AUTONOMOUS SURVEILLANCE ROBOT

자율 순찰 로봇

4조 A.S.R 팀

팀원 : 김경진, 김민서, 이은창, 한정탁

멘토 : 이성민(LG전자), 문새마로(TmaxSoft)

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3. ARCHITECTURE
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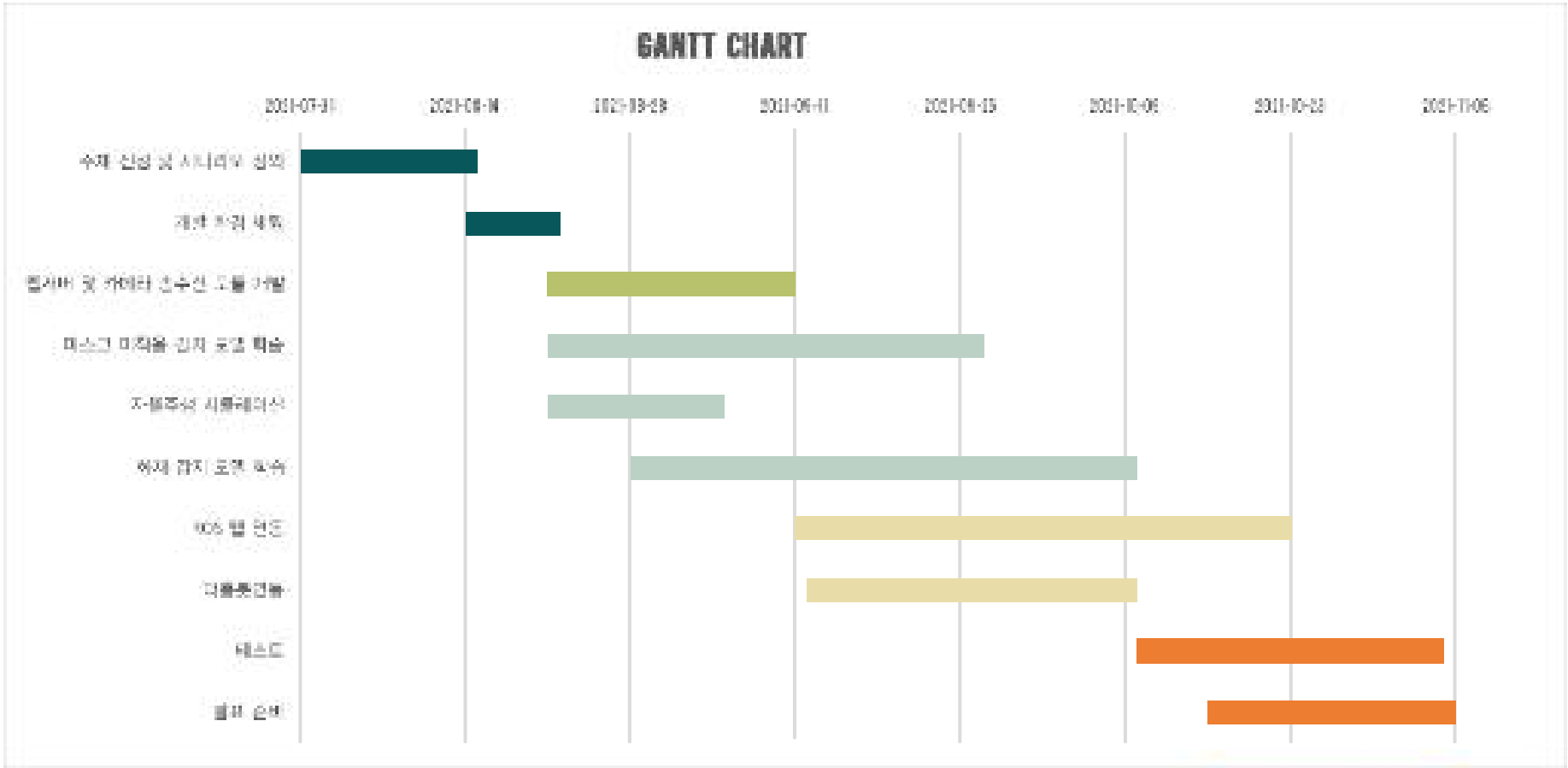

GANTT CHART

AI Vision

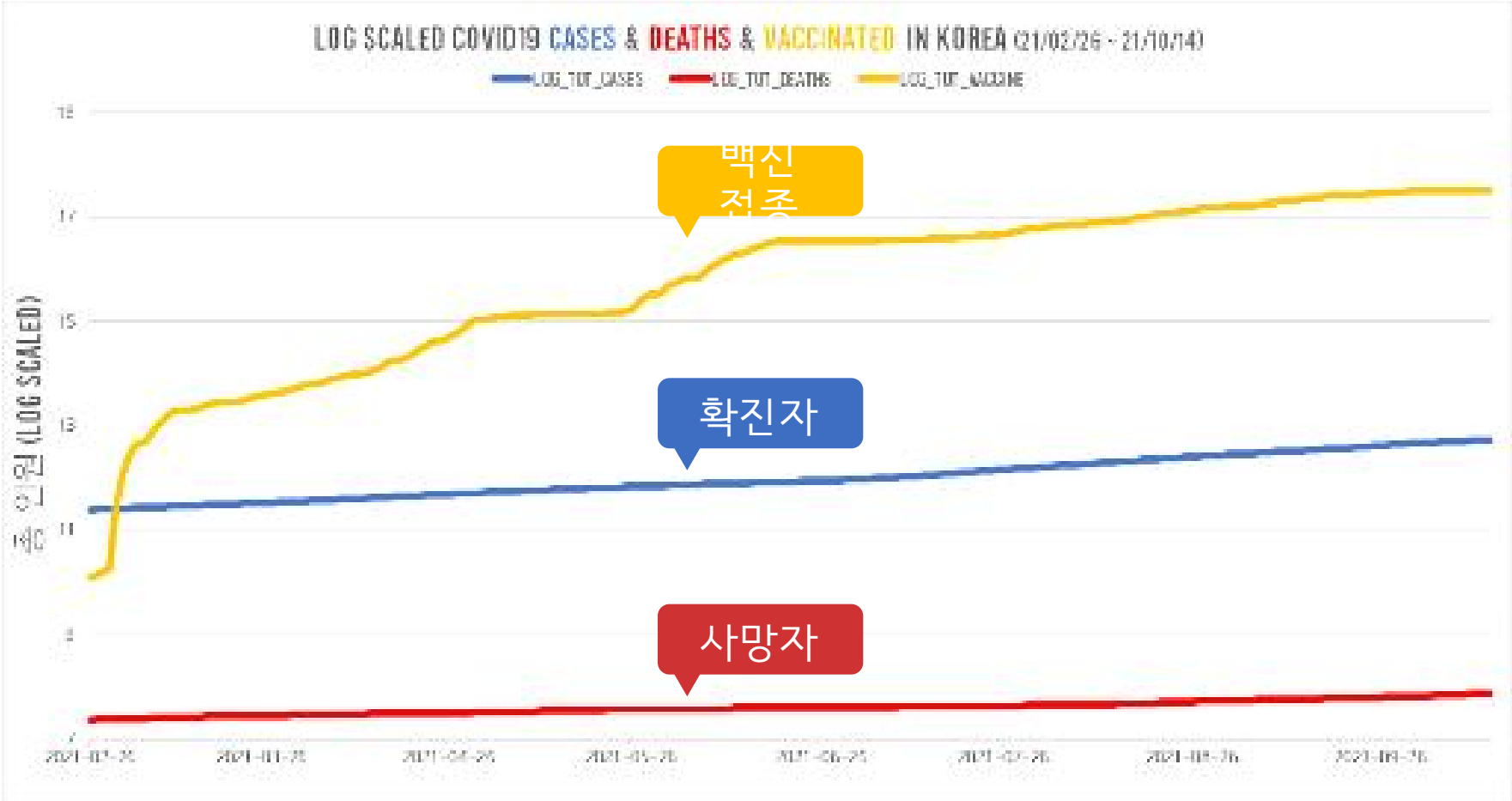
+

Robot

⇒

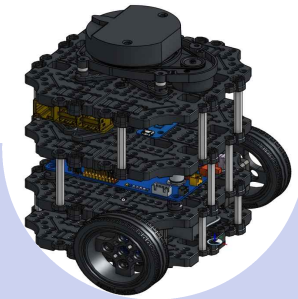
WEB Service

Why WE NEED robot? WHAT WE WANT TO DETECT?


LOG SCALED COVID19 CASES & DEATHS & VACCINATED IN KOREA (21/02/26 ~ 21/10/14)
LOG_TOT_CASES
LOG_TOT_DEATHS
LOG_TOT_VACCINE
인원 (LOG SCALED)
백신 접종
확진자
사망자

What we made
On our project

AI MODEL



AUTONOMOUS ROBOT

Mask DETECT

FIRE DETECT

Web service

ROS based
SLAM & NAVIGATION
autonomous driving using
TURTLEBOT3 BURGER

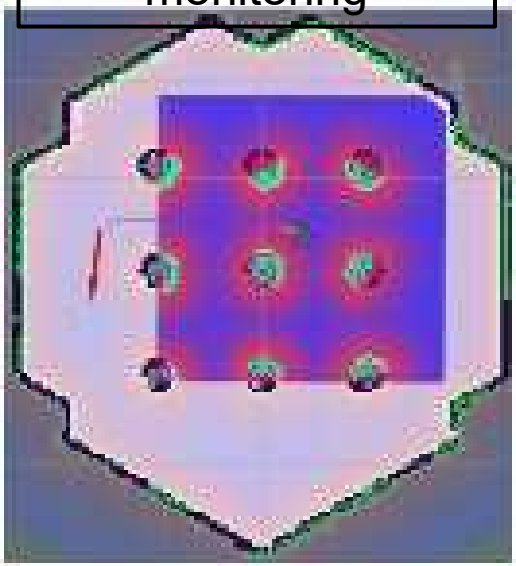
Deep learning ai model
Real-time object detection

Monitoring & Control
On web

On our web page

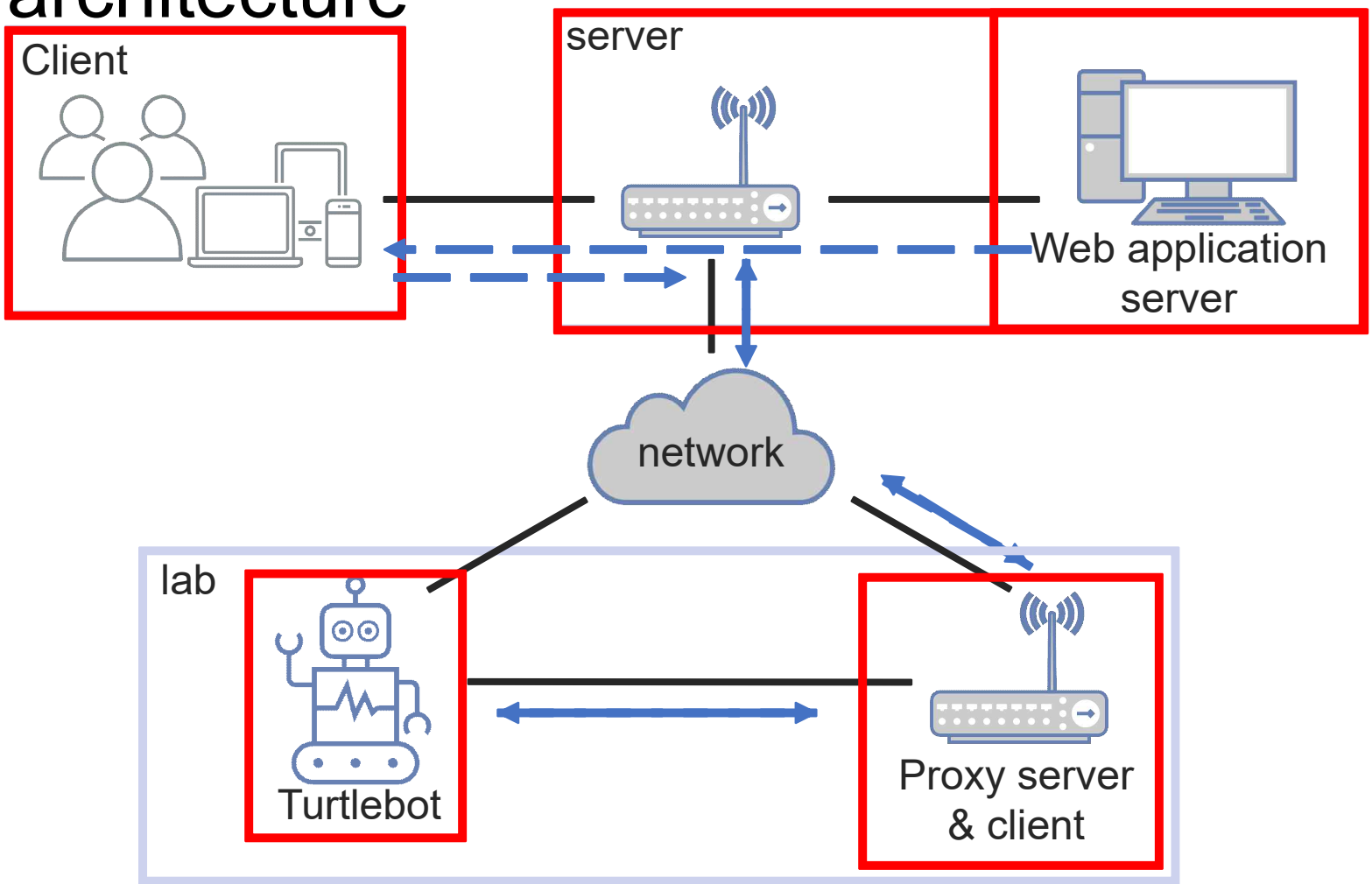
Robot controller

NAVigation monitoring



Camera video & detection monitoring

System architecture

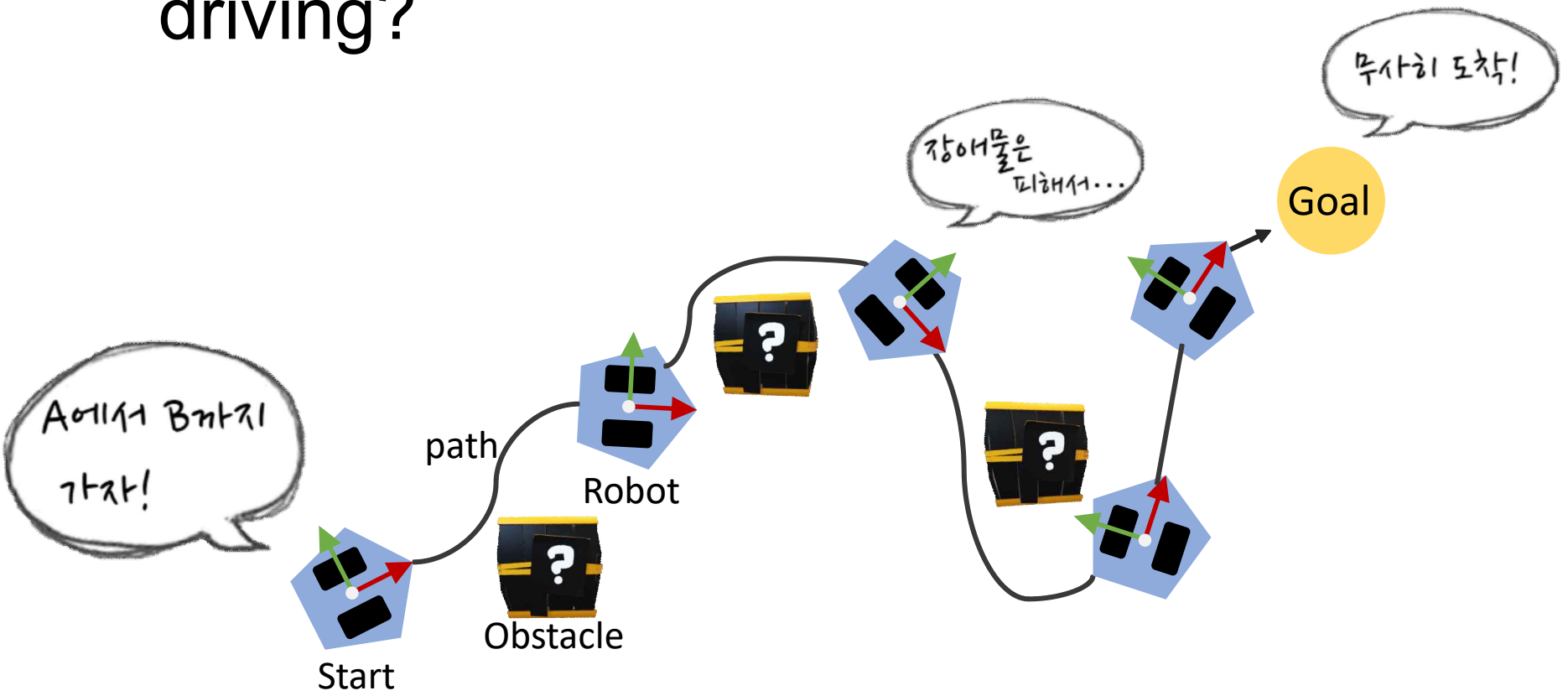


Technologies

3 main technologies we used

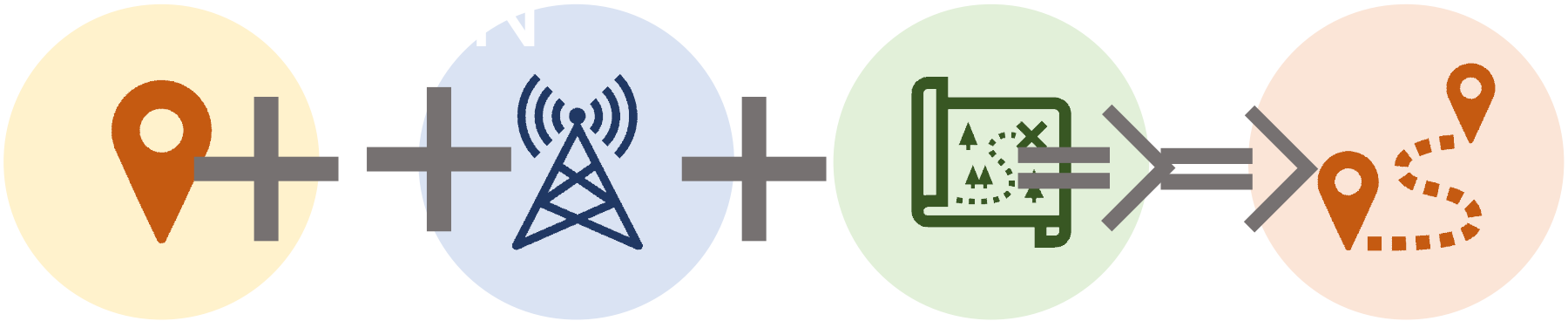
자율 주행	Slam & Navigation
통신	ros
영상 인식	Yolo

Autonomous driving?



Autonomous driving?

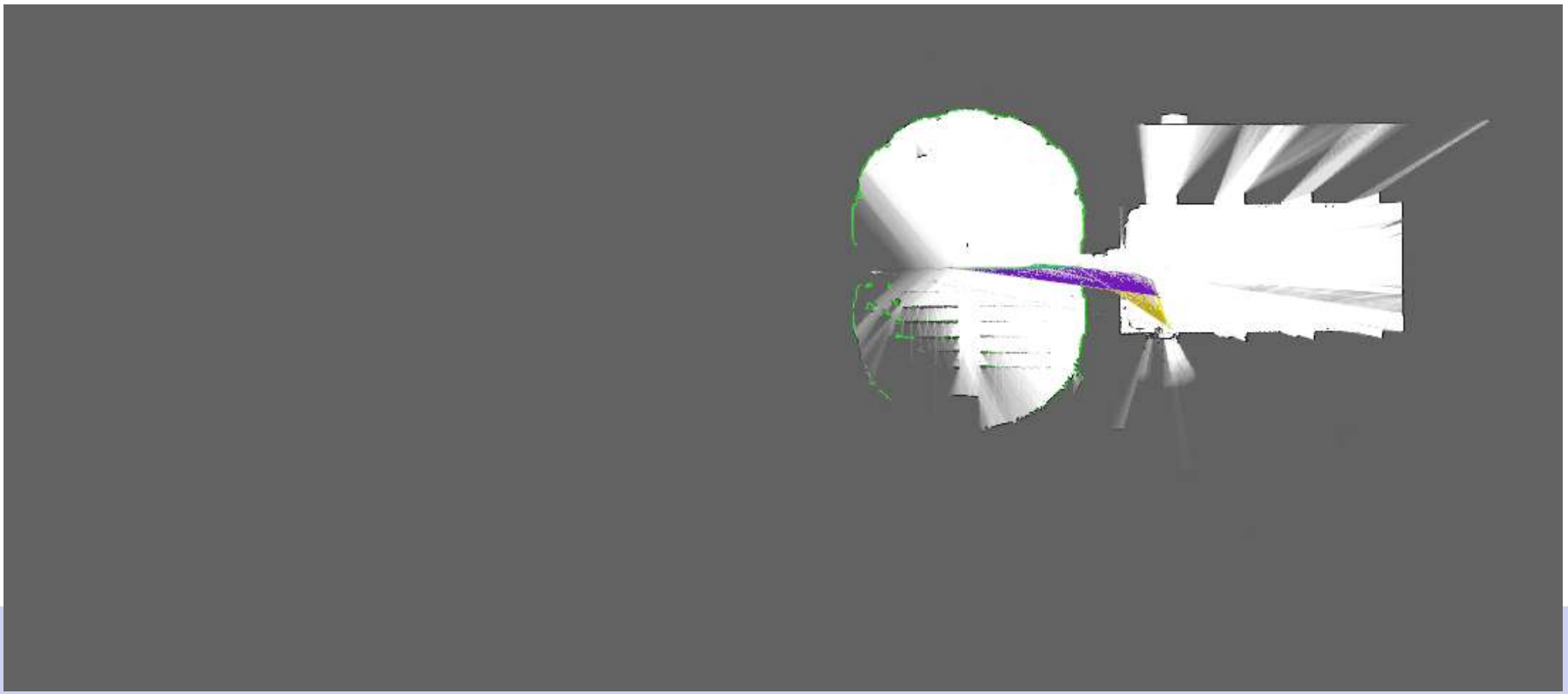
NAVIGATIO



위치 센싱 지도 경로

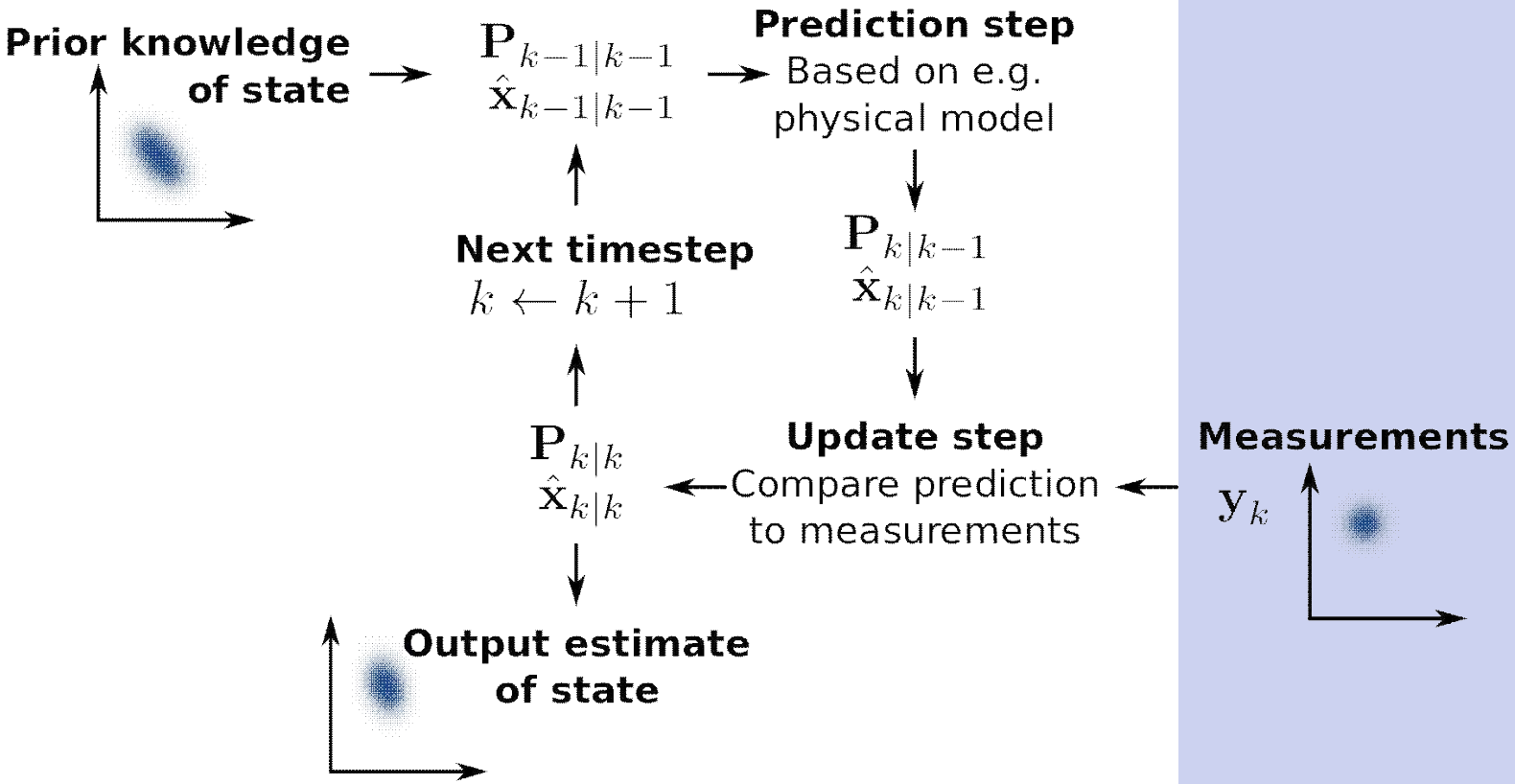
Simultaneous localization and mapping

동시적 위치추정 및 지도작성 & navigation



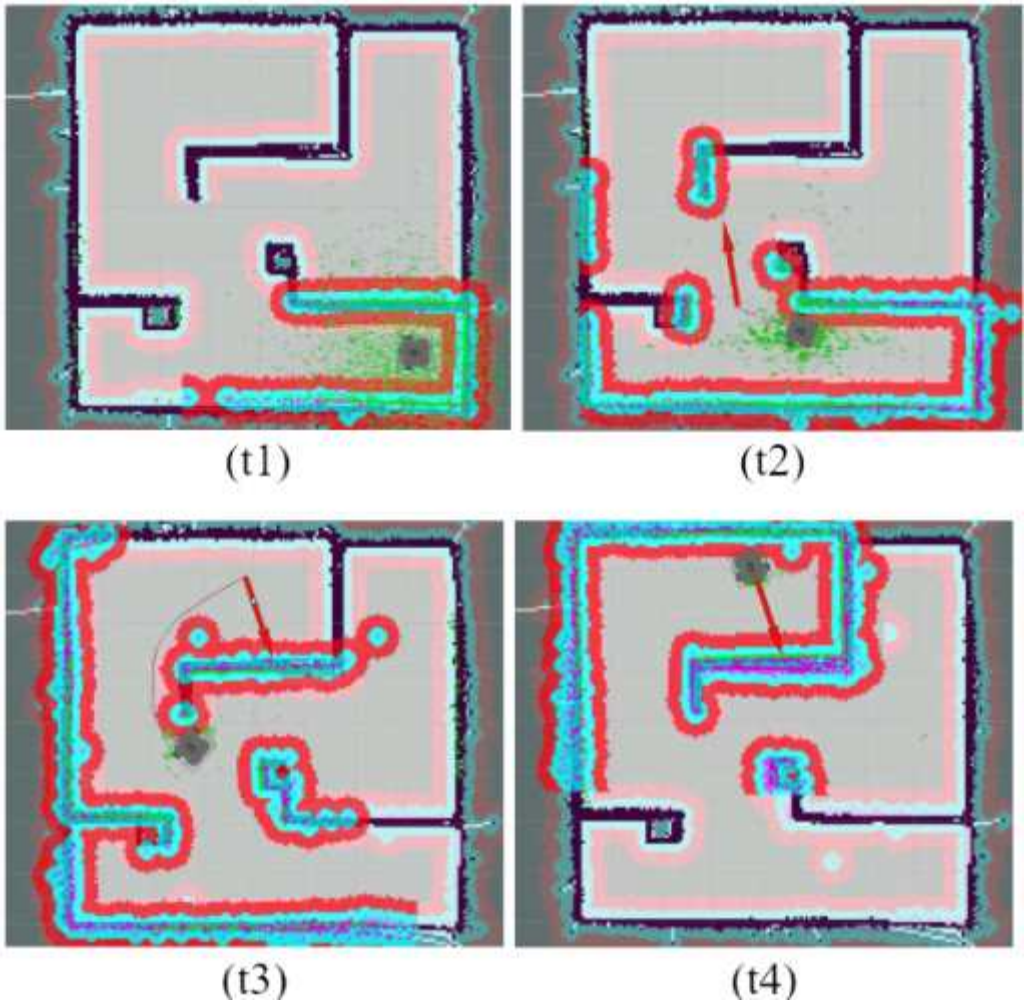
Simultaneous localization and mapping

Kalman Filter & navigation

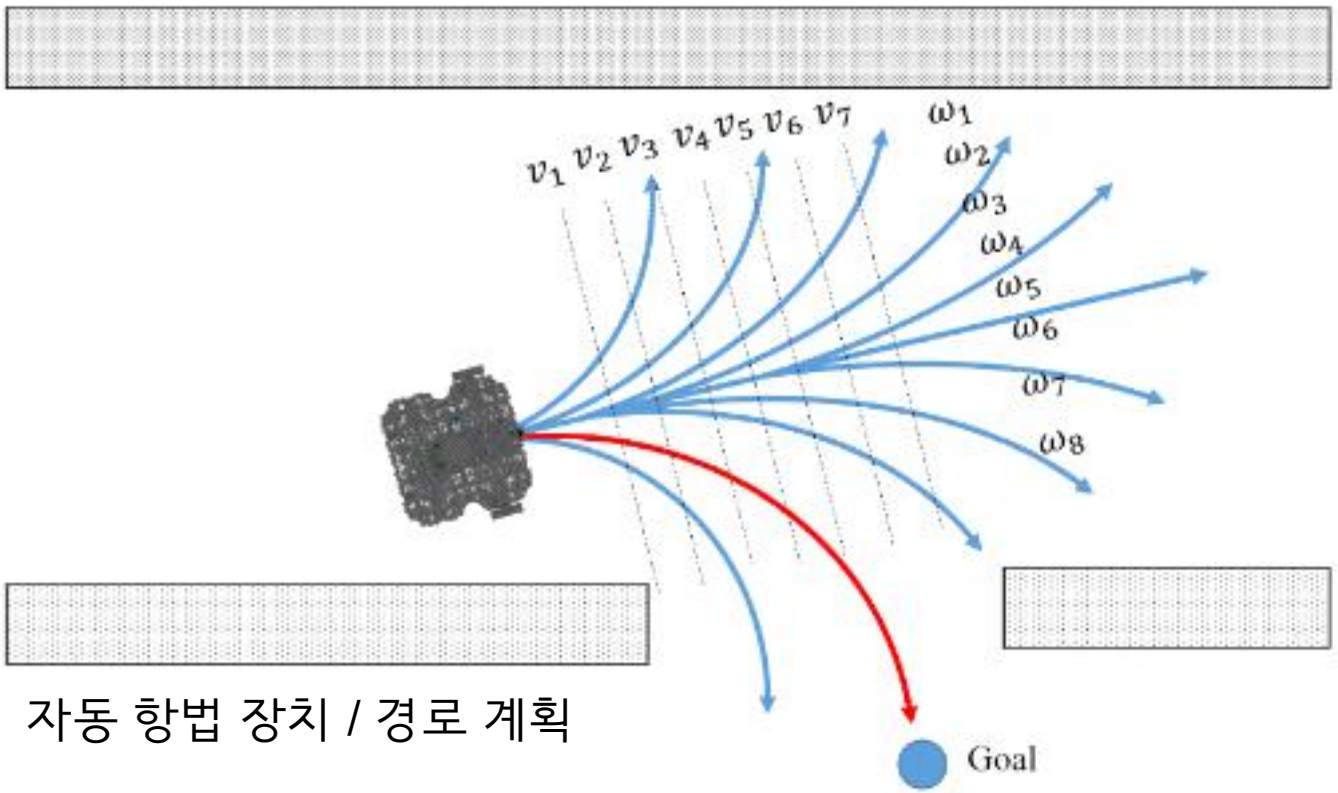


Simultaneous Localization and Mapping & navi

Particle Filter
&
Monte Carlo
Localization



Simultaneous localization and mapping & navigation



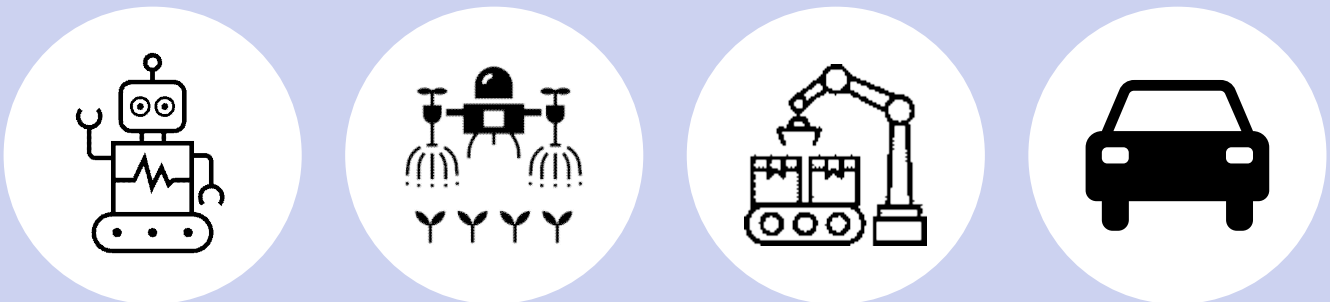
자동 항법 장치 / 경로 계획

Dynamic Window approach

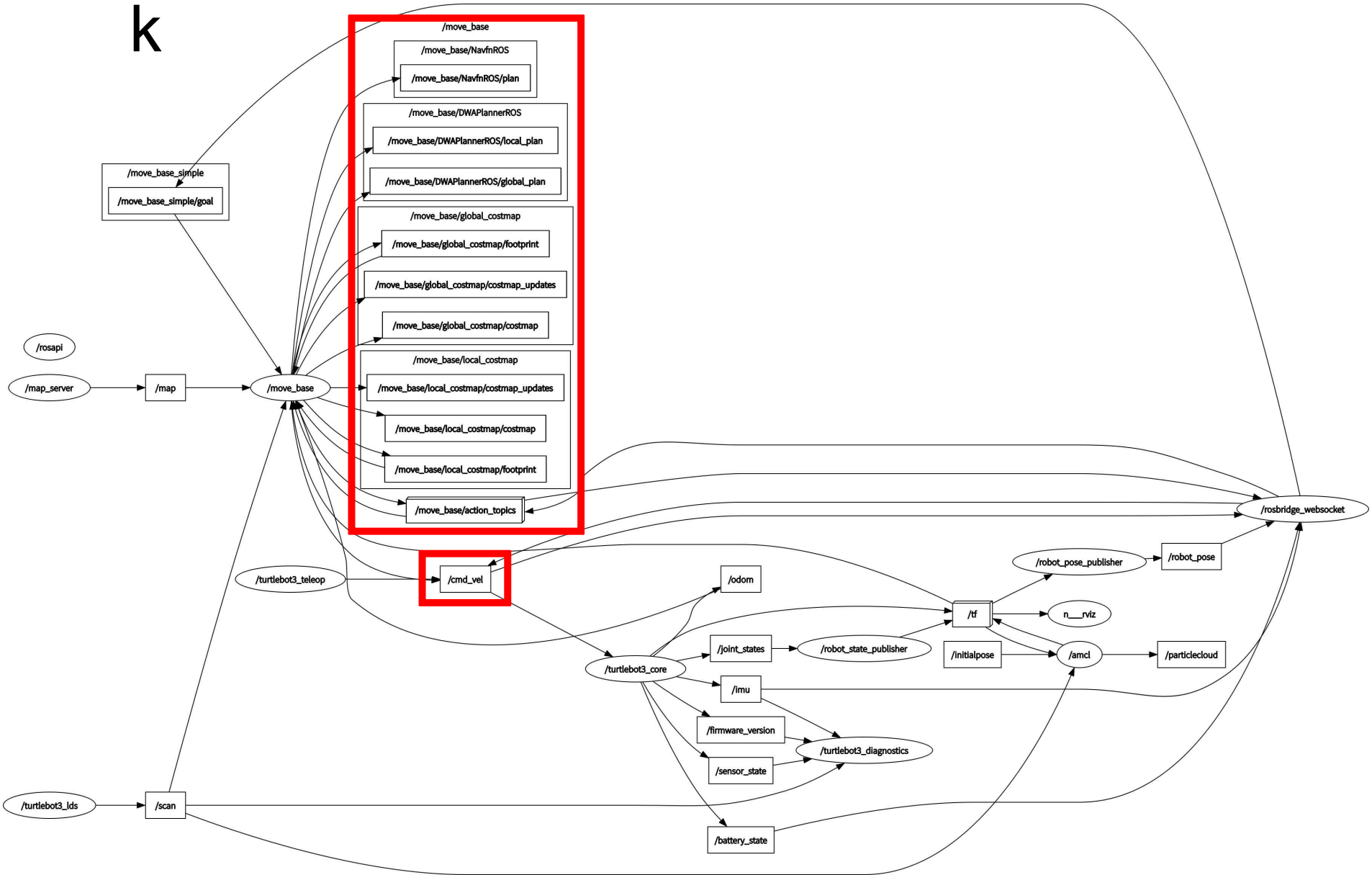
network

ROS (Robot operating system)

로봇 개발에서 사용하는
TCP 기반의 통신
미들웨어



network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/move_base/NavfnROS
/move_base/NavfnROS/plan
/move_base/DWAPlannerROS
/move_base/DWAPlannerROS/local_plan
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/move_base/global_costmap
/move_base/global_costmap/footprint
/move_base/global_costmap/costmap_updates
/move_base/global_costmap/costmap
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/move_base_simple/goal
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/rosbridge_websocket
/turtlebot3_teleop
/cmd_vel
/odom
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/tf
n__rviz
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/scan
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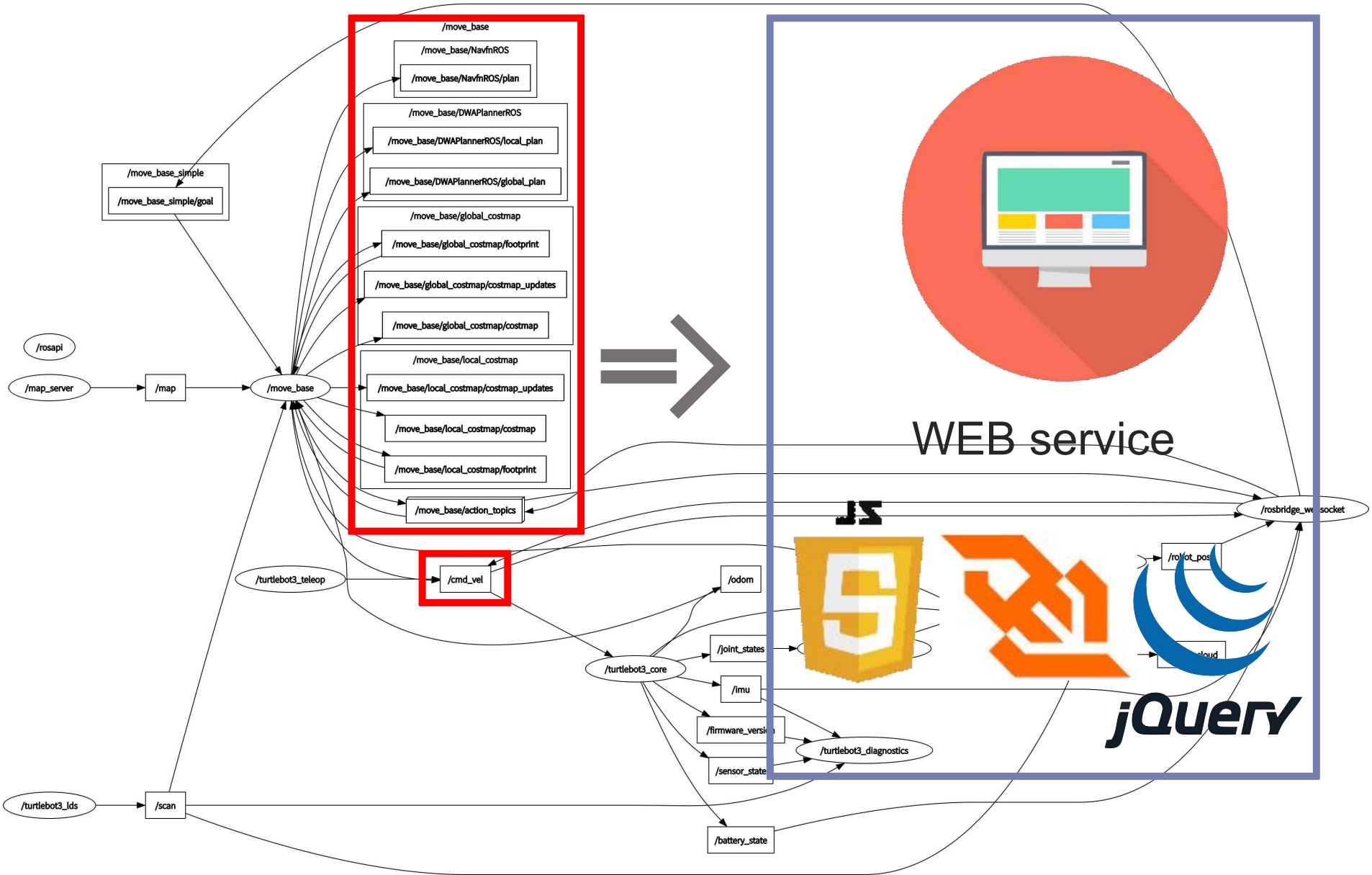
Networ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/move_base/local_costmap
/move_base/local_costmap/costmap_updates
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/odom
/joint_states
/turtlebot3_core
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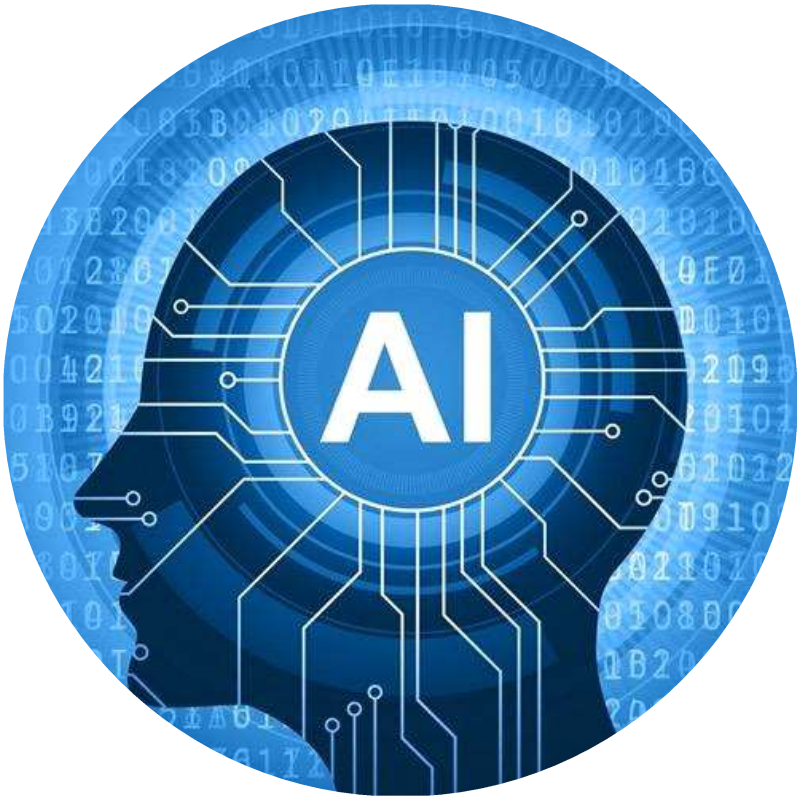
/scan
WEB service
/rosbridge_we socket
jQuery

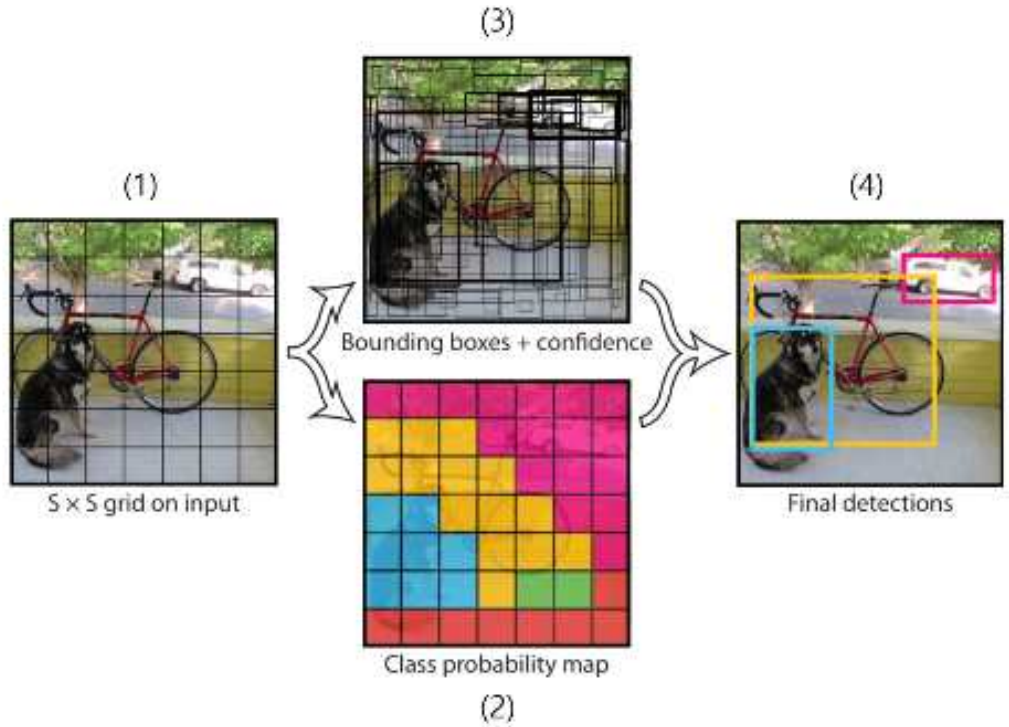
Artificial Intelligence



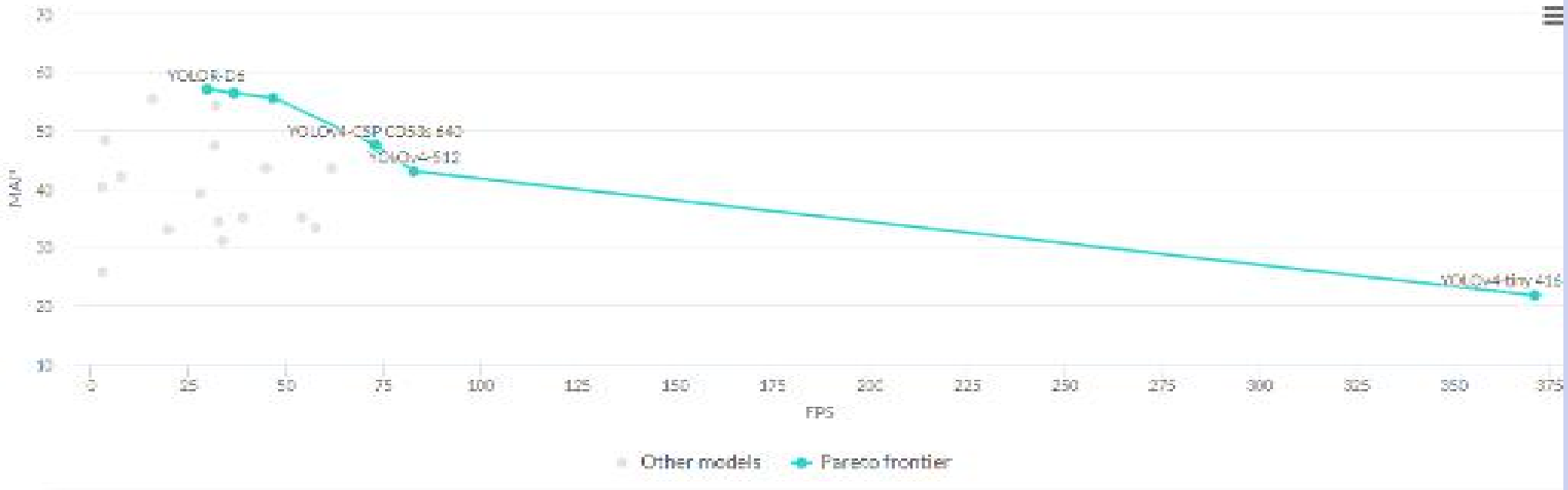
Real-time Object detection

Why is YOLO?

You Only Look Once

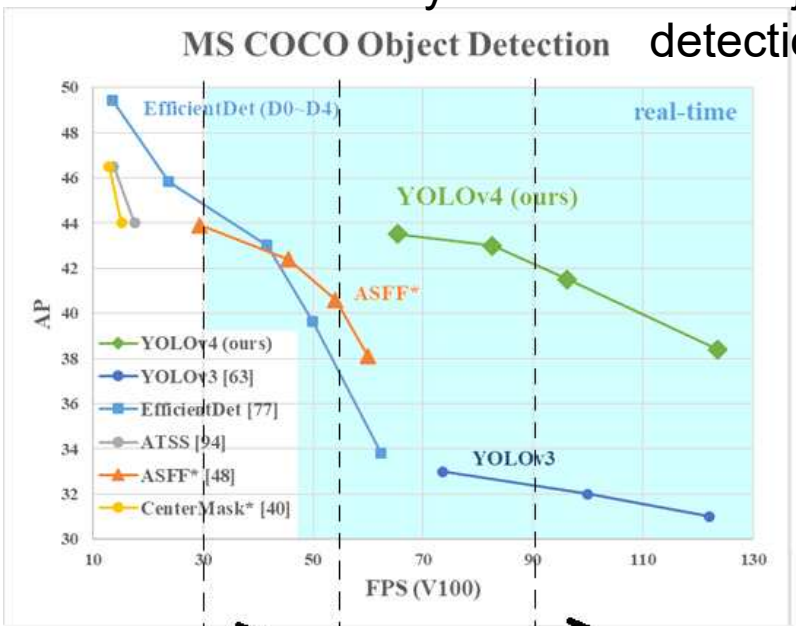


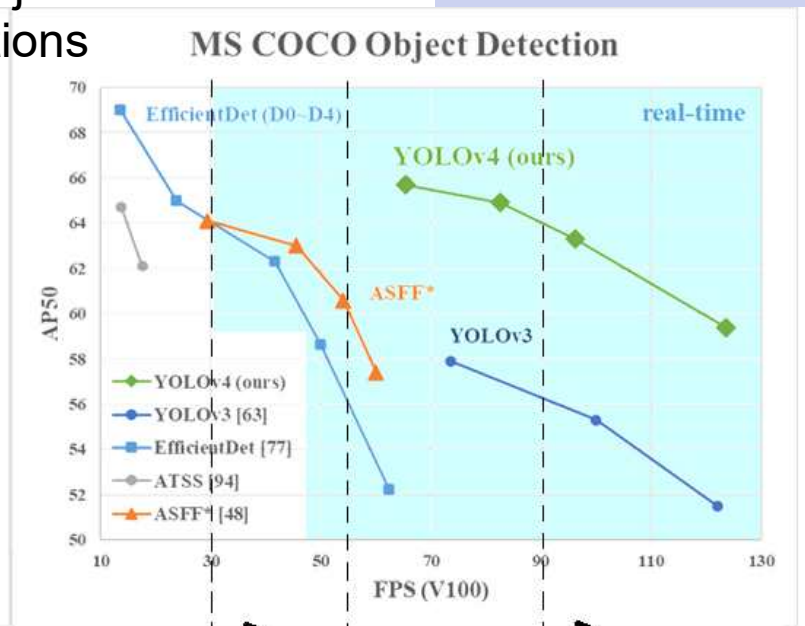
Real-time Object detection



Real-time Object detection

differences between yolo and other object detections





real-time (30 FPS) on
TitanV/TeslaV100 (server)
250 Watt
$2250 - $8000

real-time (30 FPS) on
RTX 2070 (desktop)
175 Watt
$450

real-time (30 FPS) on
RTX 2060 MXM (Mobile)
80 Watt
$700

9 FPS on
Jetson AGX Xavier (embedded)
30 Watt
$700

real-time (30 FPS) on
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real-time (30 FPS) on
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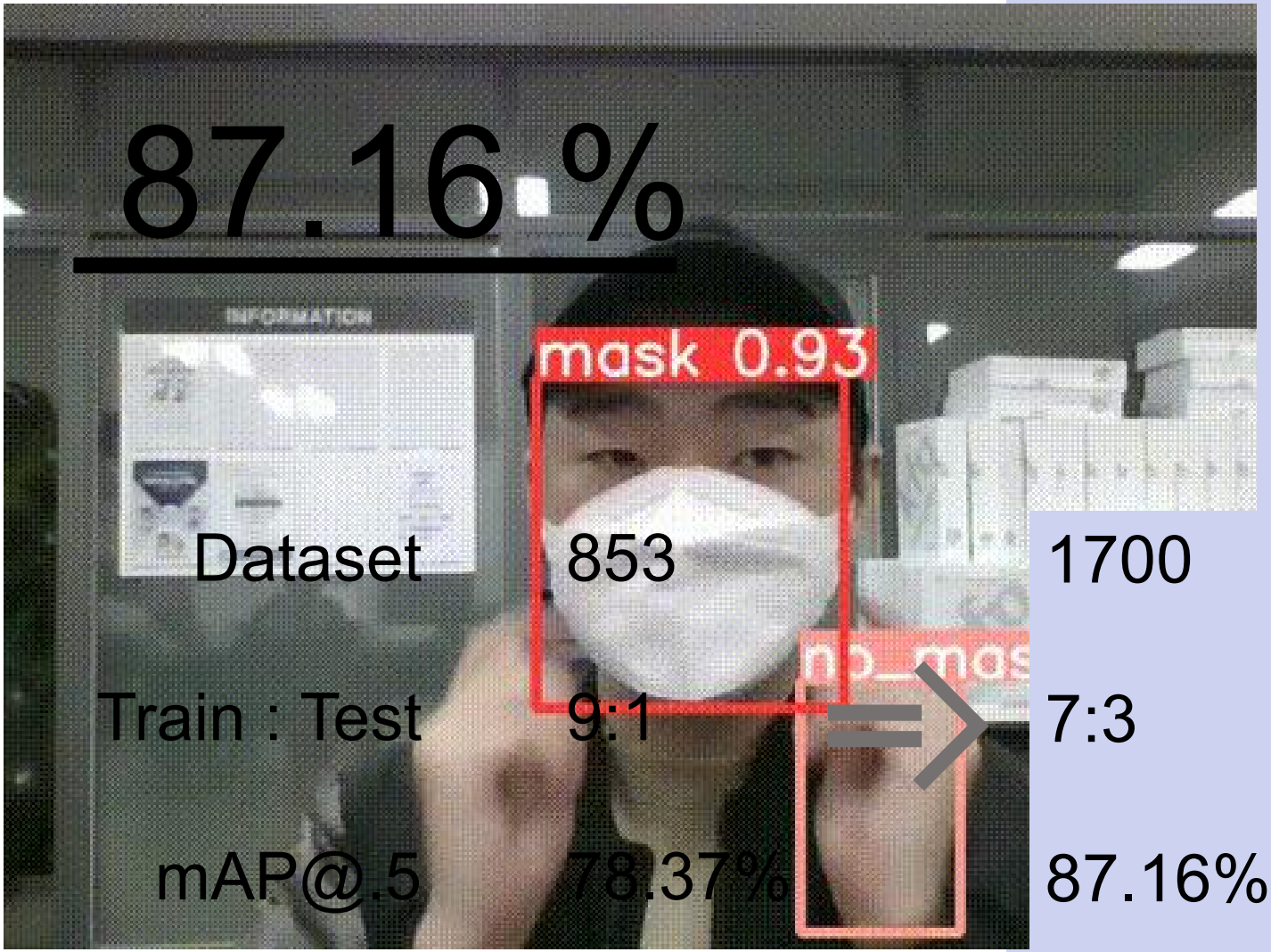
$450

real-time (30 FPS) on
RTX 2060 MXM (Mobile)
80 Watt
$700

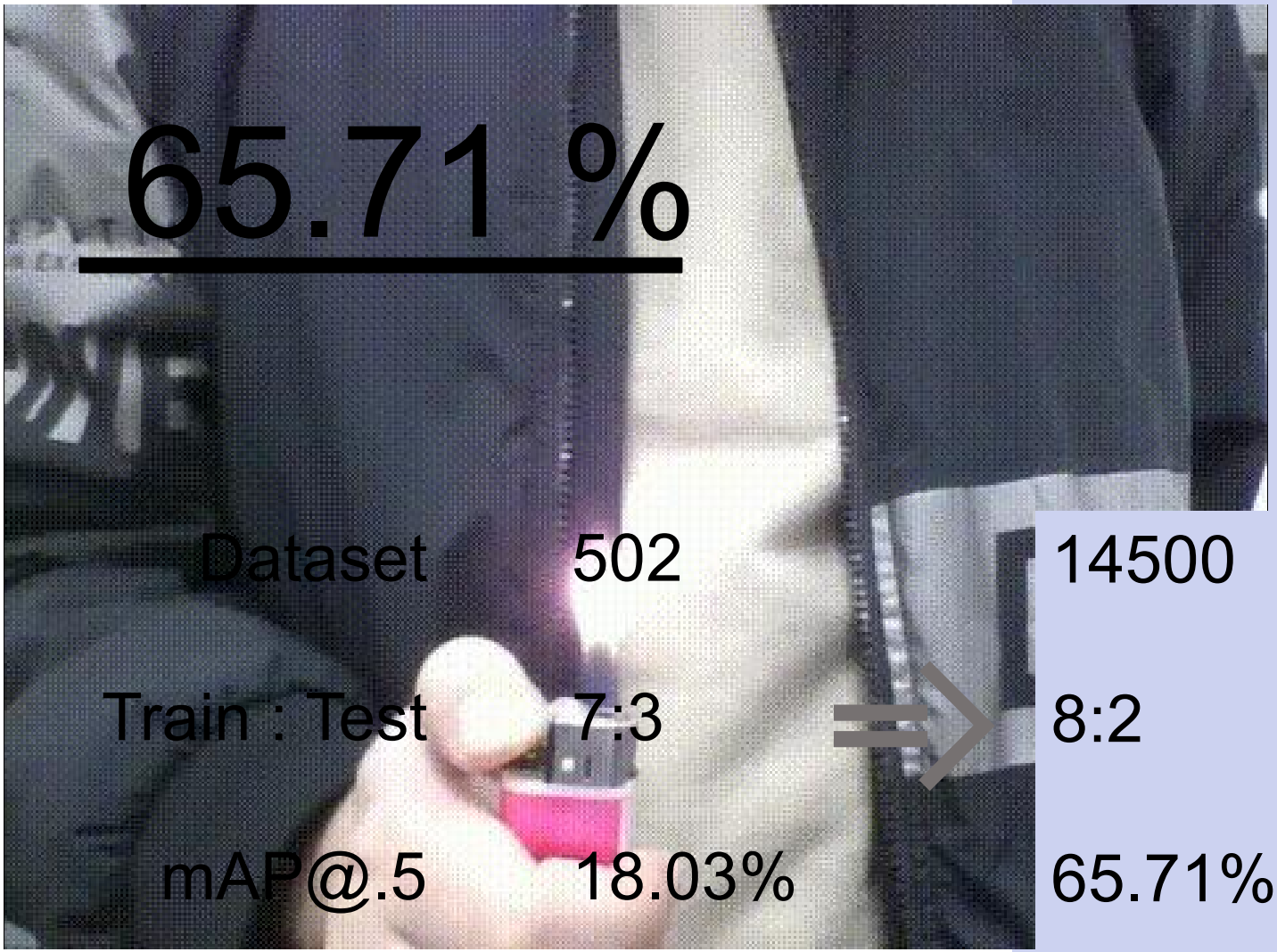
9 FPS on
Jetson AGX Xavier (embedded)
30 Watt
$700

FPS is measured on the Tesla V100 GPU.
For other GPUs with 7.x architecture,
the FPS is estimated based on the TFlops ratio.

Mask detection model

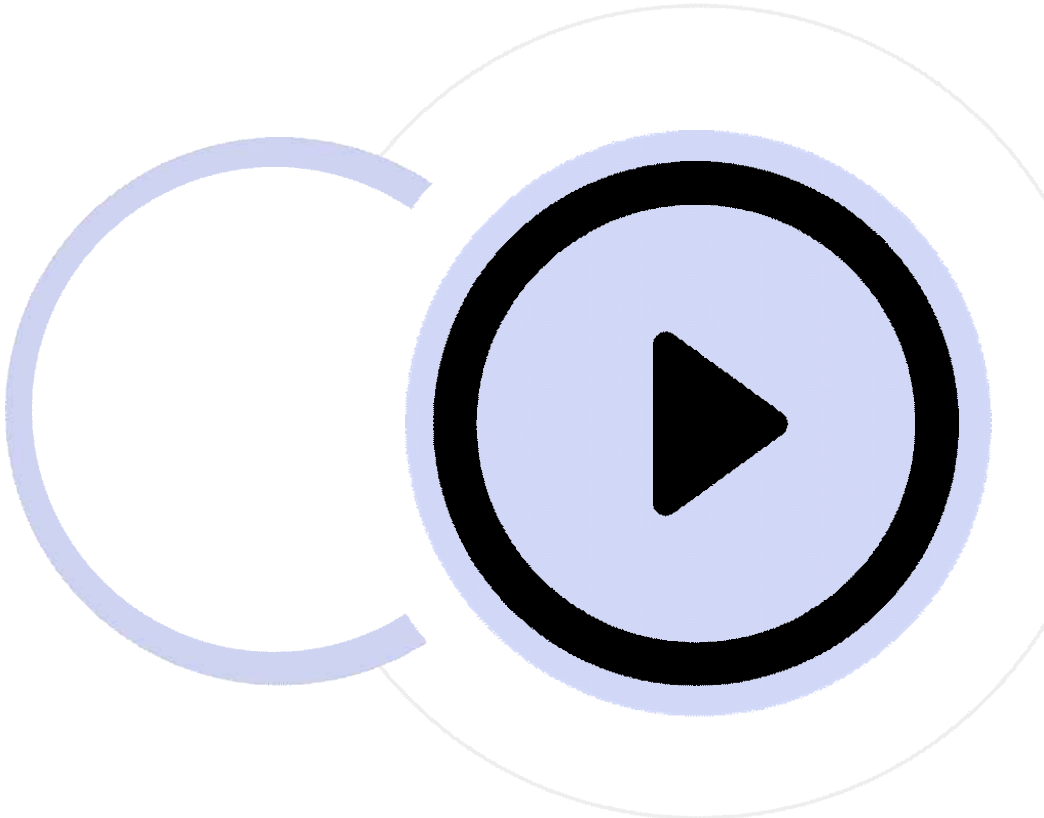


Fire detection model



~~demonstrat~~ e

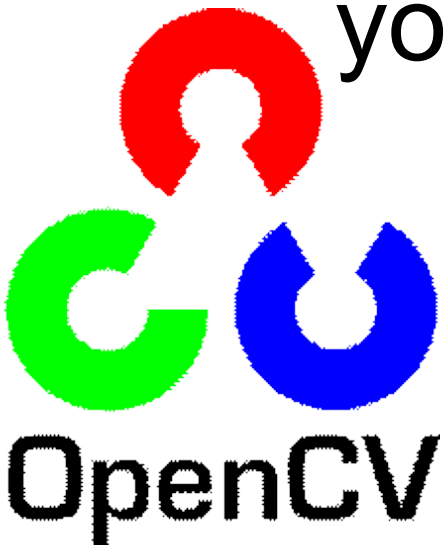
Please enjoy the show



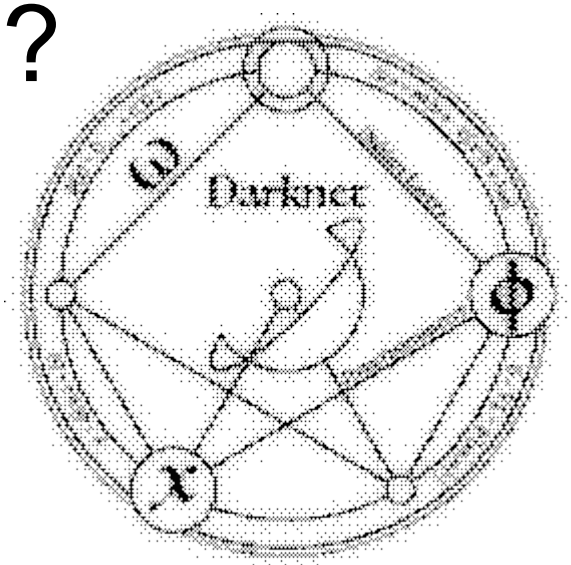
THANK YOU!

Real-time Object detection

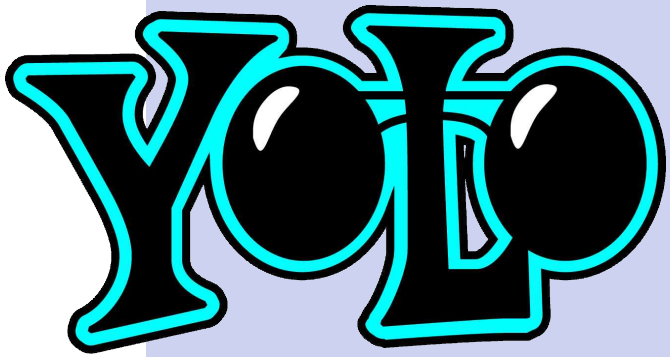
What is yolo?



Open source
Computer vision
library



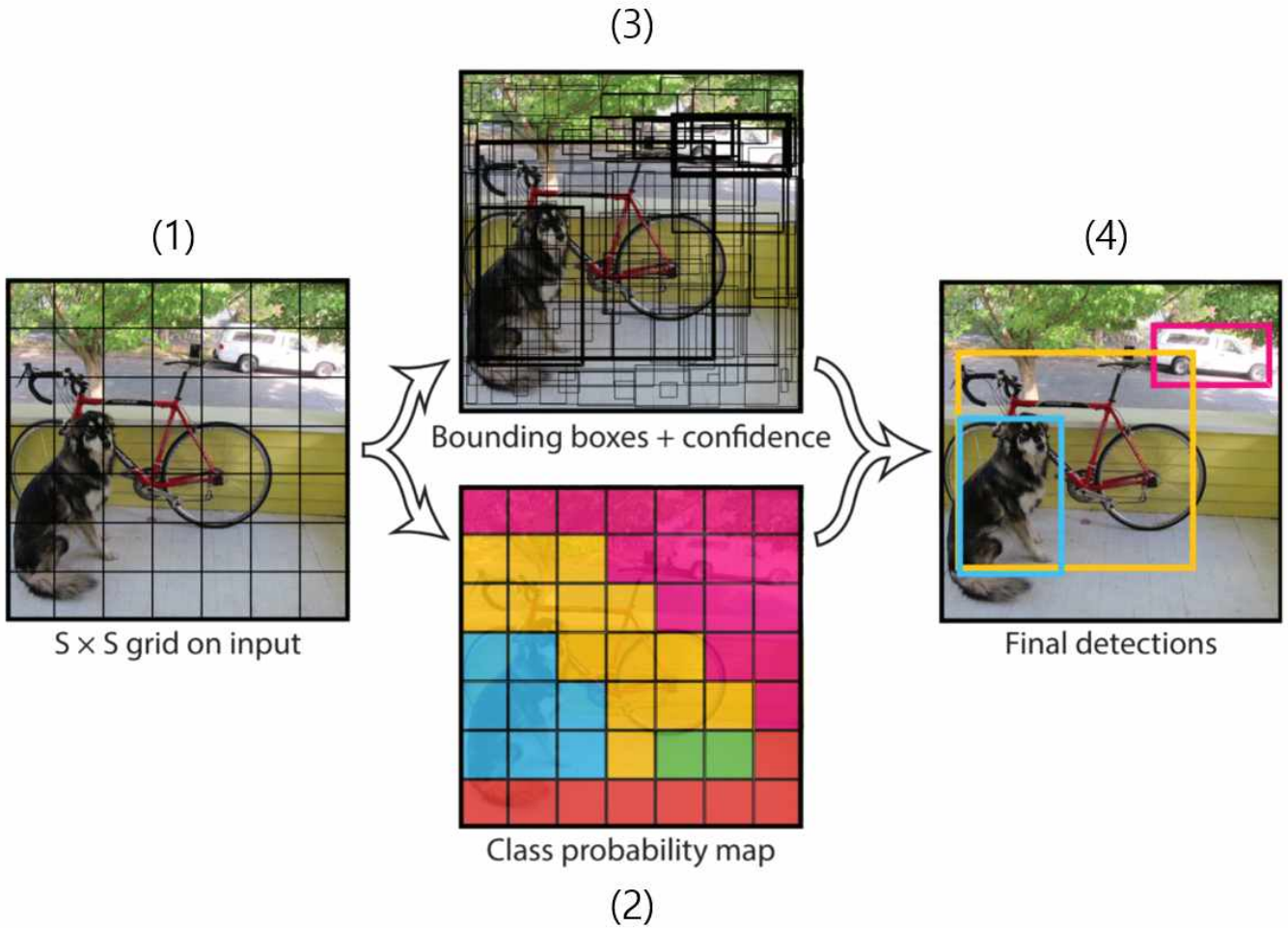
YOLO를 위한
프레임워크



Real-time opbject detection
algorithm

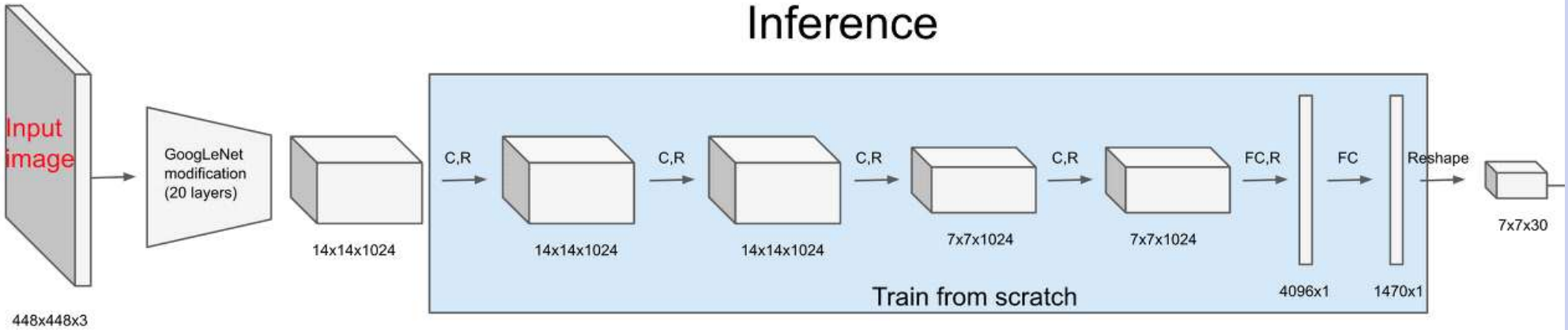
Real-time Object detection

differences between yolo and other object



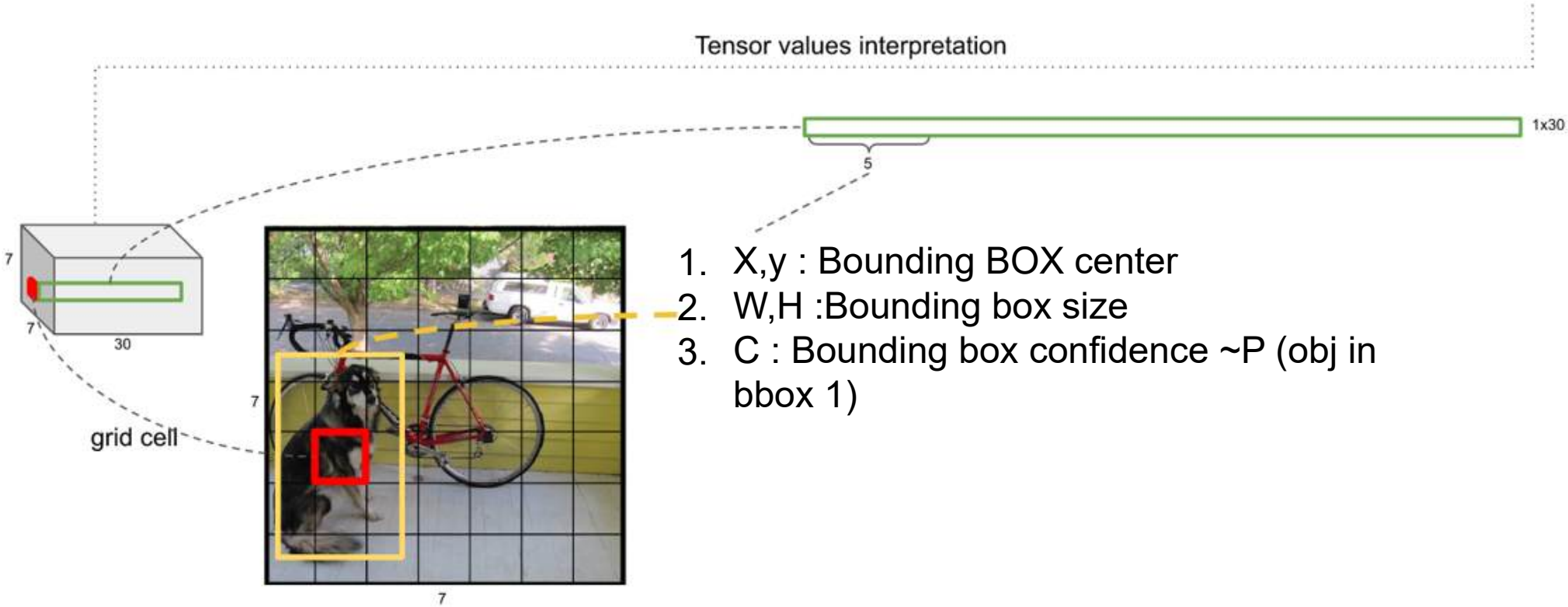
Real-time Object detection

differences between yolo and other object



Real-time Object detection

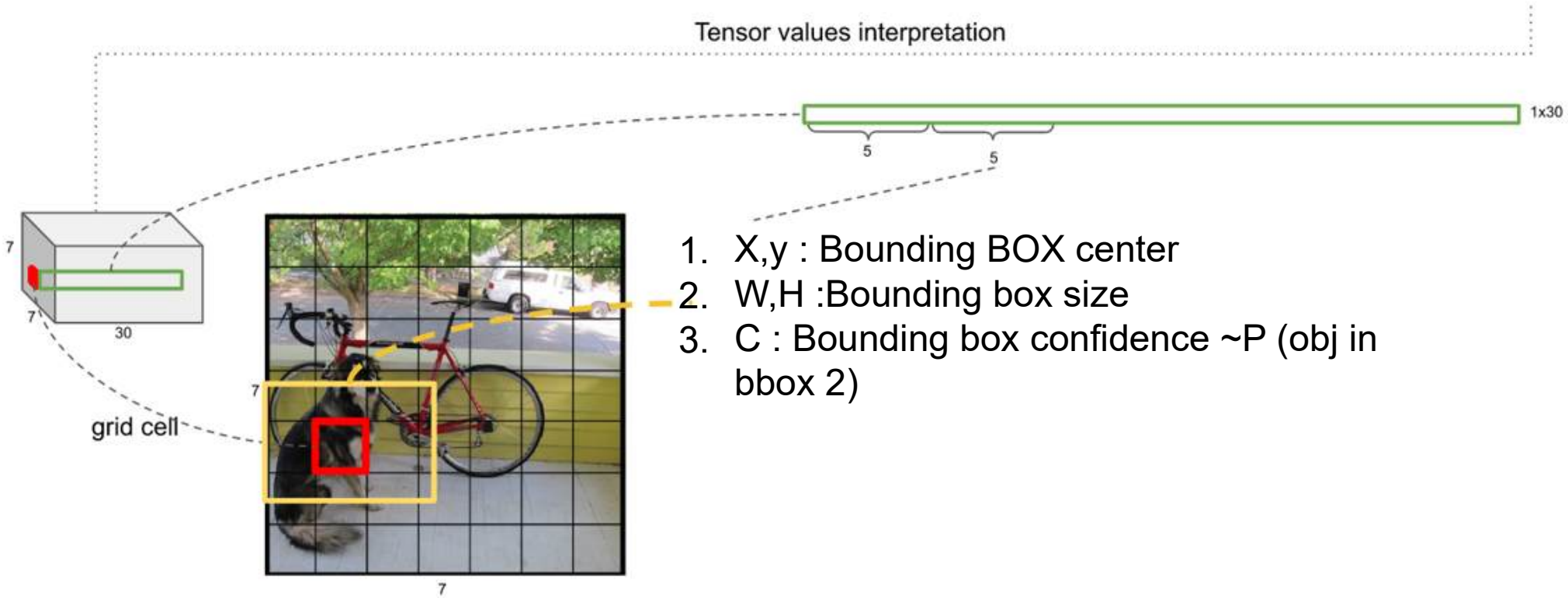
differences between yolo and other object detections



1. X,y : Bounding BOX center
2. W,H :Bounding box size
3. C : Bounding box confidence ~P (obj in bbox 1)

Real-time Object detection

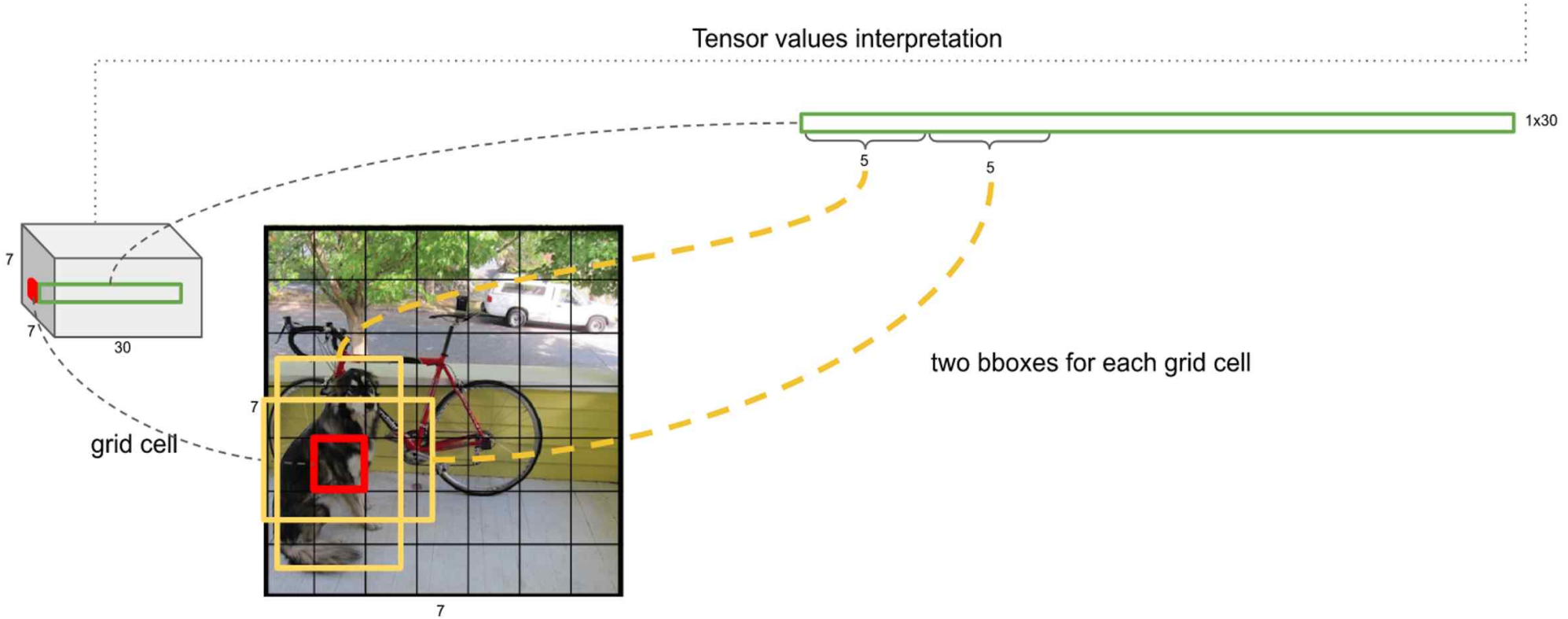
differences between yolo and other object detections



1. X,y : Bounding BOX center
2. W,H :Bounding box size
3. C : Bounding box confidence ~P (obj in bbox 2)

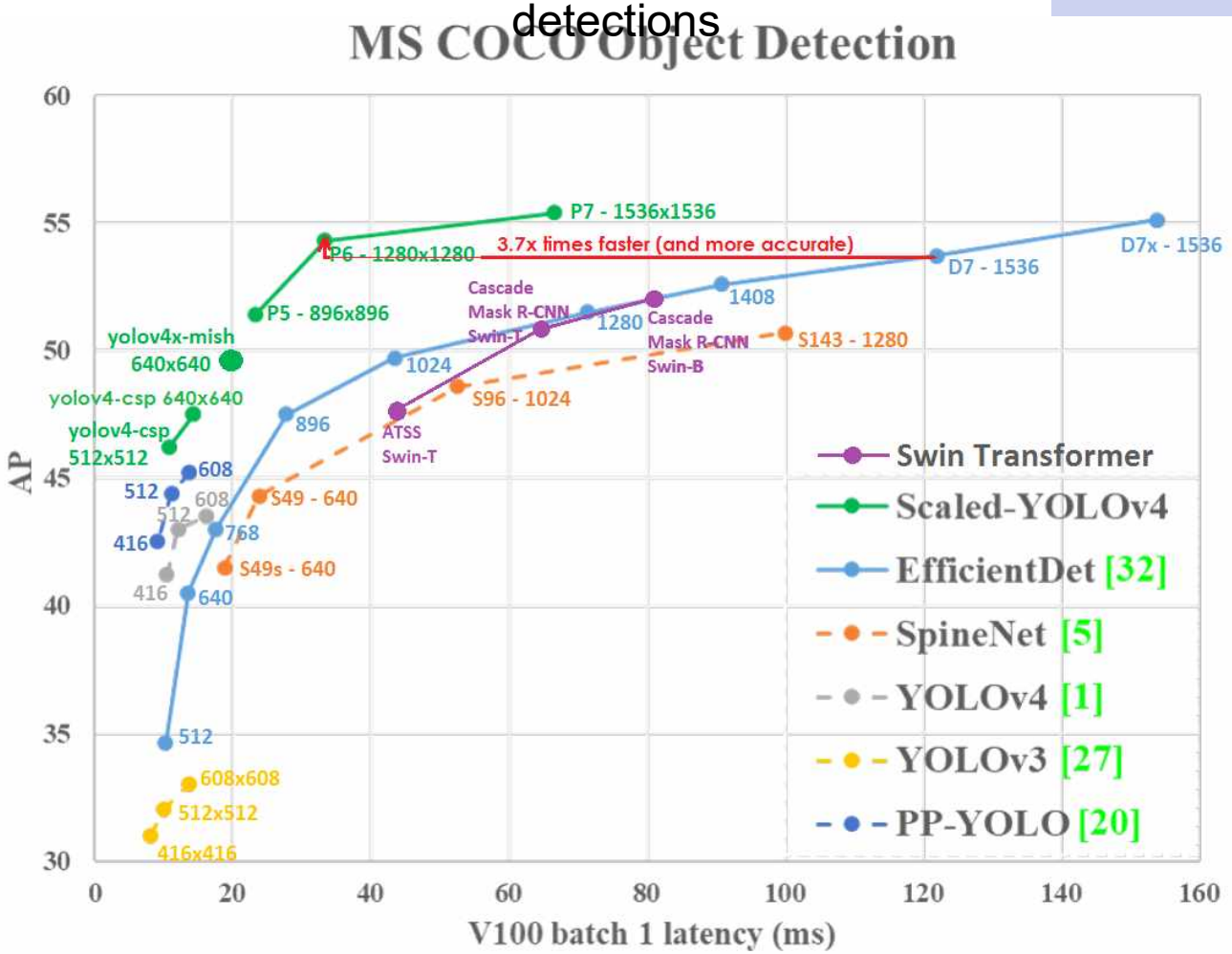
Real-time Object detection

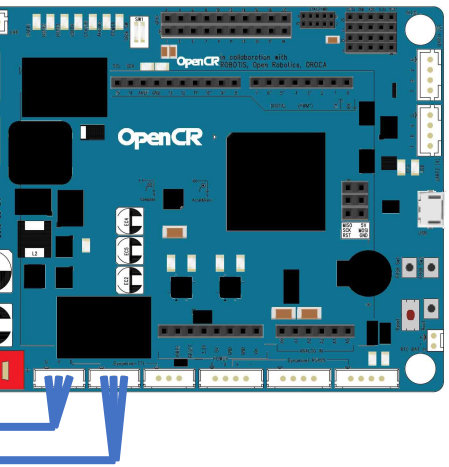
differences between yolo and other object detections



Real-time Object detection

differences between yolo and other object detections





하드웨어

TURTLEBOT3

ROS

SERVER

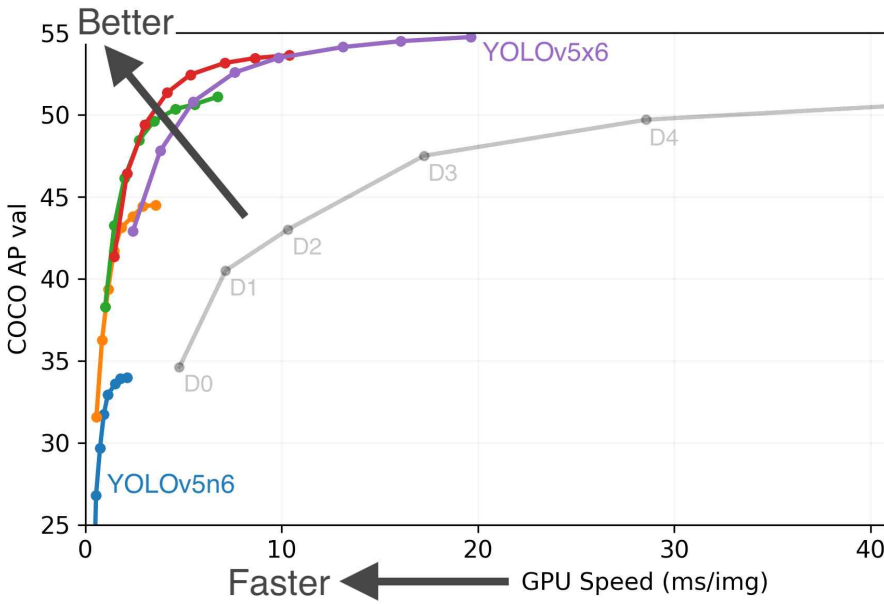
CLIENT

HTML CSS

0. Contents

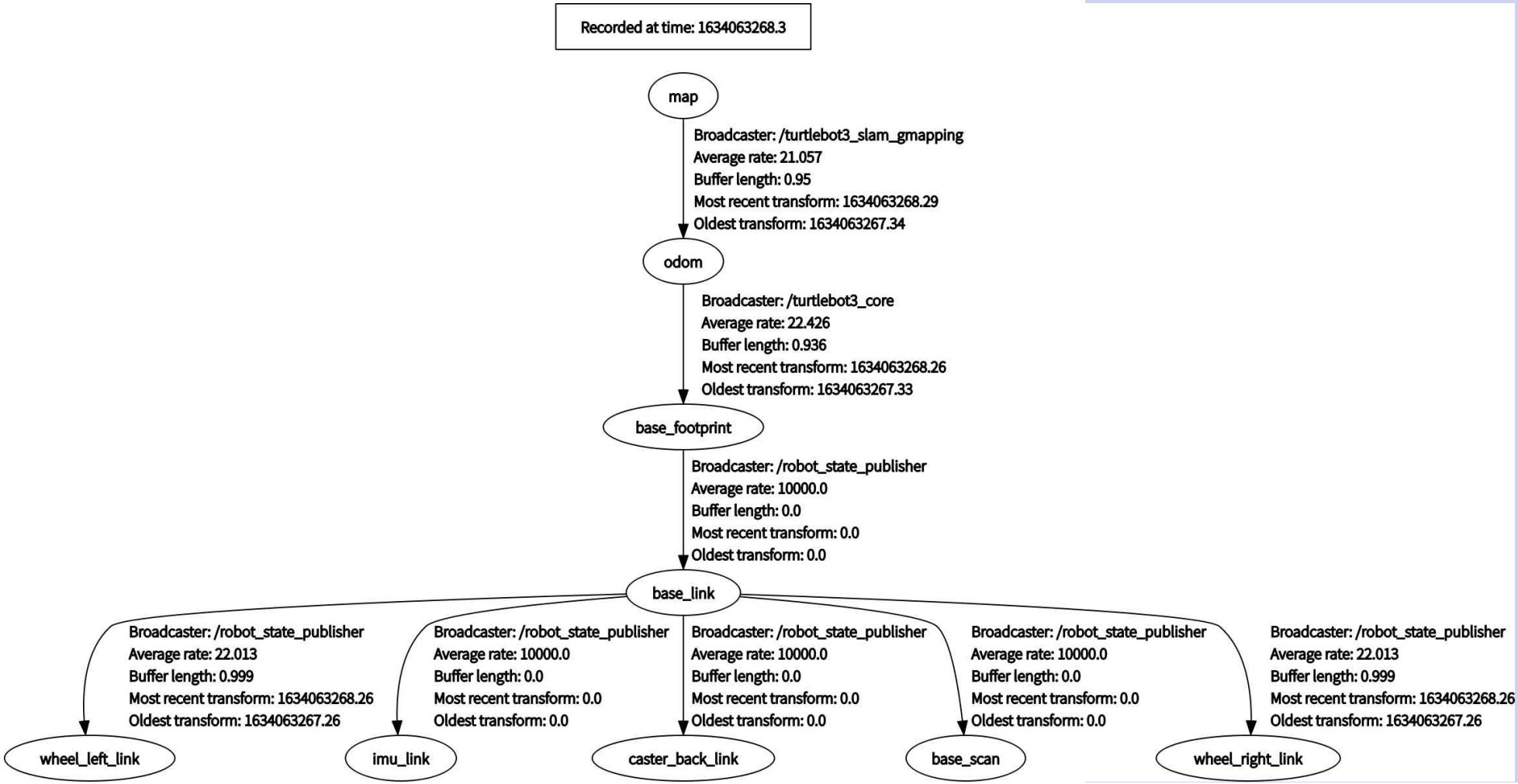
Real-time Object detection

욜로 5에 관한 슬라이드

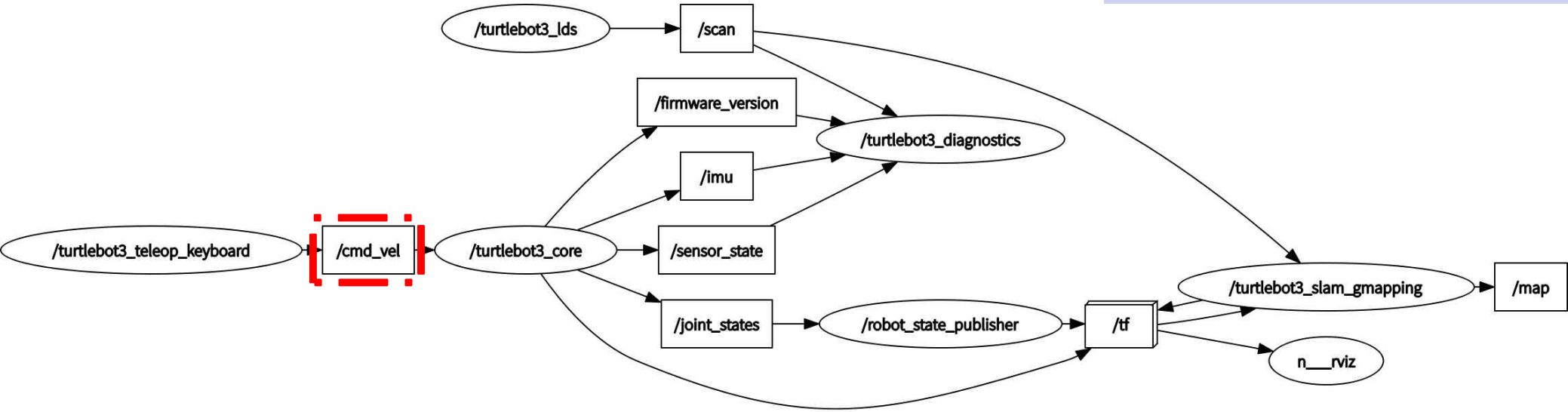


networ

Tf에 관해서 살짝 설명이 들어가야할거같기도하고



network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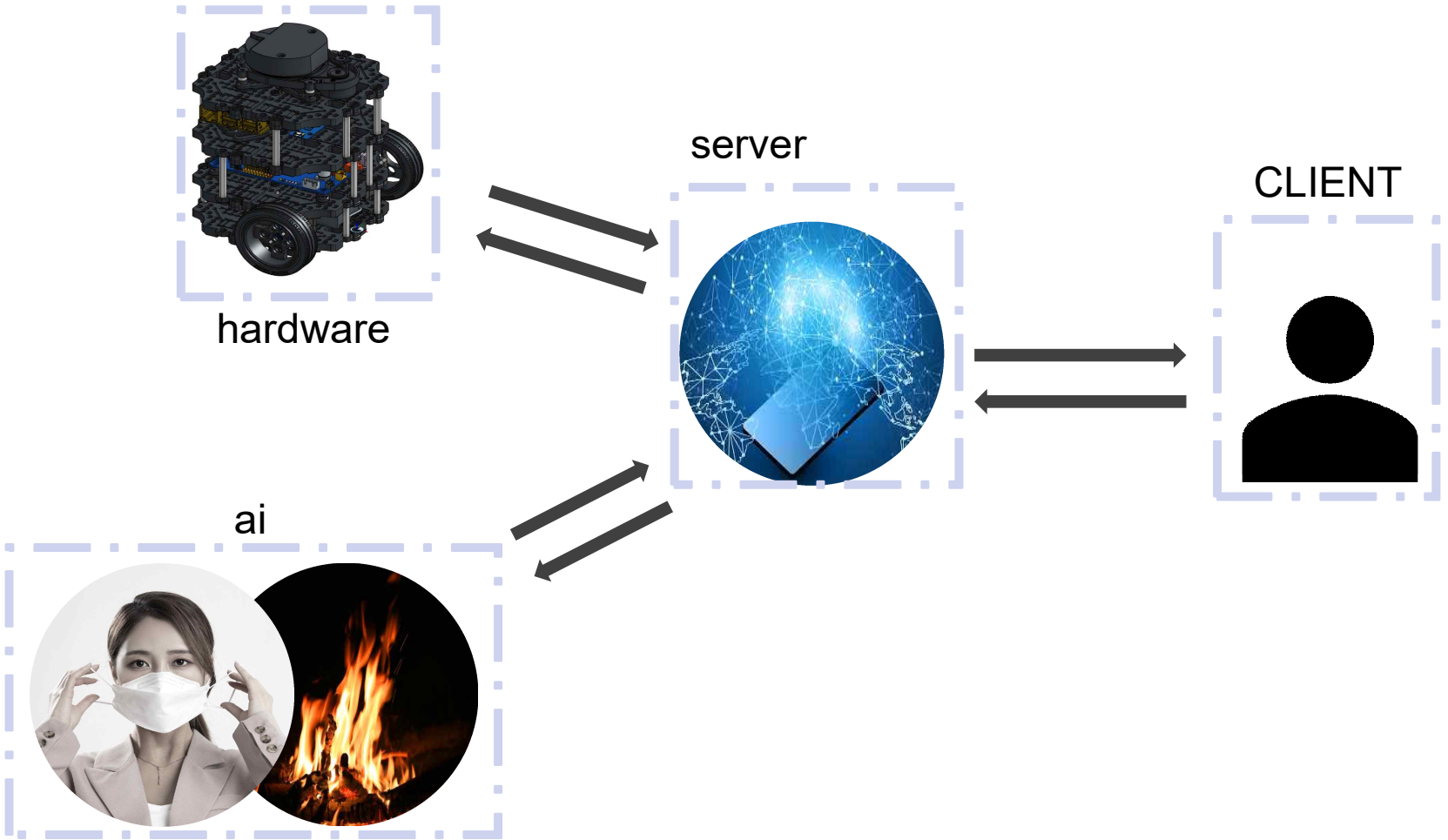
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