by solar reflection on seawater

Unmanned Ground Vehicle (UGV)

- LiDAR
- EO/RGB, EO/IR

LiDAR glass contamination by mud or dust

Expansion Bottle neck

- LiDAR Cost, maintenance expenses
- Large Camera Image processing cost
- Needs of Radar Fusion

Evolving toward unmanned autonomous navigation

Weapon systems vary by application

- Modularization and Standardization of perception systems Needs
- LiDAR minimization request
- Shot-range radar perception Needs
- Boundary environment perception through SLAM Needs

LiDAR Usage limitation (Environmental issue)

Needs for developing short-range radar perception systems

Demand for short-range perception system integrated with LiDAR/Camera/4D Imaging Radar

* EO/IR: Electric-optical/Infra-Red

Unmanned Vehicle Market Forecast

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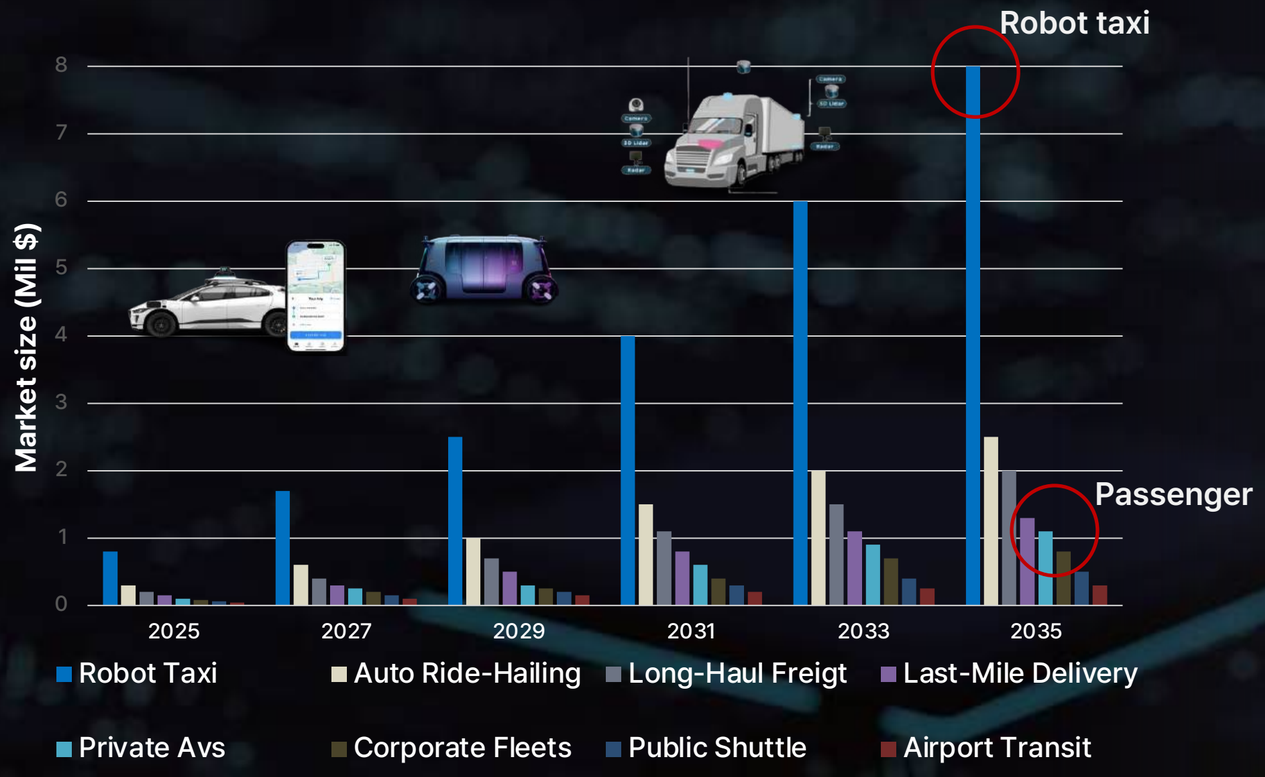
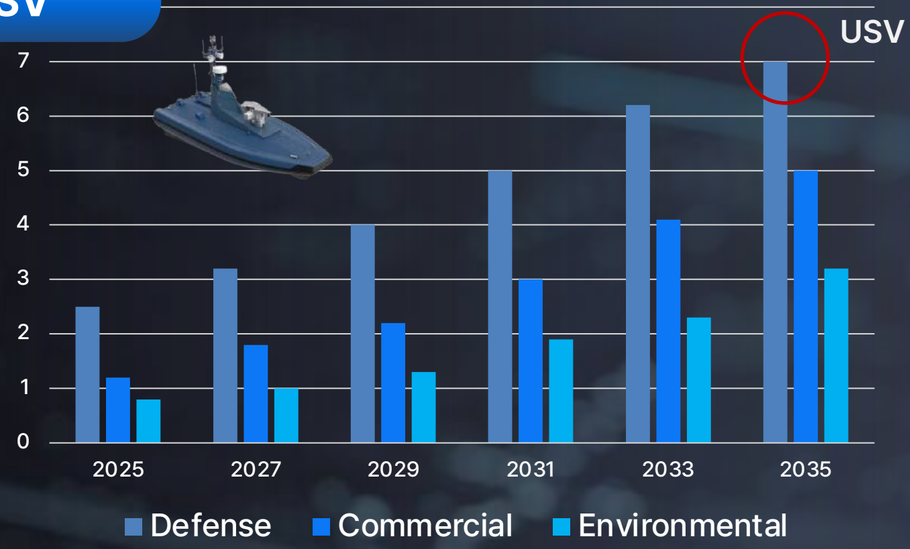
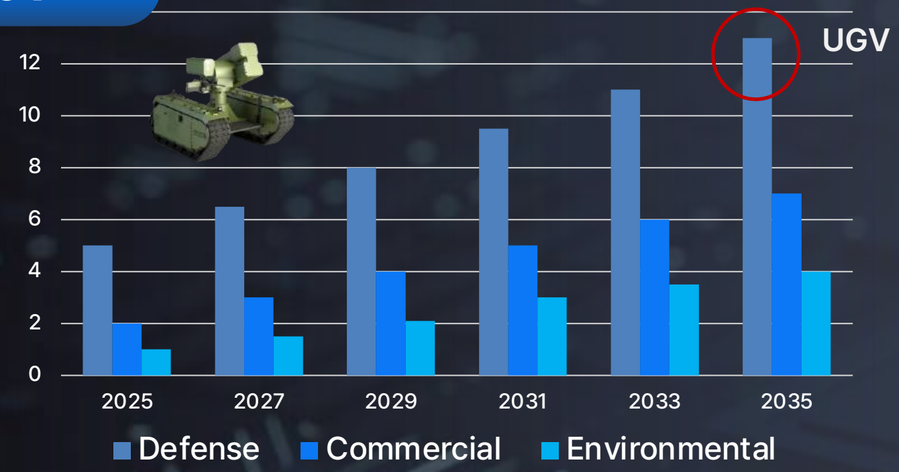
Autonomous driving Vehicle



USV



UGV



Implications

High cost & Complex sensor architecture

Frequent and specialized maintenance

→ Challenging to achieve mass adoption

Chapter 2

Technology Overview

1 DFAI’s Core Technology

- Perceptive sensor fusion (RAPA-RLC)
- Multi-radar Real-time 360° Deep Learning
- Multi-radar SLAM

2 DFAI’s Core Technology

- Virtual Multi-Radar & Pre-training Model
- Performance Comparison (with RAPA-R)

3 DFAI’s Technology commercialization Status

- Robotaxi / USV / UGV

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

DFAI Core Tech -Perceptive sensor fusion (RAPA-RLC)

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

Successfully extended radar-based deep learning into early fusion, achieving a fully developed for short-range perception system.

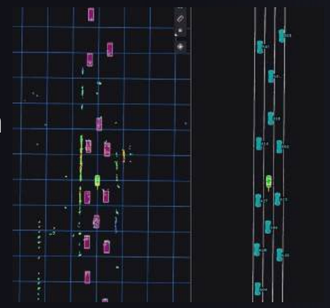
Radio Deep Learning

CES Innovation Awards 2026 Best of Innovation

RAPA-R

Real-time Attention-based Pillar Architecture for Radar

- DFAI's Multi-Radar Noise filter
- *RCS based Radar point cloud Virtualization
- Situation based Ghost data shifting
- Multi-Radar Alignment
- *IMU based Pose correction



Radar Point cloud Image DL + Velocity based partial vectorized Multi Radar pillas DL

Multi-Radar real-time surrounding Deep learning

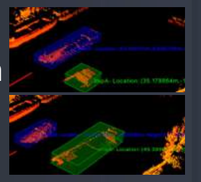
Single shot triple (RLC) auto annotation tool - Patented

Optics + Radio Fusing Deep Learning

RAPA-RL

RAPA for LiDAR : Multi LiDAR-Radar early fusion

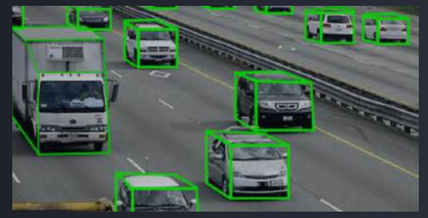
- DFAI's Multi-LiDAR Noise filter (Rain, Snow, Waves)
- Multi-Radar & LiDAR Alignment, IMU Pose correction
- LiDAR intensity & Radar Velocity Fusion (Energy Estimation)



LiDAR Point cloud Imaging DL + Energy based partial vectorized Multi LiDAR-Radar pillars DL

RAPA-RC

RAPA for Camera : Multi-Camera & Radar early fusion



High accuracy 3D DL

3D instance segmentation

*RCS: Radar Cross Section (how visible an object is to radar)
*IMU: Inertial Measurement Unit (how they are moving)

DFAI Core Tech – Multi-Radar Real-time 360° Deep Learning

DEEP FUSION AI

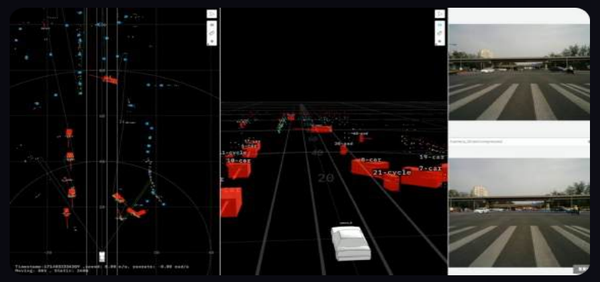
Other DL Model

arbe ROBOTICS

Israel
Application Chip
Listed on NASDAQ
(Feb 2024)

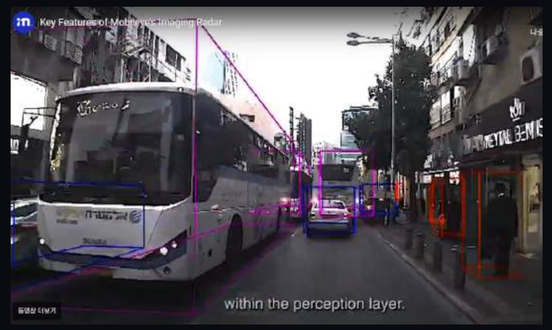
HIRAIN TECHNOLOGIES

Beijing Auto Tier1
Use Arbe solution
Front Perception
in server
(Aug 2024)



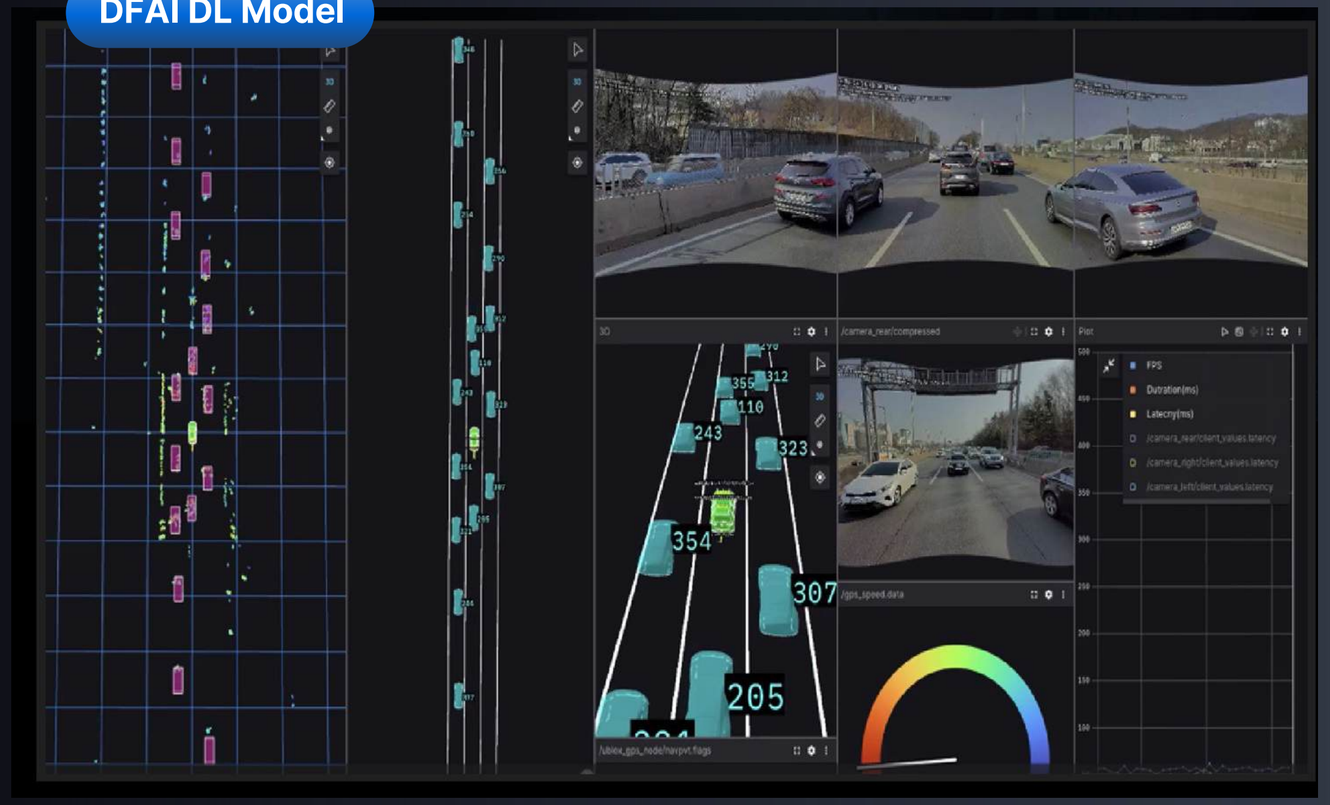
mobileye

Low Speed
Clustering +
Tracking
@CES2025



Server &
Client
Radar

DFAI DL Model



Radar-agnostic Solution

Real-time 360° Deep Learning using radar only

World's only commercial level deep learning that replaces multi-LiDAR with multi-radar

DFAI Core Tech - Multi-Radar SLAM

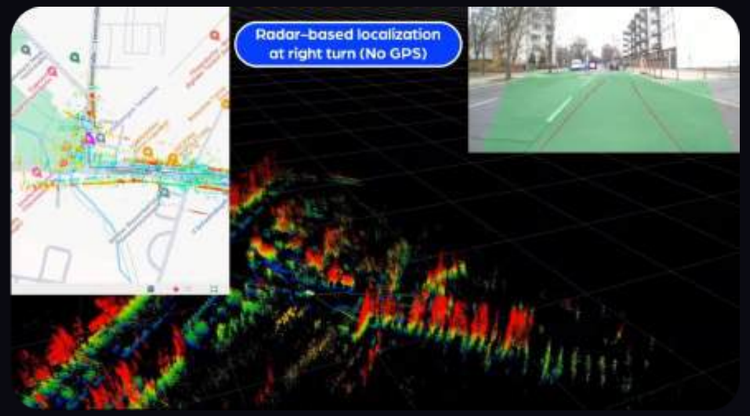
DEEP FUSION AI

World’s only commercial level deep learning model makes reducing multi-LiDAR with multi-radar sensor fusion

Other SLAM

arbe ROBOTICS

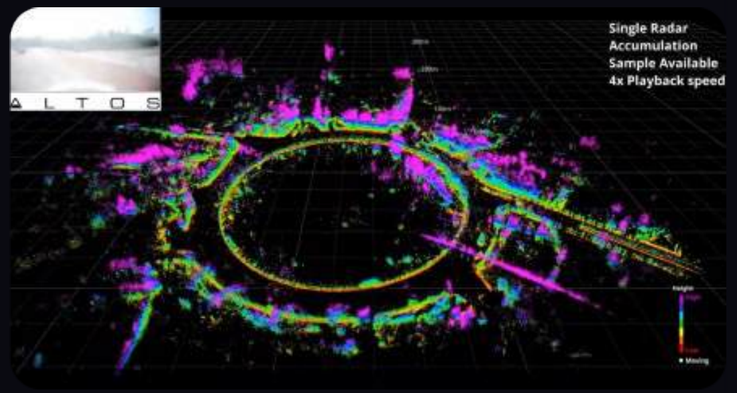
Accumulated point cloud



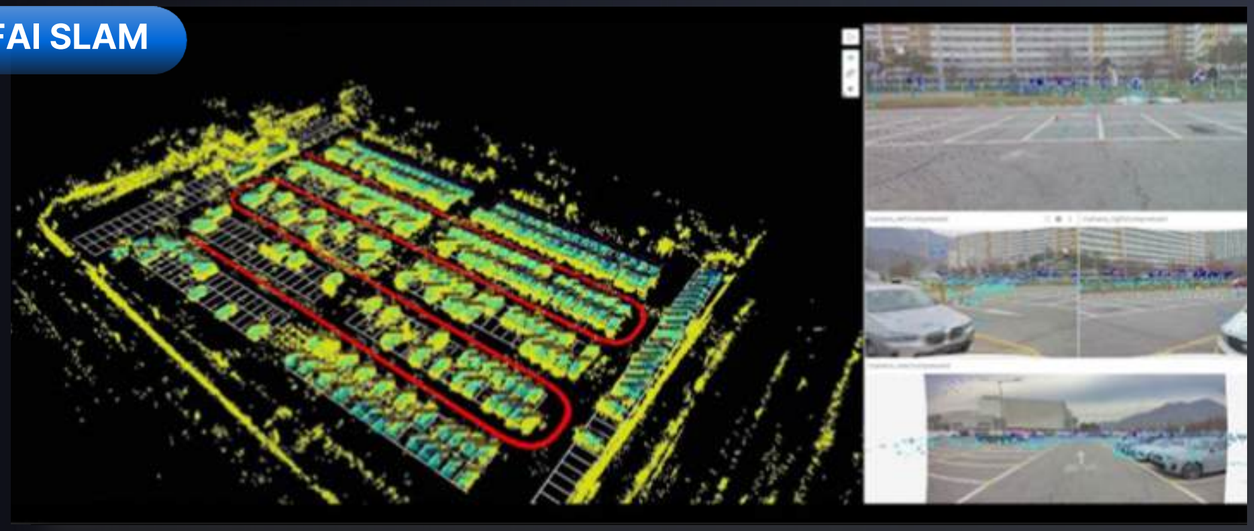
ALTOS RADAR

Accumulated point cloud

Impossible to extend HD MAP without GPS

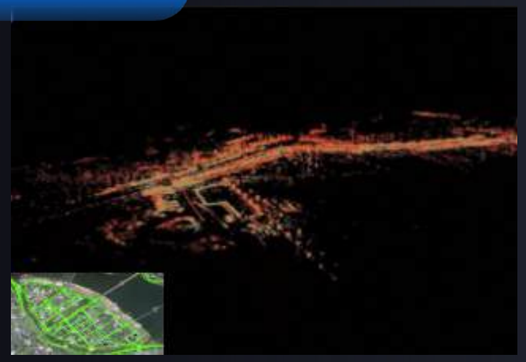


DFAI SLAM



Auto valet parking - SLAM ’24 NOV

DFAI HD-MAP



HD MAP SLAM ’23 Nov

LiDAR HD-MAP		Multi-Radar HD-MAP
	VS	
200,000 $ [Roof Top]		915 $ [Inside bumper]

kakaomobility In discussion

Inside Taxi bumper

Real-time SLAM coverage expansion

DFAI Core Tech - Virtual Multi-Radar and Pre-training Model

DEEP FUSION AI

World's Only Virtual 4D Imaging Radar and Deep Learning Pre-training Model

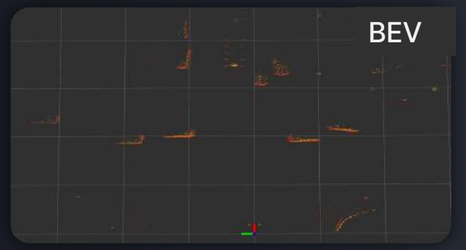
1. Overlapping FOV of 3 or more radars
2. Fusing Camera DL Result into Radar DL
3. Fusing Imaging DL & Point Pilla DL

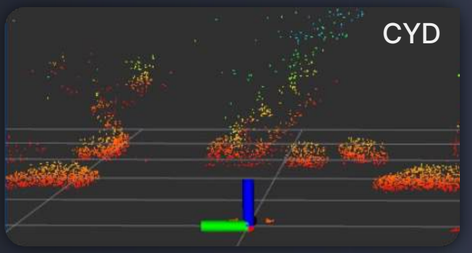
Two way DL RAPA-R

1. Accelerated deep learning for point cloud image conversion (Distillation)
2. Enhanced radar point cloud-specific DL tracking capability

Baselines	Data	Vehicle : Virtual Data-set :600K					
		3D@0.7			BEV@0.7		
		Easy	Mod.	Hard	Easy	Mod.	Hard
Open source Point Pillars	Virtual LiDAR (32ch)	80.23	52.30	45.46	81.04	53.15	46.69
RDIoU	Virtual LiDAR (32Ch)	60.32	41.20	34.72	60.65	44.69	35.02
DFAI RAPA-L RAPA-R	Virtual LiDAR (32Ch)	82.60	57.46	46.64	83.22	58.02	51.10
	Virtual Customer radar	72.67	52.80	45.14	78.40	56.38	49.12

Performance Test of DL Algorithms in Virtual Environment (w/ LiDAR)





ex) Customer 4D Multi radar Virtualization

Install 3 Radars in front bumper (Center1, Side 2)
Total point cloud : 15,0000/Sec (Max)

DFAI Core Tech Performance Test (RAPA-R)

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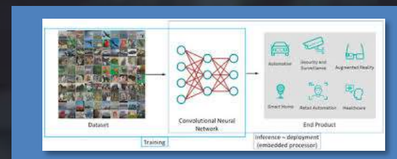
PERCEPTIVE SENSOR FUSION

World's Only Commercial-Grade Radar-Based (4D Imaging Radar) Perception Technology

Quantitative Test of Radar-Based DL
(Open ZF 4D Imaging Radar Dataset)

Link : Github



smiforme

China Academic
4D DL Model

28% mAP@0.3

US Tier-1

mvfan

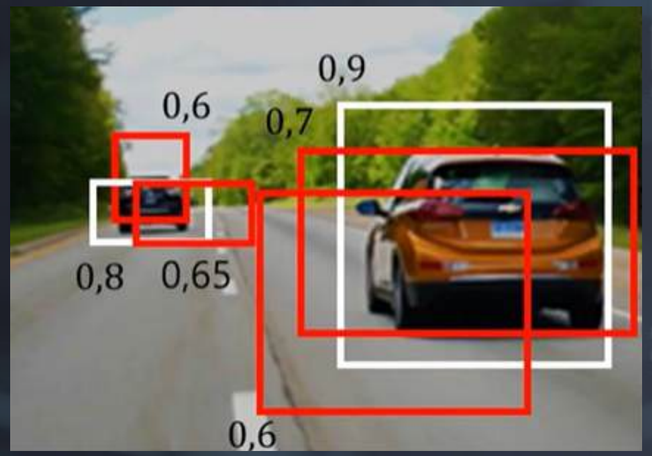
Aptiv
4D DL Model

38% mAP@0.5

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

RAPA-R

52% mAP@0.7



Commercialization Standard:
0.7 IoU is the benchmark used for commercialization (based on Benz standards)
@0.3 : Feasibility @0.5 : Dev. @0.7 Commercial

*IOU: Intersection over Union (Area of overlap)

Deep-Fusion AI achieves world-unique commercialization-level accuracy

Reference: Top-tier camera deep learning models achieve 60% mAP@0.7, and 99% after tracking.

Based on the history of camera deep learning accuracy improvements,
Deep-Fusion AI has secured a technological gap of over 5 years.

DFAI's Technology commercialization Status

DEEP FUSION AI

World's only 4D imaging radar DL technology & commercialized in Robotaxi, USVs, and UGVs

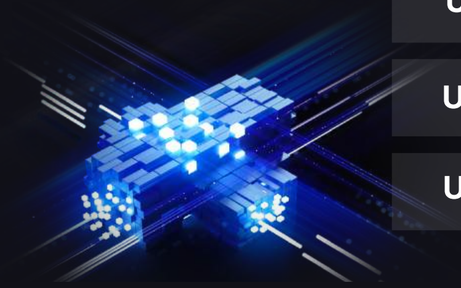
DFAI's Virtualization Technology overcoming Technical Limitations

- Camera & LiDAR DL Top-Class Technology
- Radar lacks standardized datasets (varies by manufacturer)
- Developed pre-training virtual model for radar DL in 2.5 years
- **Achieved same performance in real roads within 3 months after partner radar launch**

➔ **Proven uniqueness of DFAI's radar virtualization DL**

Innovative Perceptive Sensor fusion

RAPA-R Pre-training is fused with camera during development, and in actual vehicles, Multi-Radar alone can recognize vehicles, pedestrians, guardrails, and more.

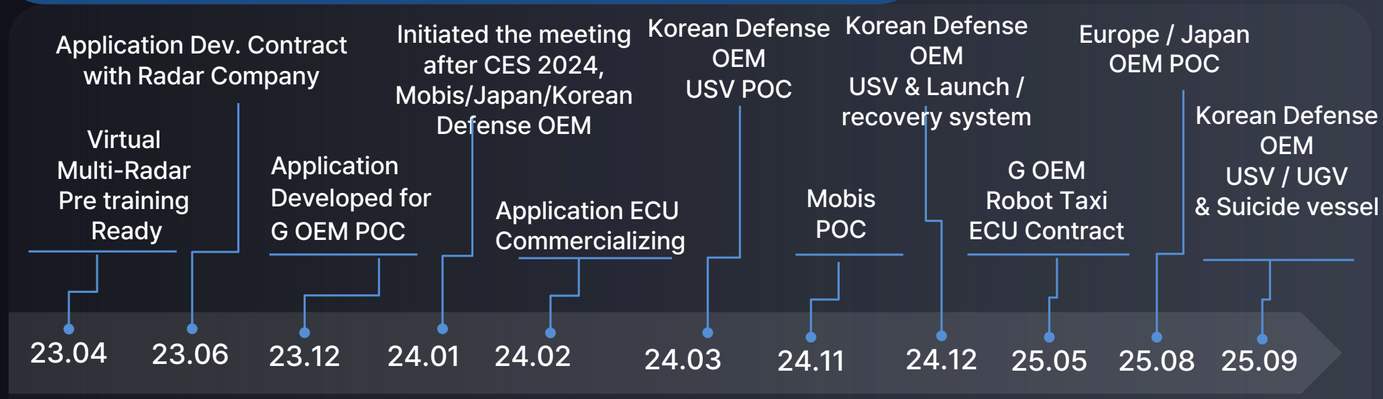


Unique Two-way deep learning

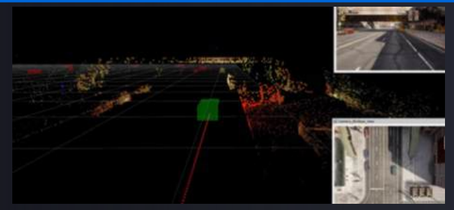
Unique Distillation

Unique DFAI Tracking algorithm

DFAI's Deep Learning journey : PoC to Win



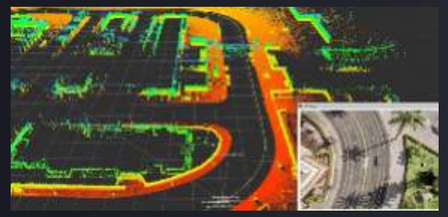
Virtual Multi-Radar Solution : realization Faster



Virtual Multi-Radar Pre training Model

OEM Vehicle Multi-radar 360° Perception

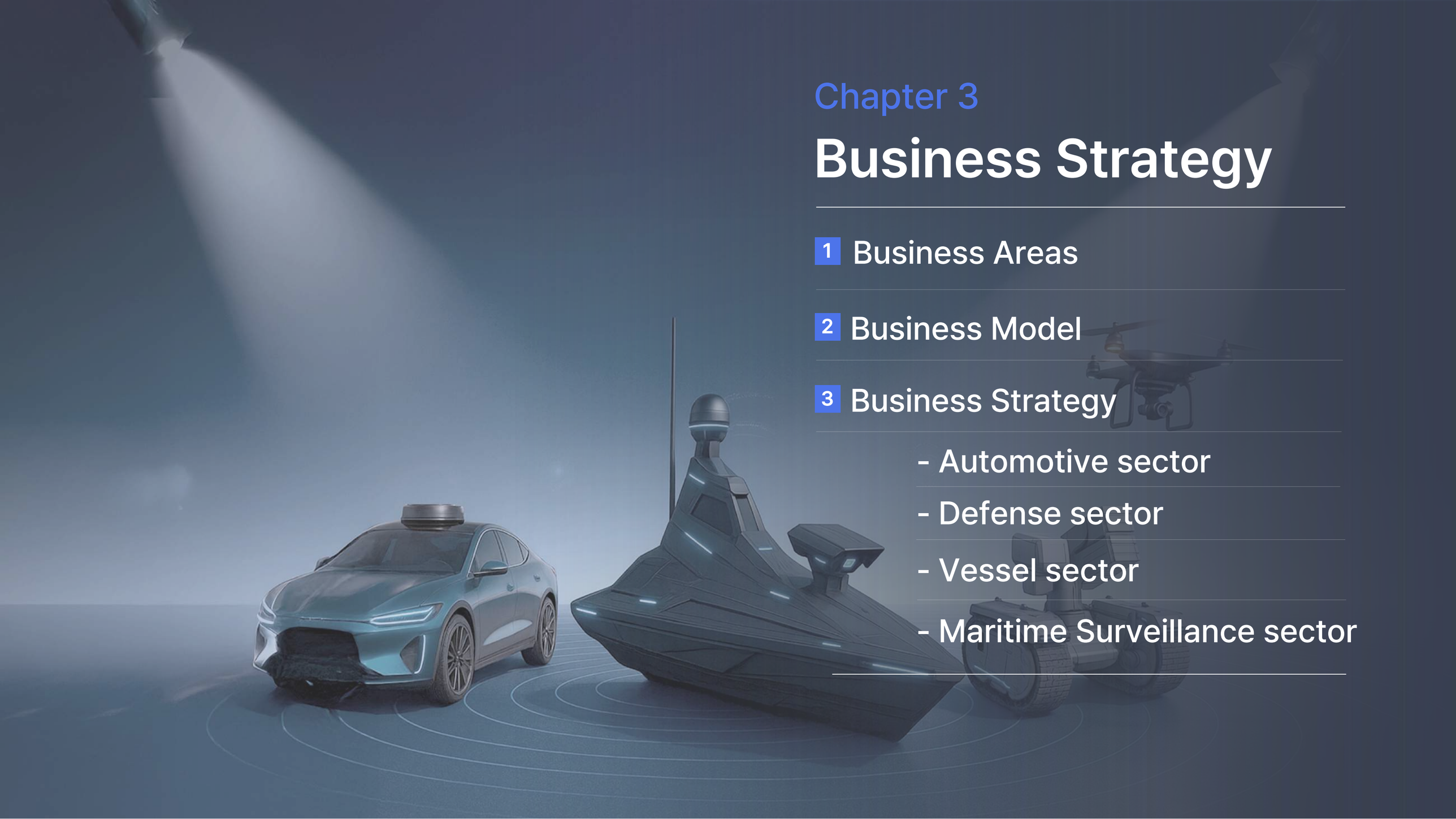
Developed



Virtual Multi-radar SLAM

Real Road Multi-radar SLAM

Developed



Chapter 3

Business Strategy

1 Business Areas

2 Business Model

3 Business Strategy

- Automotive sector
- Defense sector
- Vessel sector
- Maritime Surveillance sector

Business Areas

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

Customer acquisition through tech-driven, stage-aligned customer voice.

Automotive

Applications: Robot Taxi/ Passenger Auto Driving

Customers: Automotive OEM/Tier1

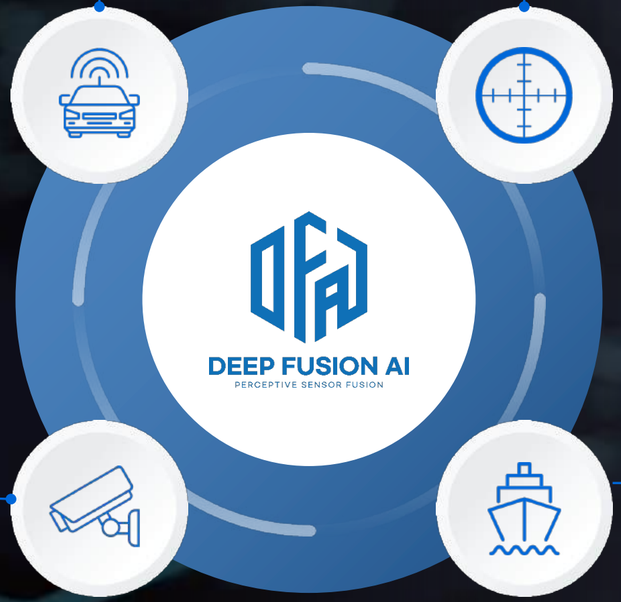
BMW, HONDA, NISSAN, HYUNDAI MOBIS, BOSCH, HYUNDAI, APTIV, MAGNA, Continental

Defense

Applications: 근거리 센서 통합인지

Customers: 국방 Tier1

LIG Nex1, HYUNDAI Rotem



Maritime Surveillance

Applications: Wave Detection

Customers: Government, Municipal Gov, Port Corp

해양수산부, 부산지방해양수산청

Vessel

Applications: Shor—range sensor / wave detection

Customers: Large shipbuilding company

HD HYUNDAI, SAMSUNG HEAVY INDUSTRIES, Hanwha Ocean

Contract | Proposal

Leveraging CEO's background

Global Automotive OEM
10+ Years in Technology Marketing
and Development Program Management

Multiple Overseas Contracts
and Mass Production Deliveries

Global Network
- CTOs and Directors at global OEMs

Business Model (Automotive / Defense)

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

Perceptive
Sensor fusion Core Tech Dev.

Sensor Integrated perception system Design

Commercial Sensor Selection and Tunning
Algorithm Integration
DL ECU Design

Quality Test
System Test

Outsourcing

Average: 52%

HW Manufacturing / Assembly
Tooling Design

Requirements
(Customer voice)

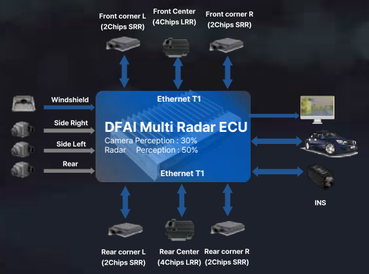
Supply

Defense short-range Perceptive System

Integrated Sensor Perception system

Unmanned Defense market

Robot Sensor Integrated Perceptive System



Sensor PKG + DL ECU

Autonomous

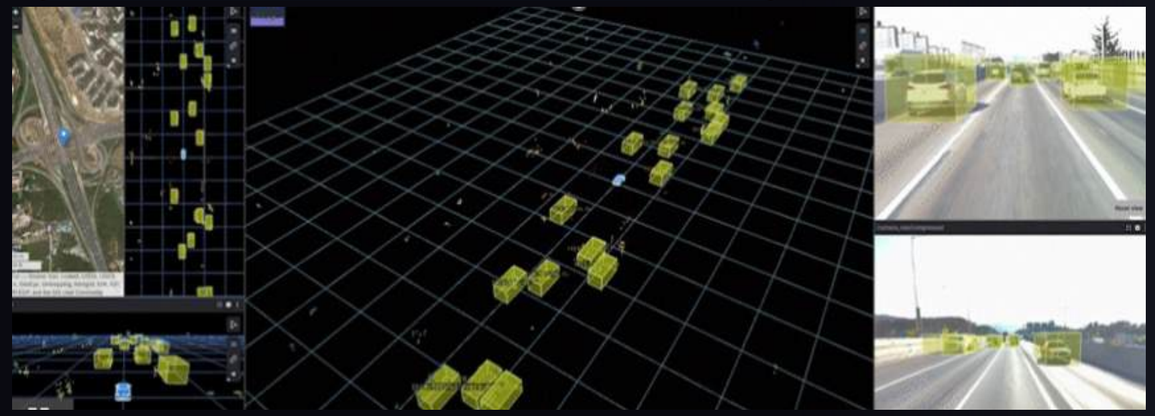
Calibration
Algorithm Fine Tuning
System Integration
System Integration Test
Scenario Test
Field Test
Maintenance

Autonomous Strategy

DEEP FUSION AI

DFAI proves its multi-radar AI in real-world tests with global OEMs

Multi-Radar Surrounding perception



G OEM POC result

Vehicle / Pedestrian Detection		Multi-Radar DL	Multi-Camera DL
Distance Error Average	Vertical Dist.	+/- 0.1m	+/- 0.5m
	Horizontal Dist.	+/- 0.3m	+/- 0.2m
Max detection Distance		300m	100m
Min detection Distance		0.2m	3.5m
Detection accuracy mAP@0.7		58% (BEV)	62% (CYV)
Tracking accuracy (BEV, CYV)		99%	95%
Detection computing power		12 Tops	120 Tops
Operating Speed (Frame base)		40ms	33ms

* Multi camera DL & late fusion (completed)

Short Term: Robot taxi in 1 year

G OEM

POC Completed
Production Design

Autoroad DiDi

Robot taxi 500 vehicle contract
'26.10 Service Launching
DFAI ECU supply

B OEM

Robot taxi POC

理工睿行 Radar Technology momenta

BYD 3D Radar Supplier
'25 Dev. Contracting stage

Long Term : Passenger (Highway - city) in 3 years

B OEM
POC '25.11

BOSCH

Autoban 400km Driving
Germany Visit on Oct /
Driving in Dec using DFAI
Poland Office

H OEM POC
'26.01

BOSCH RENESAS
Valeo Continental

B OEM POC
Discussion

N OEM '25. 11
Meeting

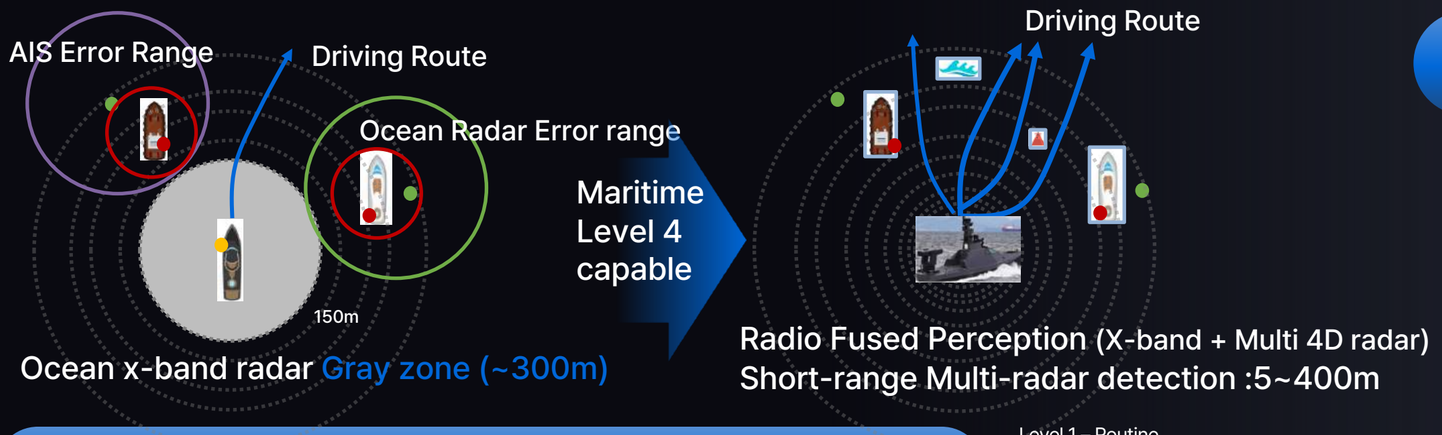
Defense - USV Strategy

DEEP FUSION AI

DFAI supplies sensor fusion modules for Korea's first unmanned surface vessel program under DAPA, part of the Navy's 2040 unmanned strategy.

Defense Acquisition Program Administration

LIG Nex1



Short-range perceptive fusion with optical & RF sensors

Level 1 – Routine
Level 2 – Alert
Level 3 – Threat
Level 4 – Critical

Developed Integrated perceptive sensor PKG (Camera + short-range Radar + LiDAR)

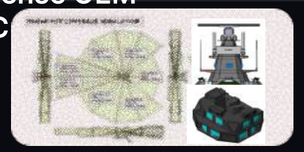
- **Integrated sensor (Short-range Radar / Camera) PKG**
- **DL ECU HW Design**
- **Heterogeneous Sensors Calibration** Technique
- **Ocean object detection Technique (Waves, vessel, Buoy)**

Supply after Contract 8 Months
Korean Defense OEM Integration Test 10 Months
Navy System Integration Test 18 Months
Delivered 2.5 years prior to integration

Secured 23 mil $ revenue pipeline until 2027 with 95 vessels

'24.12 2 Mil $ Launch & recovery USV contract ▸ '25.08 0.22 Mil $ Suicide USV PoC Contract ▸ '26.2[E] DAPA Proposal ▸▸▸ '27.04[E] Mine-hunting USV XX vessel contract ▸▸▸ '27.10[E] Suicide USV XX Contract ▸ Suicide & Mine-hunting USV & launch & recovery system

'24.03~06 Korean Defense OEM PoC ▸ '24.09 DAPA Proposal ▸▸▸ '24.12 DAPA Contract ▸▸▸ '26.01 0.7 Mil$ Reconnaissance USV PoC 3 vessels order ▸▸▸ '26.12[E] 5 Mil $ Reconnaissance USV XX vessels order ▸▸▸ '27.10[E] 17 Mil $ Reconnaissance USV XX vessels ▸ Reconnaissance USV vessels



'25.03 HD Hyundai PoC ▸▸▸ '25.06 DAPA Proposal ▸▸▸ '25.08 DAPA Contract ▸▸▸ '26.03 7.5 Mil $ Combat USV 2 Vessel order ▸▸▸ ▸▸▸ Combat USV

Defense Strategy

DEEP FUSION AI

Secured defense development contracts for the next five years from Korean Defense OEM and DAPA

2024 | 2025 | 2026 | 2027 | 2030

Reconnaissance USV - short-range perception system (Contract)

Design/ Algorithm Dev / Prototype	Parts Integration / System Integration / Algorithm Improvement	Dev Verification Test / Integrated validation Test	Operational Test support

Production

Autonomous Vessel Research Center Established (Completed)

Module Certificate (Korean Defense OEM)
Installed Internal Performance Test Equipment

Production Assembly line (Ready)

Export of remote command units for suicide USVs (Contract)

Production

Deployment of Short-Range Integrated Perception System for Combat USV(Contract)

Design/ Algorithm Dev / Prototype	Parts Integration / System Integration / Algorithm Improvement	Dev Verification Test / Integrated validation Test	Operational Test support

2025 | **Europe R&D** | 2027 | 2030

Export of Integrated Perception System for Combat USV (Advance R&D)

Production

Design/ Algorithm Dev / Prototype	Parts Integration / System Integration / Algorithm Improvement	Dev Verification Test / Integrated validation Test	Operational Test support

Additionally multiple advance R&D for short-range perception system

Defense R&D Pool

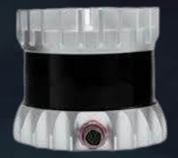
20 → 37 → 40 → 44 → 46 → 62

Vessel sector – Vessel Perception System with Korean Defense OEM ('27)

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

DFAI contribute to standardize Autonomous vessel perception systems

Existing vessel Perception system

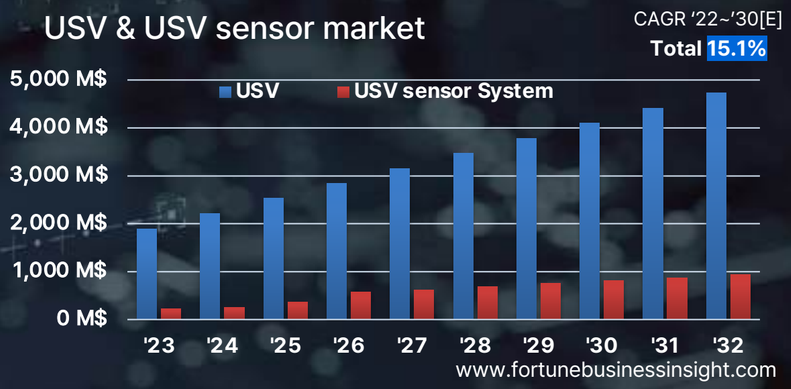


Long distance : GPS + AIS
Upto 10Km : X-band Ocean Radar
Short range : Camera + LiDAR

*AIS: Automatic Identification System

Autonomous rescue vessels sail even in extreme weather to save lives. In such conditions, LiDAR detection range significantly shortens.

USV Sensor market forecast



DFAI's Vessel Perception System

Long Distance : GPS + AIS
Upto 10Km : X-band Ocean Radar
Short range : **Thermal** Camera + Short-range Multi-radar

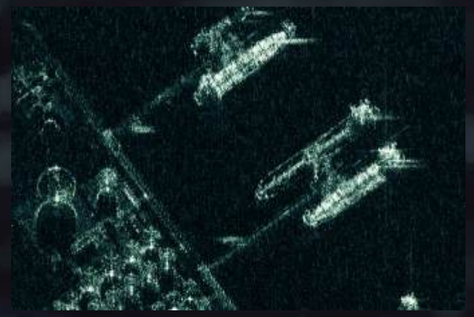
Commercialized short-range detection system for marine recovery.

Confirmed demand from Korean Defense OEM for next-generation small USVs.

Major Sales Target

- Oversea Defense/ Marine exhibition for Brand marketing
- Domestic large ship-builder Demo, POC

*. Selected for the 2025 Disruptive Tech 1000+ company in Marine Sector Program.
Conducting overseas marketing in collaboration with the Small Ship Research Institute.



Multi-radar unmanned recovery SLAM

Maritime Surveillance sector

DEEP FUSION AI

DFAI contribute to standardize short-range multi-radar wave detection systems globally.

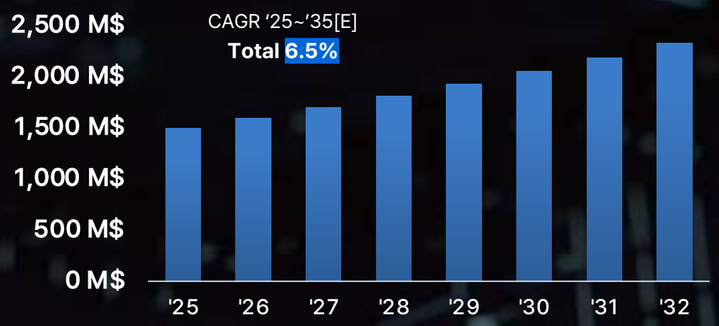
Low spec wave detection system

Sensor : Ultra sensor+ 3D radar
MAX range : 6m
Cost : 25K $
Purpose : weather forecast

High spec wave detection system

Sensor : LiDAR + Camera
MAX range : 120m
Cost : 300K $
Purpose : Berthing system

Ocean Wave sensor market



https://www.verifiedmarketreports.com/

DFAI's wave detection system is being commercialized.

Sensor : Short-range Multi-radar+ Thermal Camera
Cost : 25K $ (1 Sensor cost)
Max range : 400m

Autonomous wave avoidance system

Sea coast wave / rip current

Ocean structure wave analysis

Wave Detection for Docked Vessels

Sales targeted for 2027 following system integration

Wave detection System Development Result

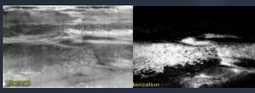
Time-series wave dataset Building

Short-range Wave dataset MOU

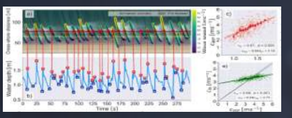
CiLab

Long-range Waves dataset MOU

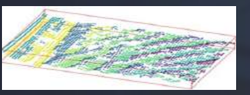
UST21



Thermal Camera Wave Dataset



Sensor Fusion based wide-wave measurement



4D Wave Data

DFAI Team

DEEP FUSION AI

Our founding members, who have extensive experience in deep learning productization and a strong business mindset, are always focused on mass production as their ultimate goal.

SungHun Yu

CEO

AD System Engineering Expert

M.S in Control Engineering, KyungHee Univ.
Ph.D course in System Eng, Ajou Univ.
E-intelligence CTO
- Global Marketing
- Vinfast ADAS 350 mil USD

KPIT (India) Solution Architect
- ADAS System concept / Logic Design

LG Electronics/ POSCO Researcher

25 Exp.

SeongEun Kang

CTO

Sensor Fusion and Deep Learning Specialist

B.S in Computer Engineering , POSTECH
E-intelligence Solution Architect,
Perceptive Sensor Fusion,
Vision/Lidar Deep Learning
Bluebird Lead Engineer, Vision Deep Learning, Sensor Fusion

22 Exp.

DongHo Ham

COO

ADAS Application specialist

B.S in Control & Instrumentation, Halla Univ
E-intelligence Solution Architect,
ROS2 AD Platform, 4D App Design
Bluebird Lead Engineer,
Lidar Deep learning, ROS App Design

21 Exp.

KyuJin Lee

CSO

Global Strategic Biz Dev.

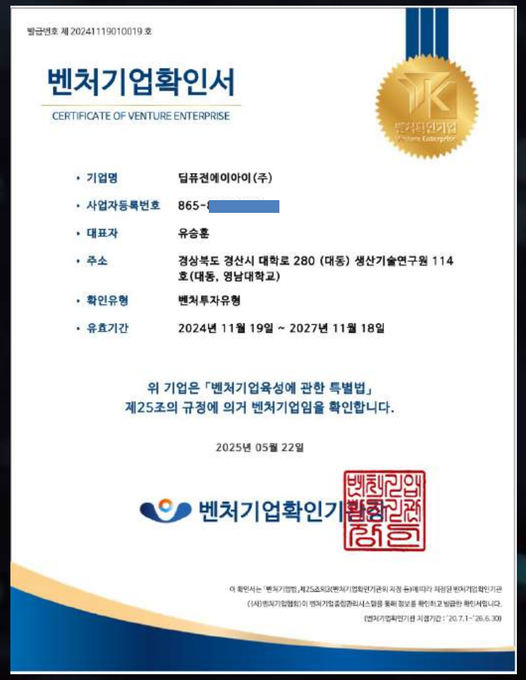
M.B.A in Business Administration, Ajou Univ.
Ph.D Marketing, Korea Transportation Univ.
KPIT Korea Country Director
- Hyundai Motor Group – Strategic Account Director

20 Exp.

Various Certifications

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

Our credibility is validated through certifications from government and industry authorities.



Certificate of
Venture Enterprise

Certificate of
Small-medium-sized
Enterprise

Certificate of
Autonomous Driving
Research Institute

Certificate of
Autonomous Ship
Research Institute

Deep-Fusion AI moves forward, while others hesitate.

Tech Leadership:

- Developed advanced 4D radar sensor fusion with 192ch virtual profile
- Built breakthrough deep learning model for 4D radar perception
- Delivered high-accuracy 4D radar SLAM
- Co-developing applications with leading global 4D radar companies
- Short-range perception system for USVs
- Fire Agency Short-range detection system for combat USVs
- Short-range detection system for Combat USVs– jointly developed with Korean Defense OEM

DEEP FUSION AI
PERCEPTIVE SENSOR FUSION

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