TANGO

스마트선박 신경망 적용기술

성 명 한정욱(CTO) 소 속 (주)에이브노틱스

SUBJECT

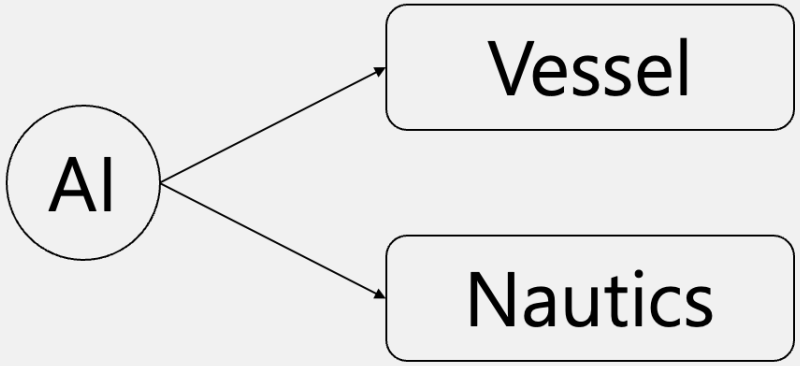
인공지능 기술의 대중화 (AI Democratization)를 위한

TANGO 커뮤니티 3회 컨퍼런스

주관 ETRI 한국전자통신연구원 (TANGO) 주최 과학기술정보통신부 IITP 정보통신기획평가원

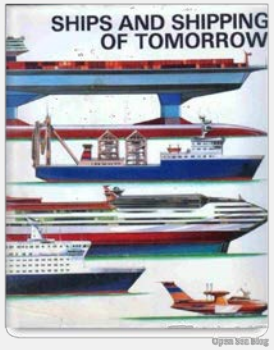
후원 Line lablup weda tesla system (사)한국인공지능협회 SNUH 서울대학교병원 고려대학교 KOREA UNIVERSITY 홍익대학교 HONGIK UNIVERSITY CAU 중앙대학교

AI.V.Nautics Corp.



History of Autonomous Cars

In GM's 1939 exhibit, Norman Bel Geddes created the first self-driving car, which was an electric vehicle guided by radio-controlled electromagnetic fields generated with magnetized metal spikes embedded in the roadway. By 1958, General Motors had made this concept a reality. The car's front end was embedded with sensors called pick-up coils that could detect the current flowing through a wire embedded in the road. The current could be manipulated to tell the vehicle to move the steering wheel left or right.



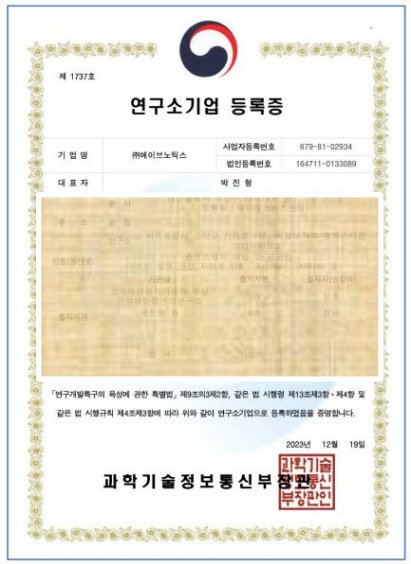
JANUARY 1, 1970 – JANUARY 1, 1980

FIRST CONCEPT

The concept of autonomous ships was first introduced during 1970's in the Rolf Schonknecht's book "Ships and Shipping of Tomorrow" where mentioned that in future the Captains will perform their duties from an onshore office building and the vessels will be navigated with the use of computers.

"the art of navigation"

- 설립일: 2023년 2월20일
- 선박해양플랜트연구소 기술출자
- 과학기술정보통신부 제1737호 연구소기업 등록 (관리기관: 선박해양플랜트연구소)
- 본사: 대전광역시 유성구 유성대로 1689번길 70 (KT대덕2연구센터)
- 연구소: AI 허브 양재 (하이브랜드 1206호)
- DMC (Digital Maritime Consultancy ApS): Frederiksborggade 5, 1360 København K, Denmark
- 인력 현황 (박사: 6*명, 석사: 2명, 학사(재학 포함): 10명, 전문학사 1명) *CTA 및 DMC 포함


제 1737호

연구소기업 등록증

기 업 명	㈜에이브노틱스	사업자등록번호	679-81-02934
		법인등록번호	164711-0133089
대 표 자	박 진 형		

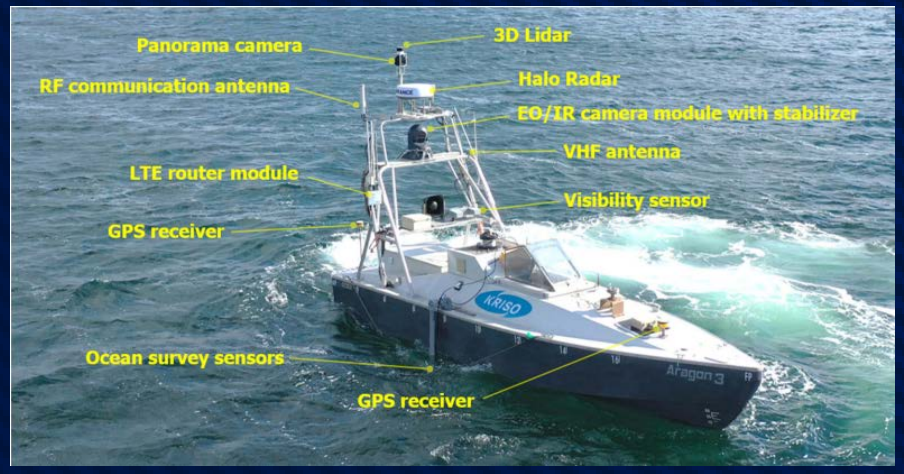
「연구개발특구의 육성에 관한 특별법」 제9조의3제2항, 같은 법 시행령 제13조제3항 · 제4항 및 같은 법 시행규칙 제4조제3항에 따라 위와 같이 연구소기업으로 등록하였음을 증명합니다.

2023년 12월 19일

과학기술정보통신부장관 과학기술정보통신부 장관인

<한국형 e-Navigation>

<KRISO 아라곤 무인선>



한국형 e-Navigation 개발 및 구축 사업
(해양수산부 : 1,100억원)

자율협력형 무인선 기술 개발
(과기정통부 : 22억원)

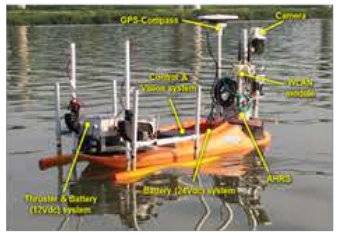
연안 해상교통 환경에서의 무인선
자율운항 기술 고도화
(선박해양플랜트연구소 : 6억원)

MAIDaS
(Maritime AI & Data Science)
(선박해양플랜트연구소 : 100억원)

AIVN
Innovating Navigation

Safer Navigation

Greener Navigation



2011 Sep.

Developments of various types of USV platforms and their autonomous navigation algorithms @ KAIST

2014 Oct.

RobotX Challenge 2nd place (1st MIT) @ KAIST

2019 June

Development of full-scale USV platforms and field demonstrations @ KAIST-KRISO

2021 Oct.

Demonstration of a fully-unmanned surface vehicle in complex coastal areas @ KRISO

2022 Oct.

Development of USV for autonomous cooperation @ KRISO

2023 Feb.

Begin the development of MANAS @ AIVN

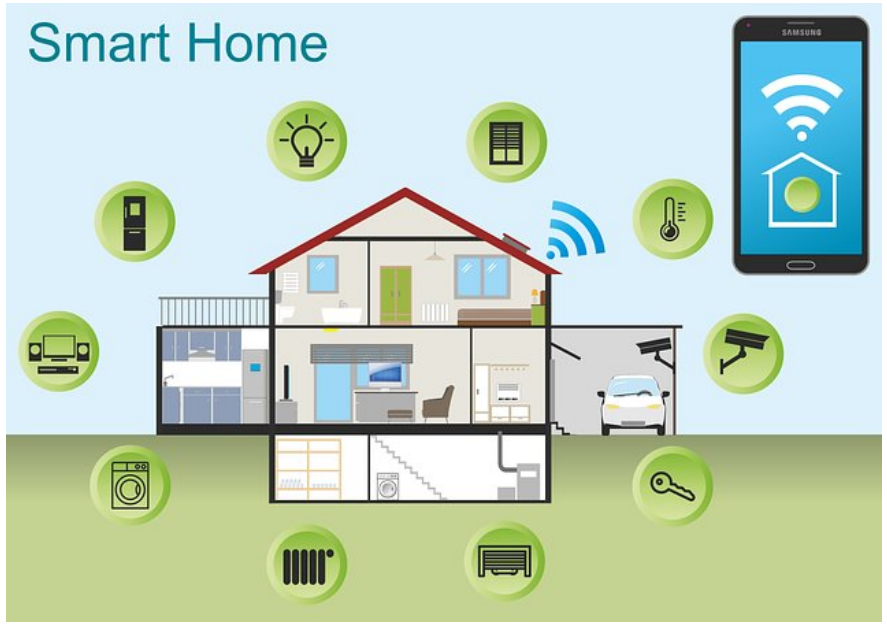
목 차

1. 스마트 선박 (smart ship)

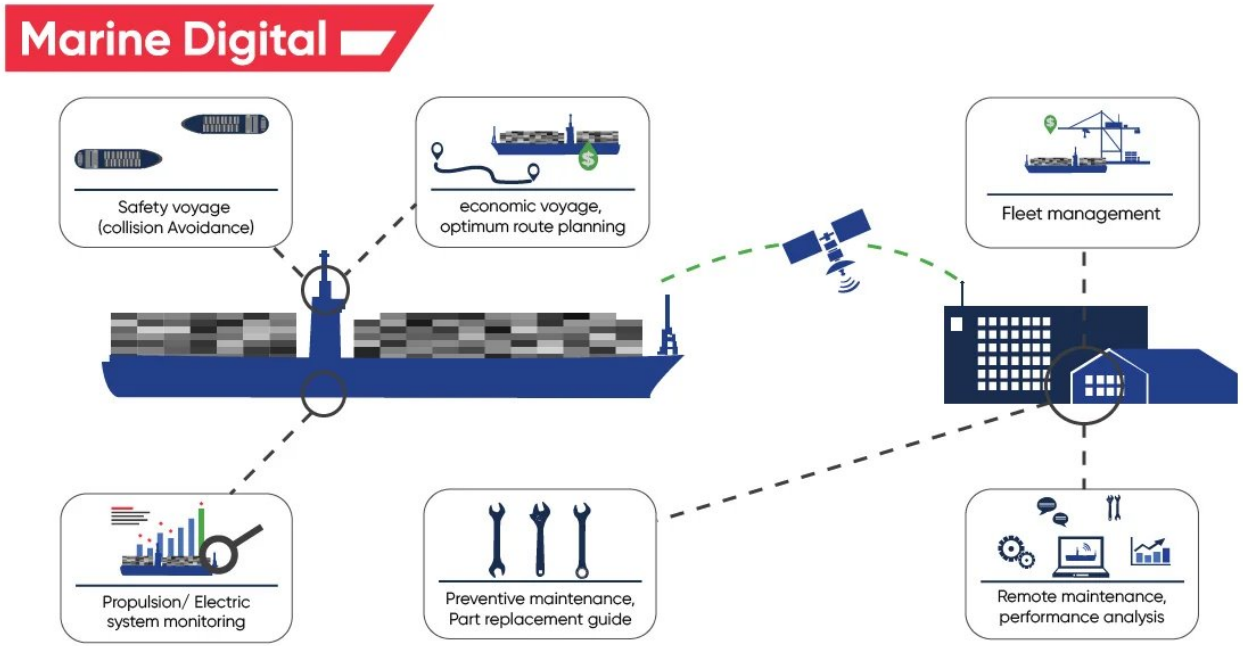
Context of “SMART”

- Connect to the internet or other devices.
- React to events.
- Send and/or receive data and commands.

출처: https://www.hattelandtechnology.com/blog/what-is-a-smart-ship



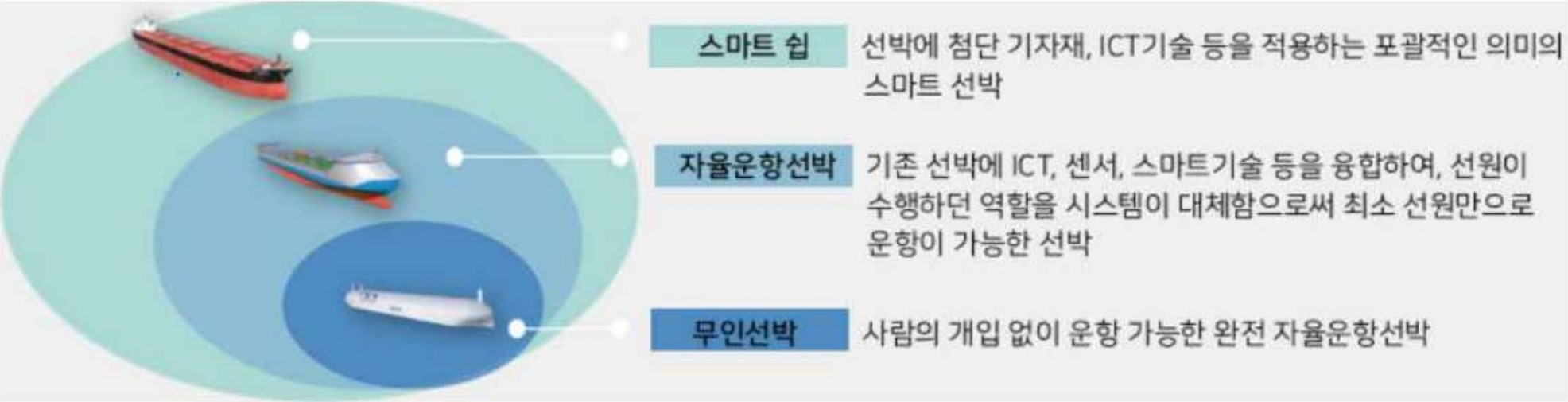
출처: https://carbontrack.com.au/blog/future-smart-homes-functional-feature-integration/



출처: https://marine-digital.com/article_smartship

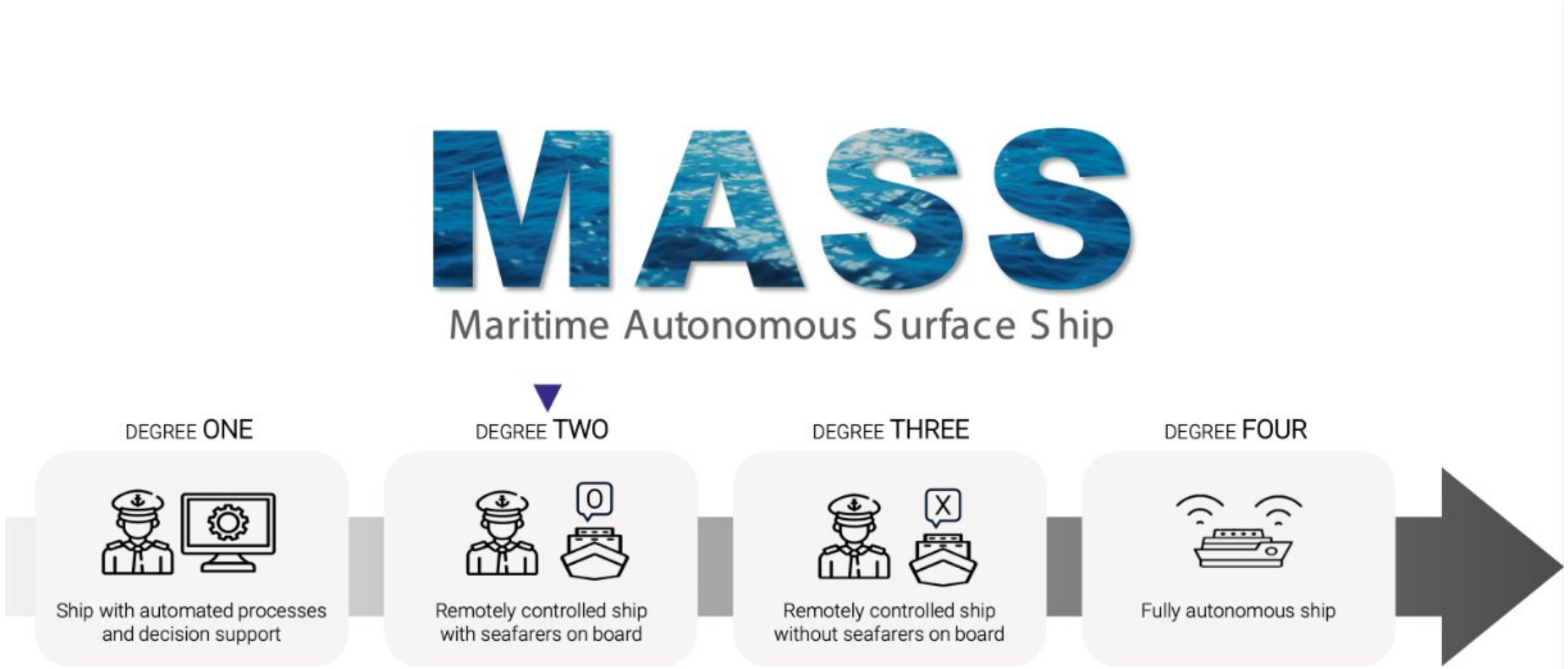
스마트 선박

"첨단 기자재, ICT 기술이 적용된 포괄적인 의미의 선박"



출처: 한국과학기술기획평가원(2019.12), "자율운항선박 기술개발사업 2019년도 예비타당성조사 보고서"

MASS (Maritime Autonomous Surface Ship)



출처: Avikus, IALA Workshop on MASS, 2023

1. 스마트 선박 (smart ship)

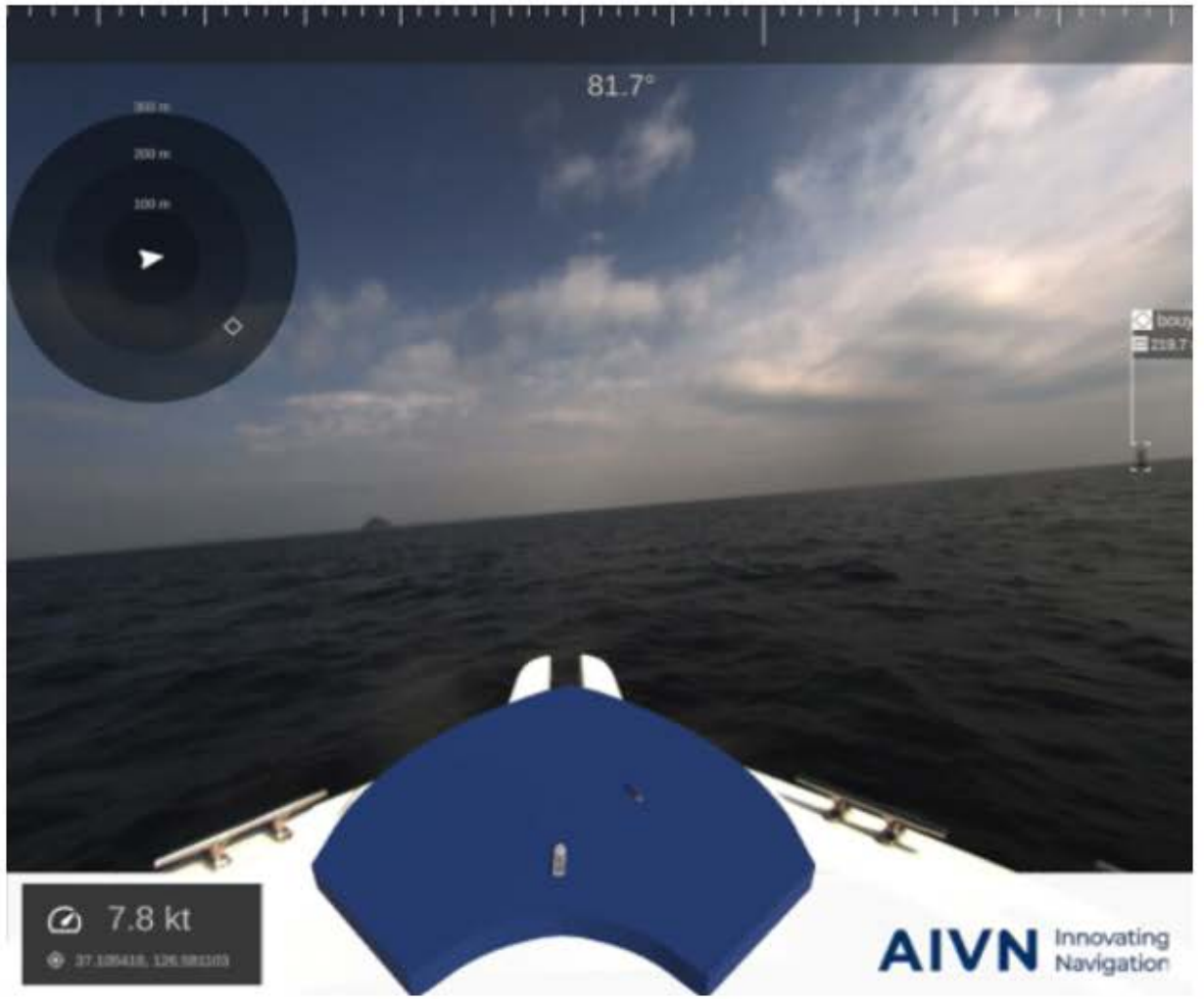
MASS: 상선(대형 여객선, 대형 화물선) 중심

출처: https://www.maritimekr.com/2020/03/16/maritime-insight-25/

출처: 현대 AVIKUS

1. 스마트 선박 (smart ship)

MANAS (Maritime Autonomous Navigation Assistance System)

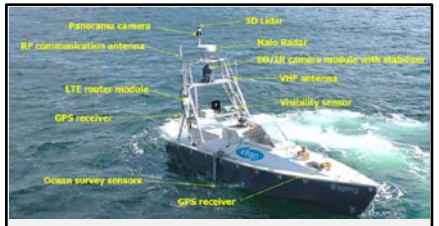


2. 스마트선박과 신경망

자율운항 (Autonomous Navigation)

Autonomous Navigation System (ANS)

platform

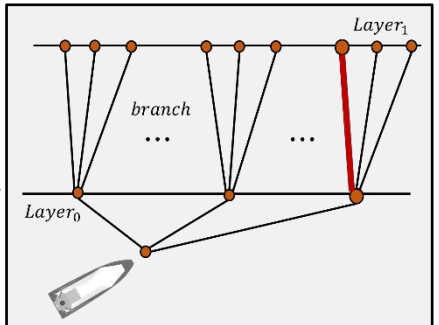


radar, lidar, EO camera, IR camera, GPS, IMU, Gyro, AIS and etc.

situational awareness

digital understandings on world of surrounding environments with AI

planning



deciding a sequence of actions

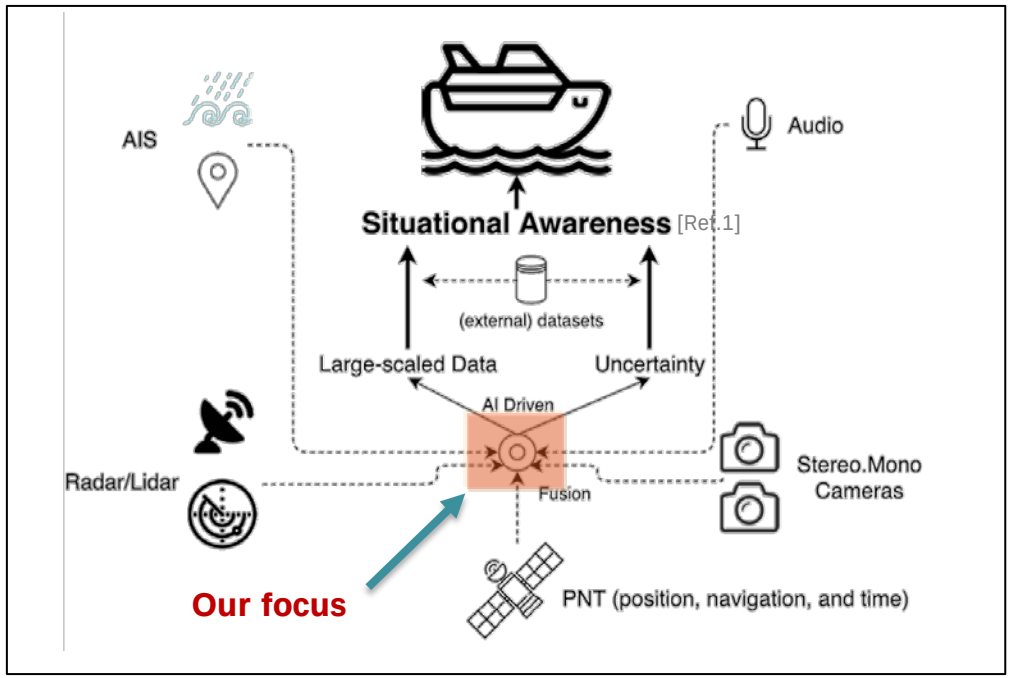
action

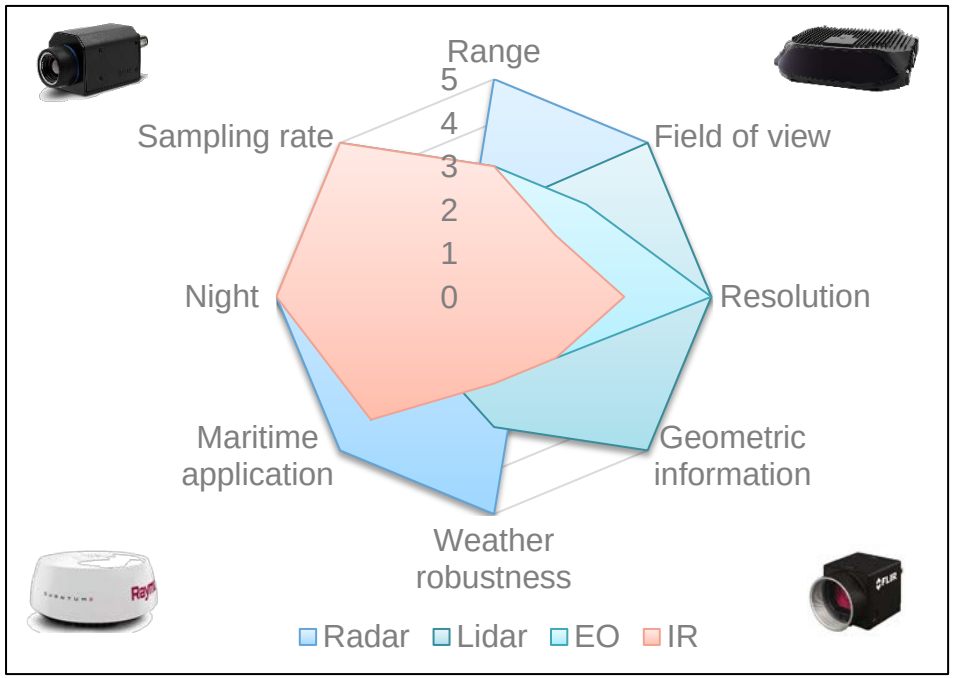
performing the planned actions

Key component for real-world application of ANS

2. 스마트선박과 신경망

상황인식 (Situational Awareness)

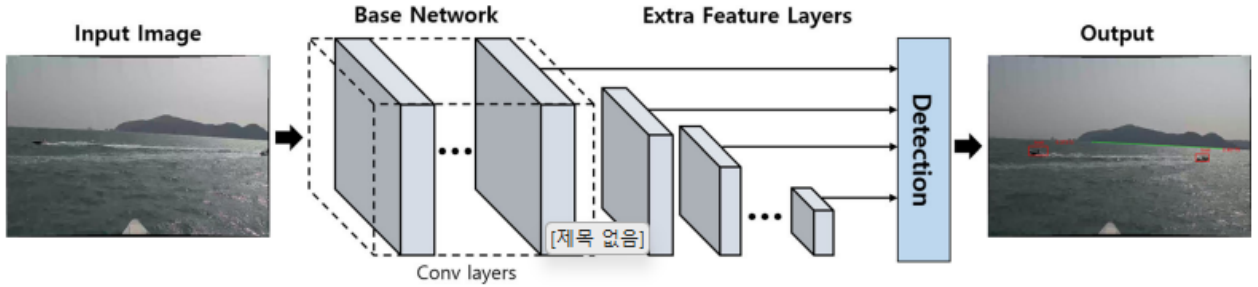




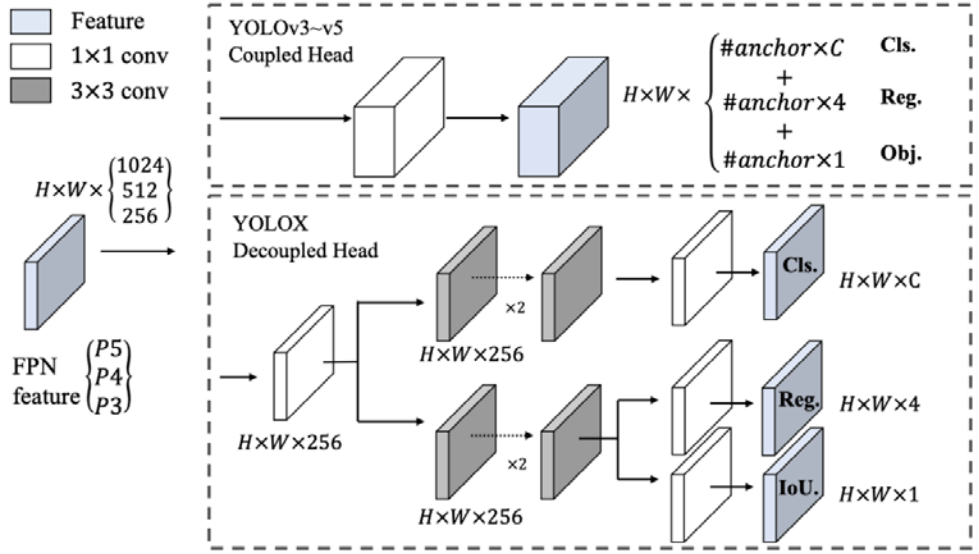
출처: Thombre, S, et al., “Sensors and AI techniques for situational awareness in autonomous ships: A review”, IEEE transactions on intelligent transportation systems, 23(1), 64-83, 2020.

2. 스마트선박과 신경망

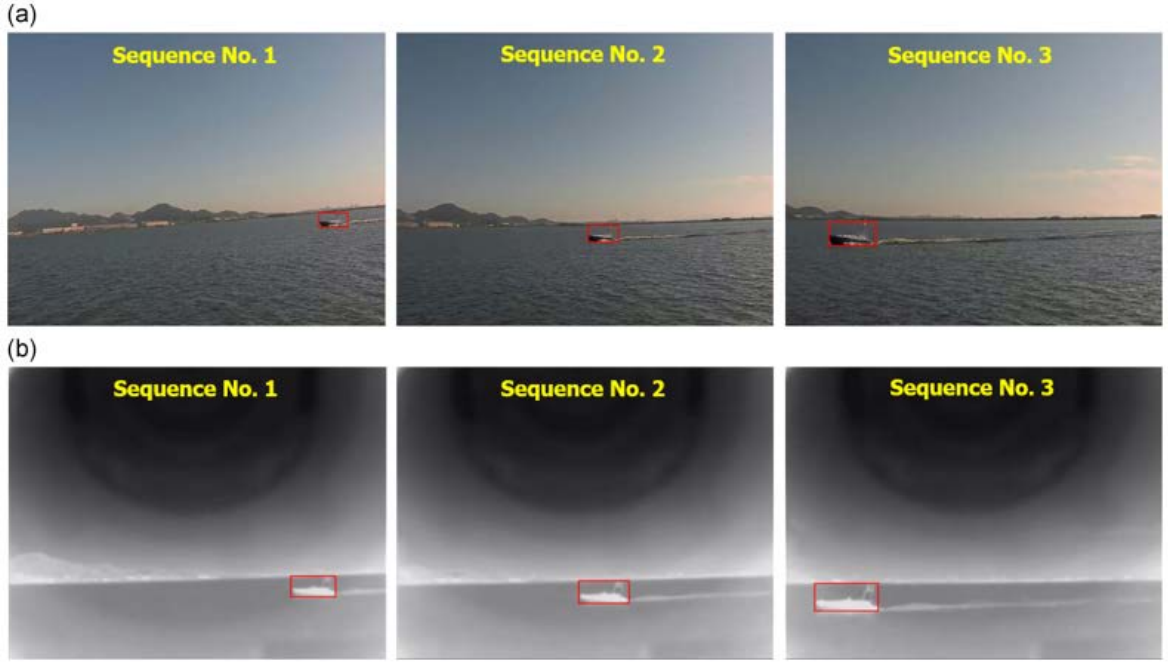
상황인식 (Situational Awareness)



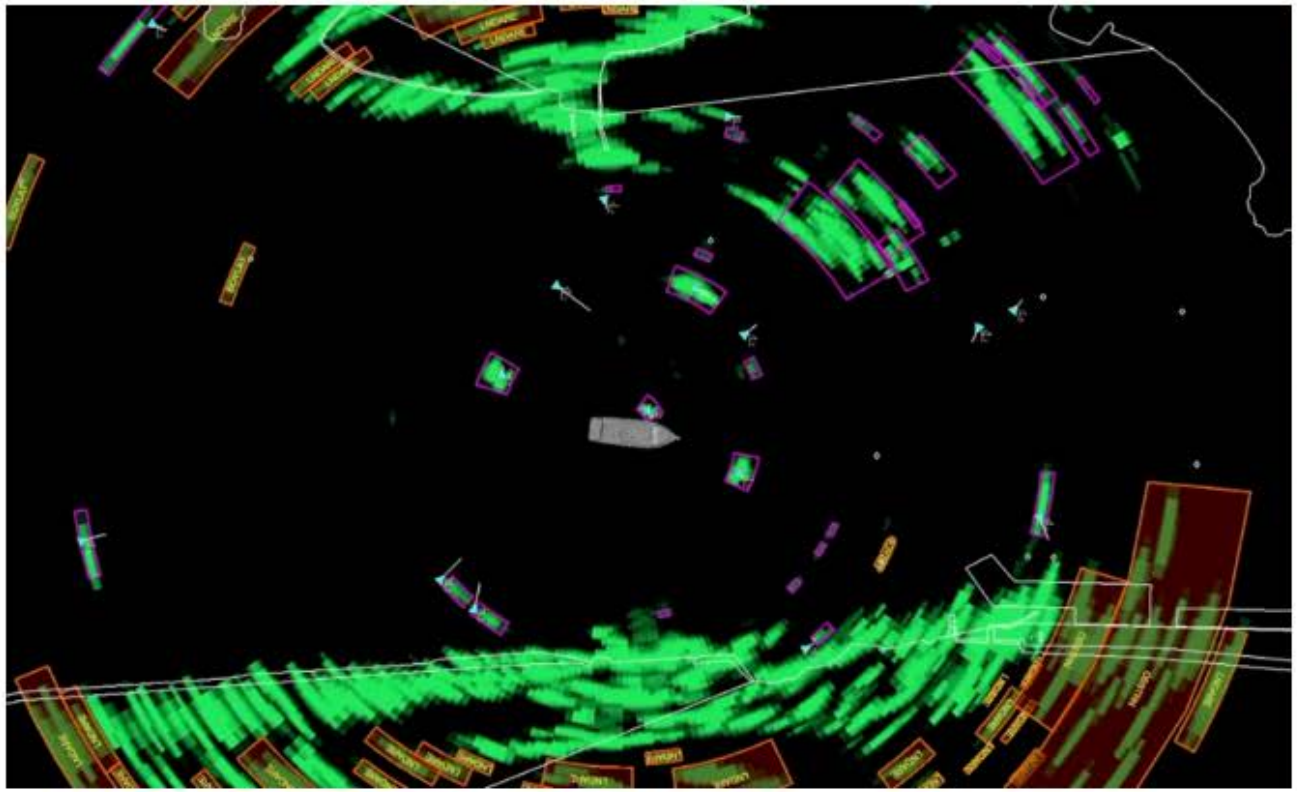
출처: J. Han, Y. Cho, J. Kim, J. Kim, N. Son, and S. Y. Kim, “Autonomous collision detection and avoidance for ARAGON USV: Development and field tests,” J. Field Robot., vol. 37, no. 6, pp. 987–1002, Sep. 2020.



출처: YOLOX: Exceeding YOLO Series in 2021



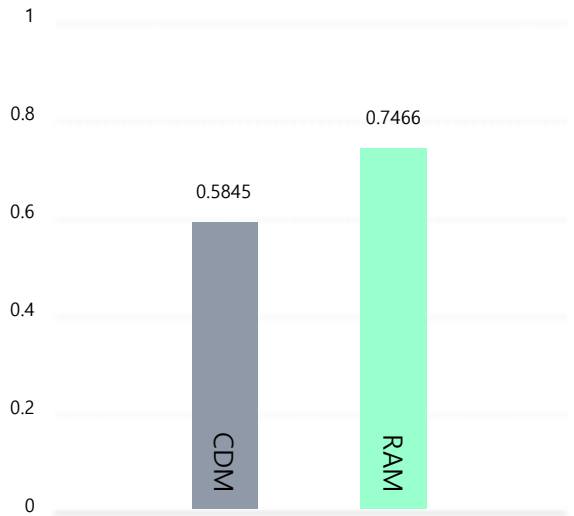
이기종 센서융합



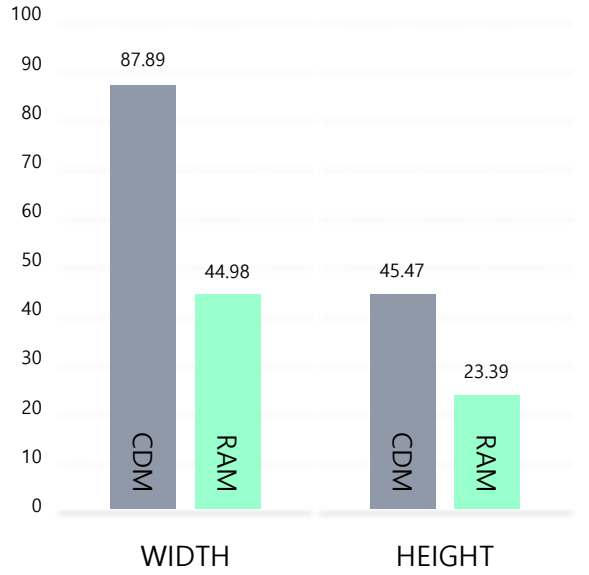

(#001032) ROS time : 102252.98 [hhmmss.ss] / Roll: -0.0 deg., Pitch: 3.0 deg., Yaw: 77.1 deg., Spd: 12.0 m/s

레이다-카메라 융합기반 객체 인식

“이미지 데이터 활용 신경망 기반 센서 융합”



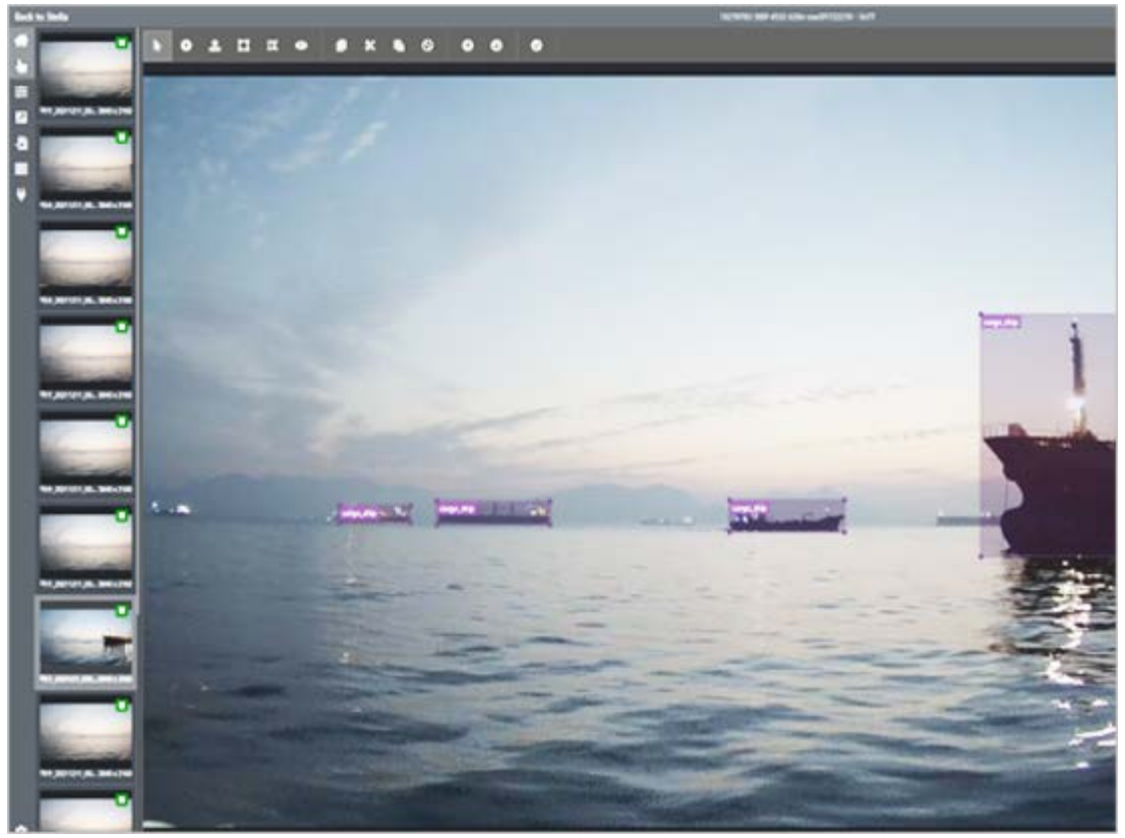
영상 내 객체 검출 성능 27.7%



영상 내 탐지된 객체 평균 거리 104%

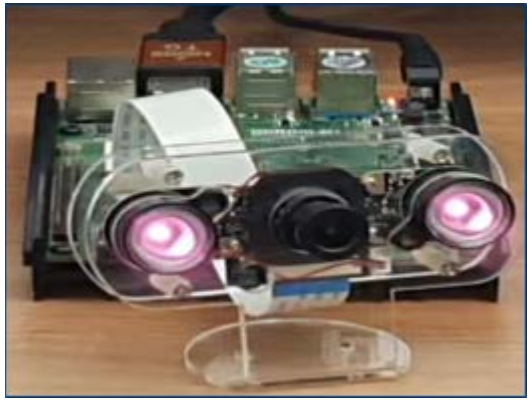
3. 신경망 적용 기술

MLOps



출처: 박진형 외, “스마트 해양안전 및 기업 지원을 위한 오픈플랫폼 기술 개발” 2차년도 연차실적 보고서, 선박해양플랜트연구소, 2022

On-device Deployment



출처: 조창식 외, TANGO 프로젝트 결과 소개 자료, ETRI, 2023

TANGO

감사합니다.

주관 ETRI 한국전자통신연구원 (TANGO) 주최 과학기술정보통신부 IITP 정보통신기획평가원

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