



OLAF➔

PROJECT

실내 길안내 로봇

TEAM 11 ELSA

2020 Capstone Design

김다훈 김선필 배한울 윤찬우 김명수



프로젝트 소개

TEAM: ELSA



15김다훈



14김선필



13김명수



15윤찬우



15배한울

PROJECT: OLAF



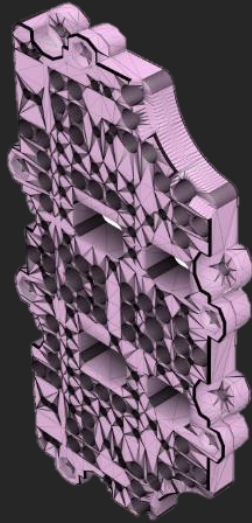
프로젝트 목표:

실내에서 사용자가 원하는 목적지까지 안내하는 로봇 제작

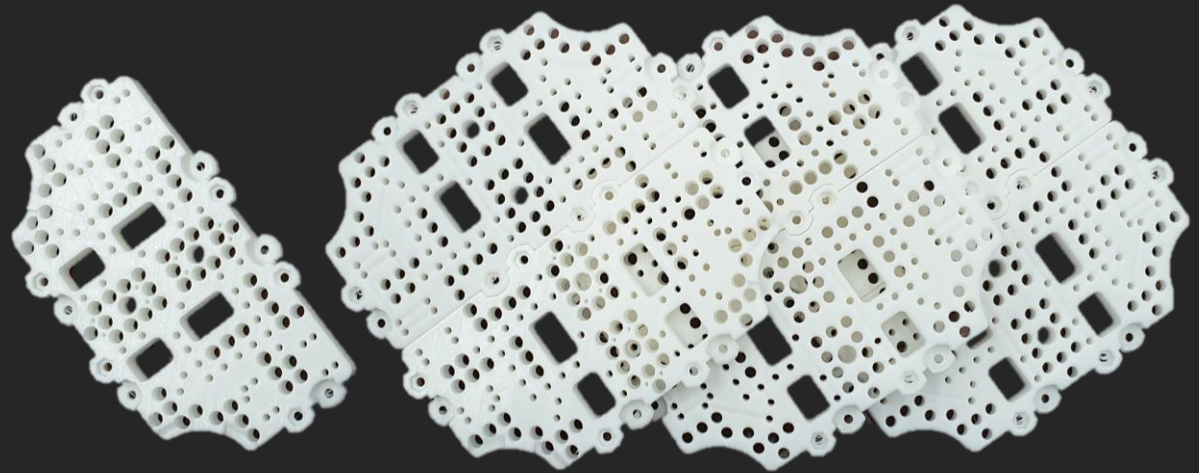




하드웨어 제작



3D Model



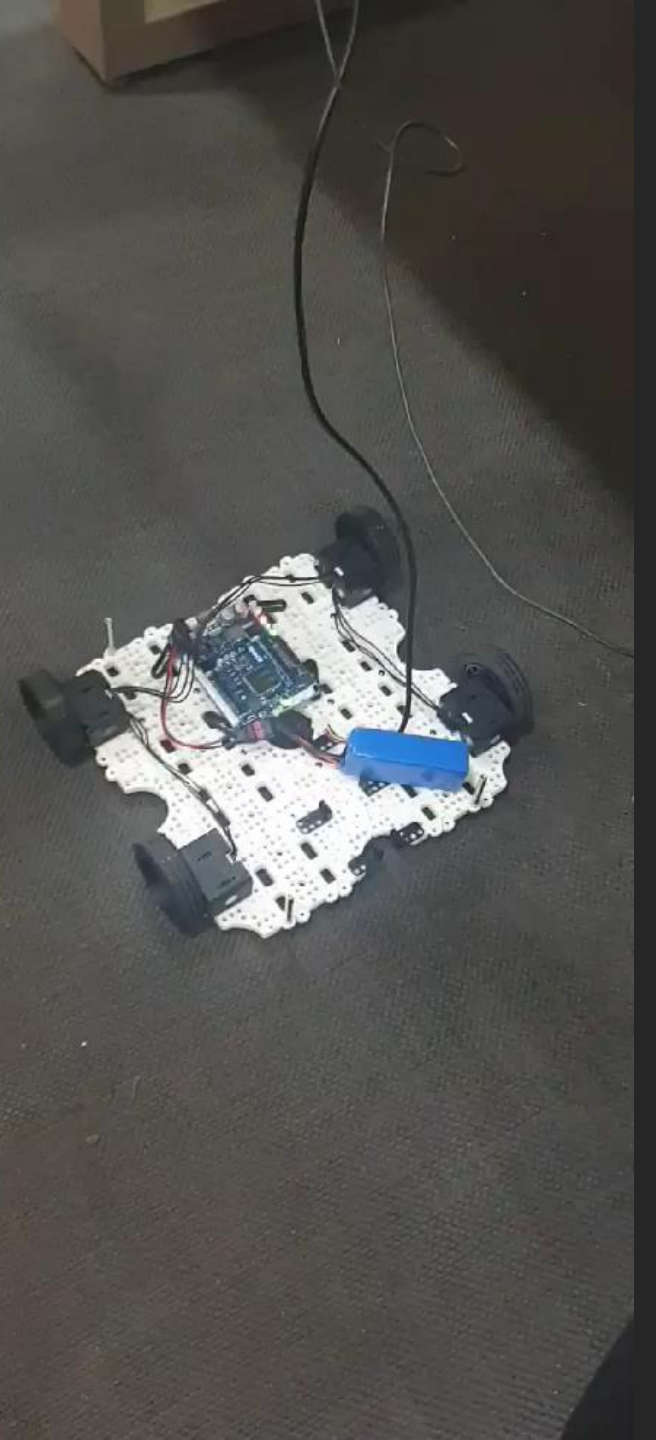
3D Printed Plate

TEST :

OpenCR Board

+ Dynamixel Motor x4

+ Battery



Hardware

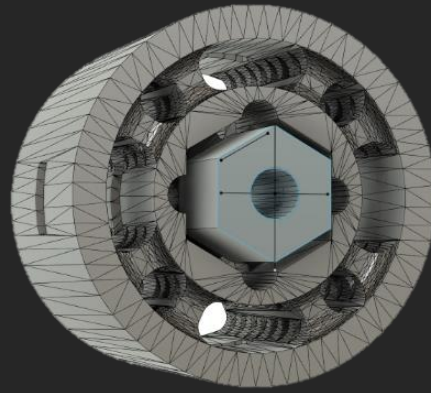
Make Robot Plate

Actuator Test

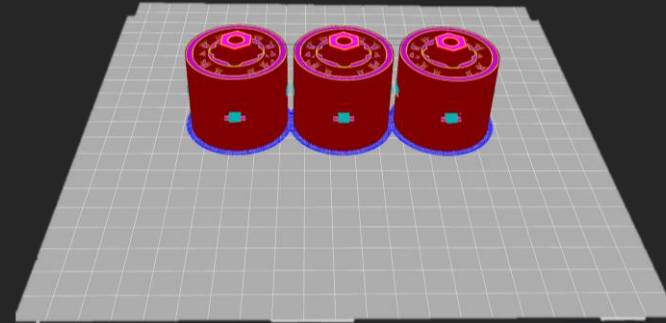
Make Axle Shaft

Assemble

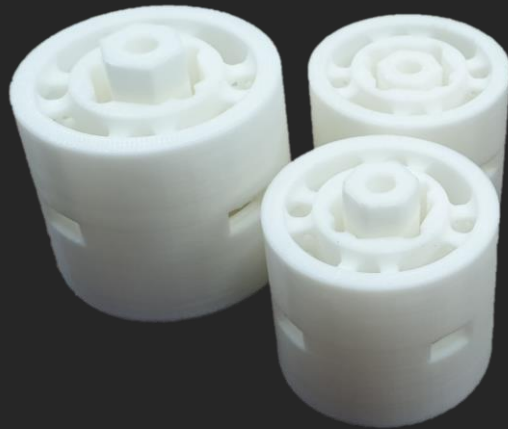
Soldering Capacitor



3D Model



Place Model to Print



3D Printed Axle Shaft



Combined with Wheel

Hardware

Make Robot Plate

Actuator Test

Make Axle Shaft

Assemble

Soldering Capacitor



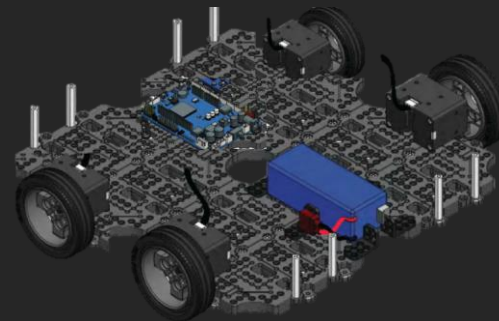
4th Floor



3rd Floor



2nd Floor



1st Floor



Completed Robot

Hardware

Make Robot Plate

Actuator Test

Make Axle Shaft

Assemble

Soldering Capacitor



Soldered TX2 Board

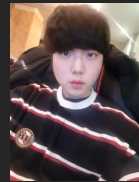
E/C 63V 4700UF
(85°C) LUG 타입



Capacitor



소프트웨어 개발



Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

Server

Data Share Protocol

Lane Detection

Obstacle Detection

RoomNum Recognition

W

A

S

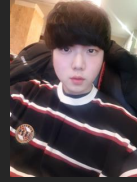
D

방향키로 로봇을 조종 가능하도록 구현한 노드

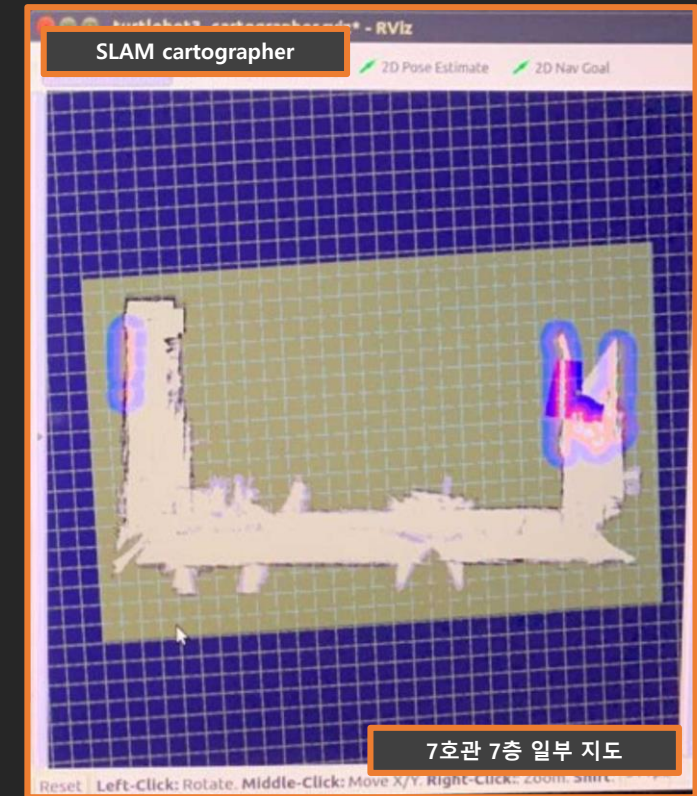
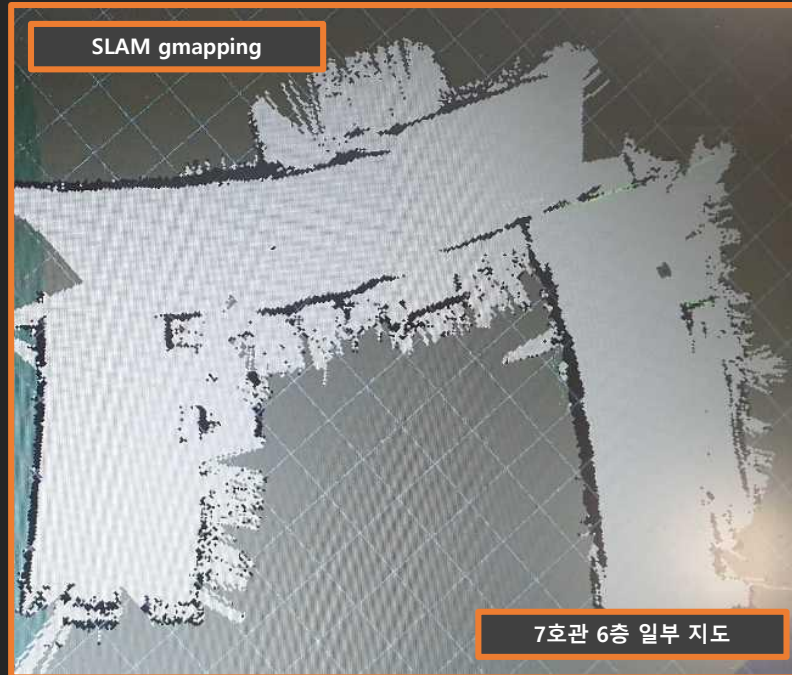
W / S : speed up / down

A / D : rotate left / right

테스트를 위해서 개발됨



SLAM: 사용되지 않음



Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

Server

Data Share Protocol

Lane Detection

Obstacle Detection

RoomNum Recognition

OLAF

Software



Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

Server

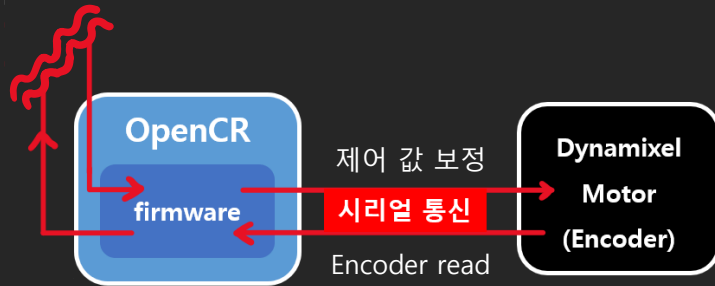
Data Share Protocol

Lane Detection

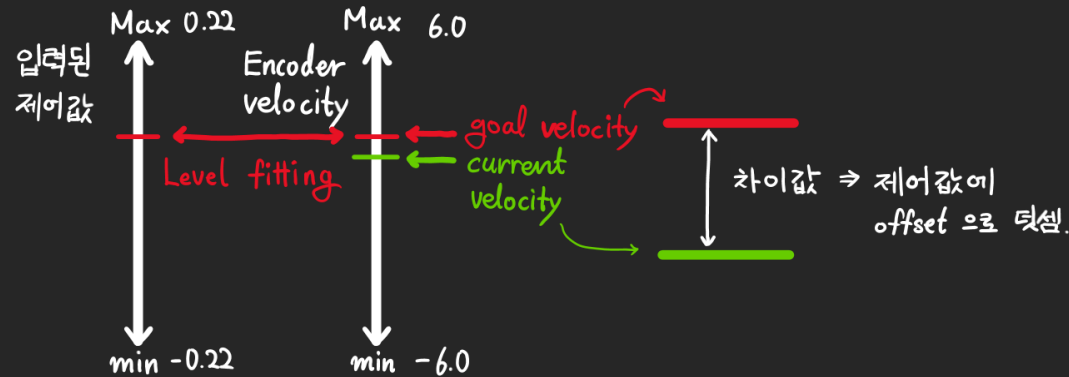
Obstacle Detection

RoomNum Recognition

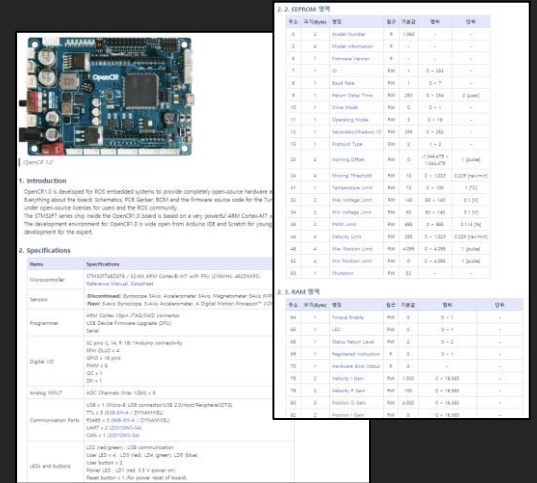
구조 :



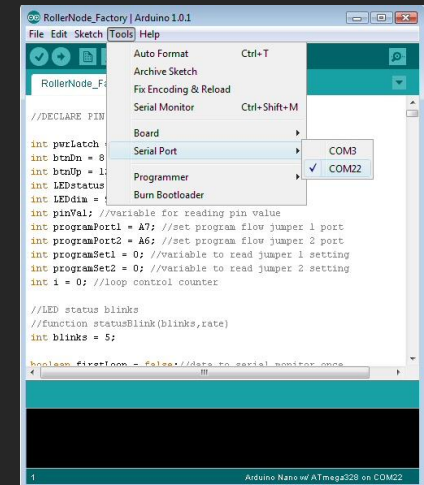
제어 :



현재 속도에 Offset을 가감하여
목표 속도와 현재 속도의 차이를 줄이는 방식



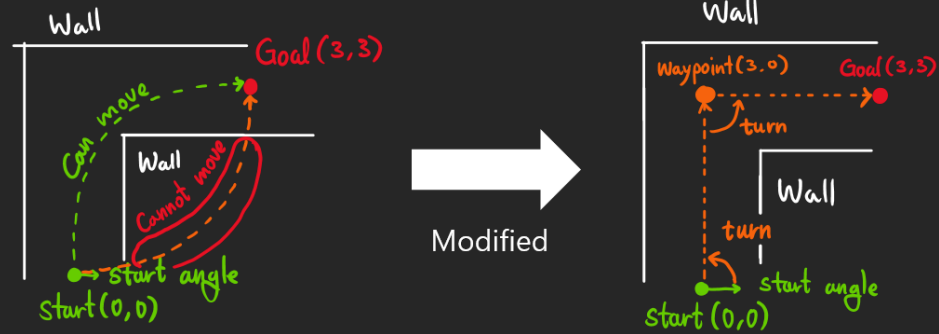
보드, 모터 매뉴얼 참고



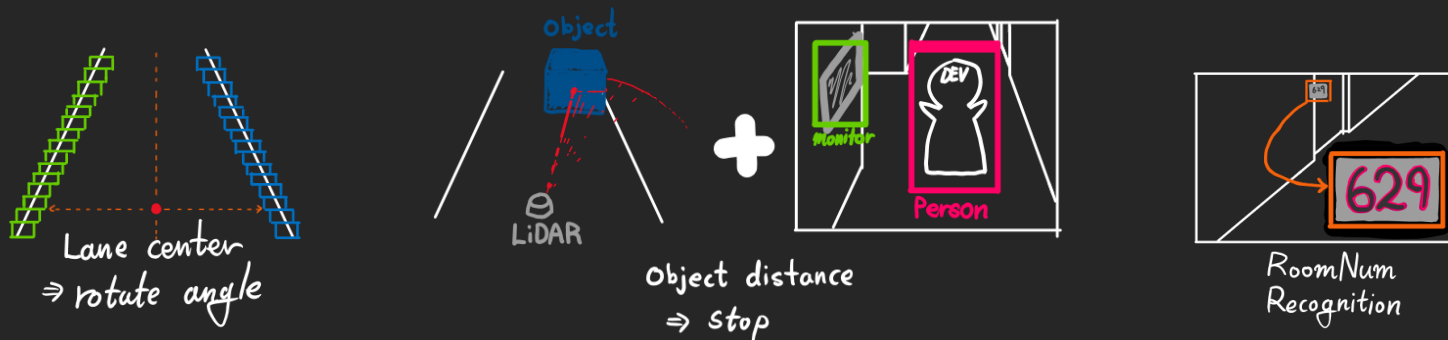
아두이노 펌웨어 코딩



Modified



Added



Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

Server

Data Share Protocol

Lane Detection

Obstacle Detection

RoomNum Recognition



Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

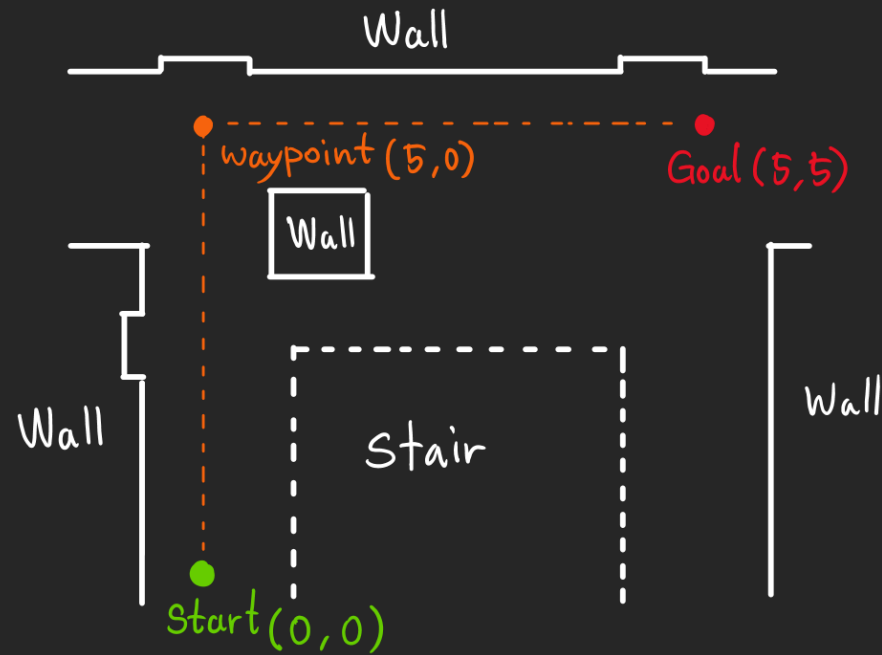
Server

Data Share Protocol

Lane Detection

Obstacle Detection

RoomNum Recognition



미래관(7호관)의 내부 구조가 직각 경로로 이루어져 있음

목표 좌표를 입력 받아 직각 경로를 반환



Software



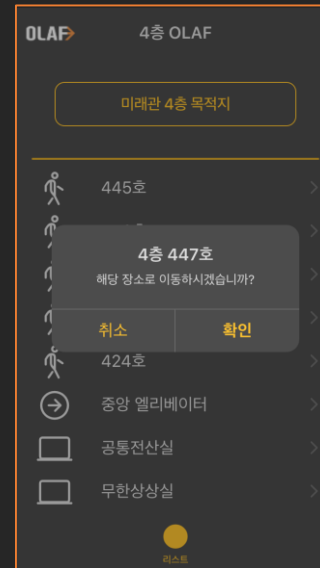
Web Server UX / UI



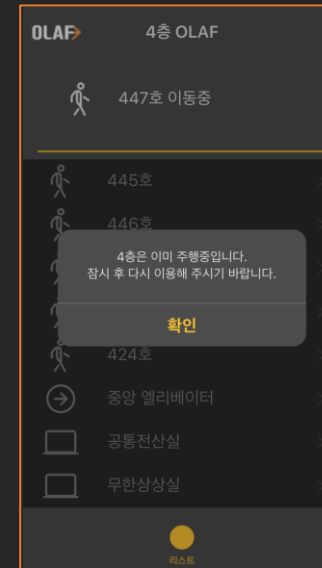
입력 대기



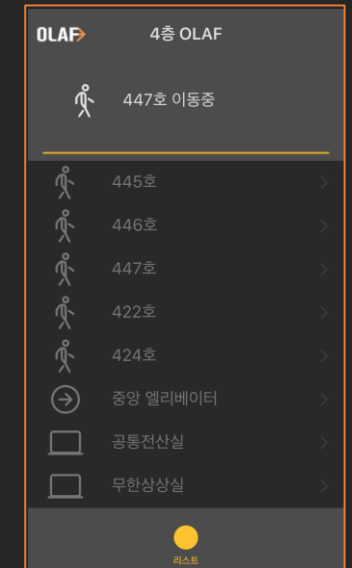
층 선택



목적지 입력



주행 중 입력 방지



이동 중

Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

Server

Data Share Protocol

Lane Detection

Obstacle Detection

RoomNum Recognition



Teleop node

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Path Calculation

Server

Data Share Protocol

Lane Detection

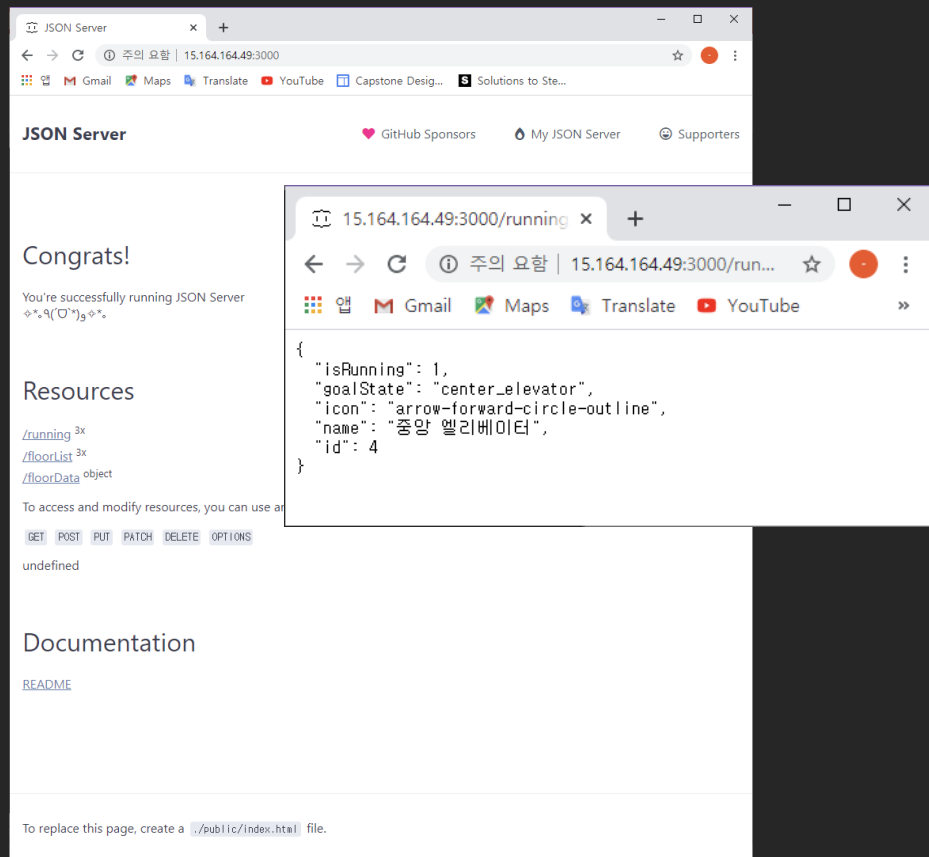
Obstacle Detection

RoomNum Recognition

JSON Server

JSON serve는 사용자와 로봇의 중간 다리 역할이다.

Python의 Dictionary와 같은 형식으로 데이터를 표현한다.





Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

Server

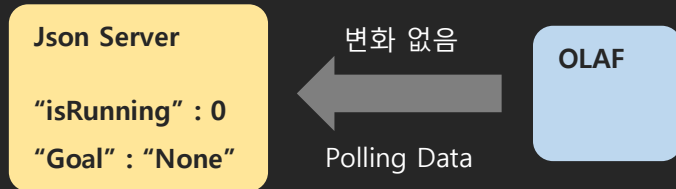
Data Share Protocol

Lane Detection

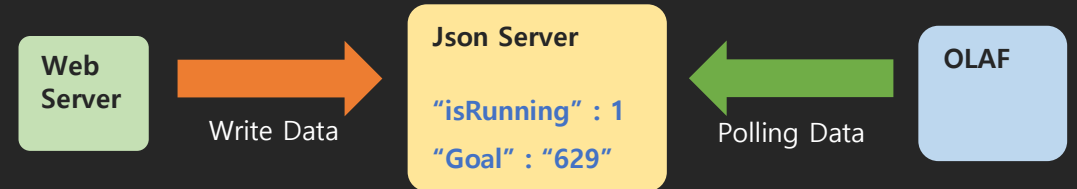
Obstacle Detection

RoomNum Recognition

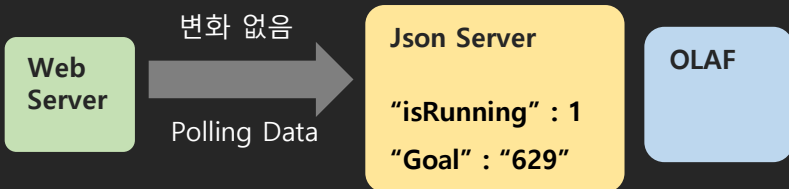
1. 대기 중



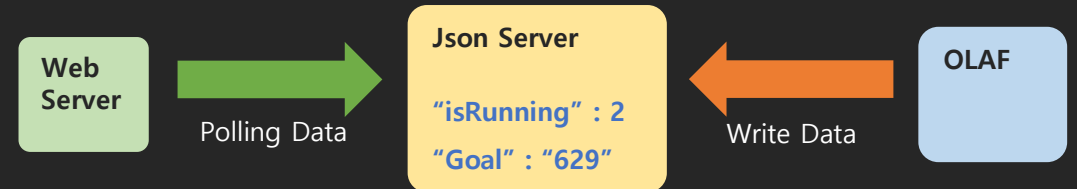
2. 사용자 입력



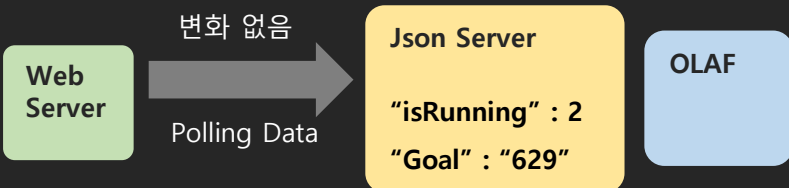
3. 안내 중



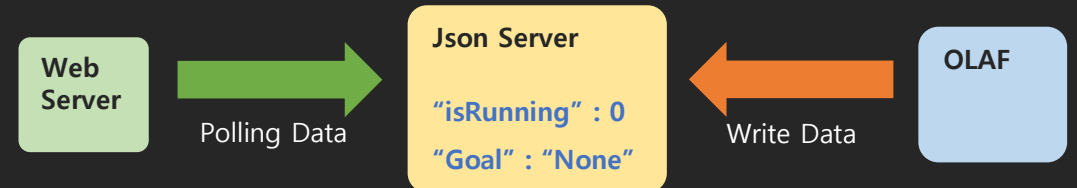
4. 목적지 도착



5. 원점 회귀 중



6. 원점 도착



Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

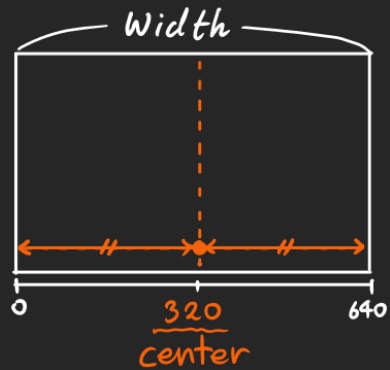
Server

Data Share Protocol

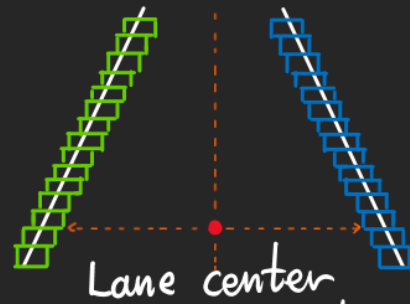
Lane Detection

Obstacle Detection

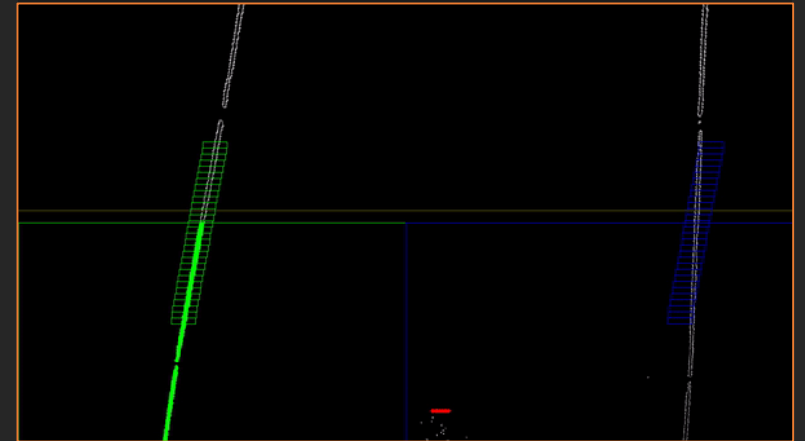
RoomNum Recognition



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인식된 양쪽 차선의 X좌표 중심과
카메라 해상도 폭 중심의 차이를 계산하여
정방향 주행에서 벗어난 정도를 인지





Teleop node

SLAM

Encoder correction

Pointop node

Path Calculation

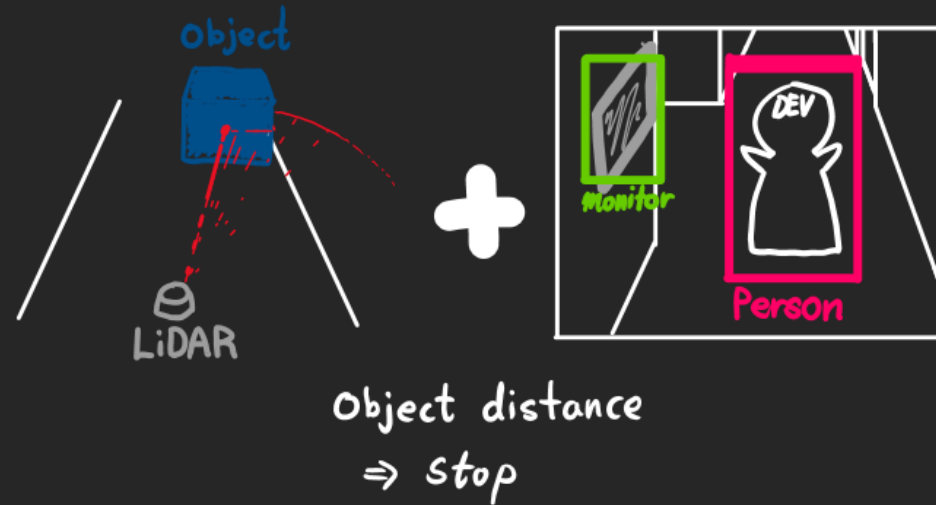
Server

Data Share Protocol

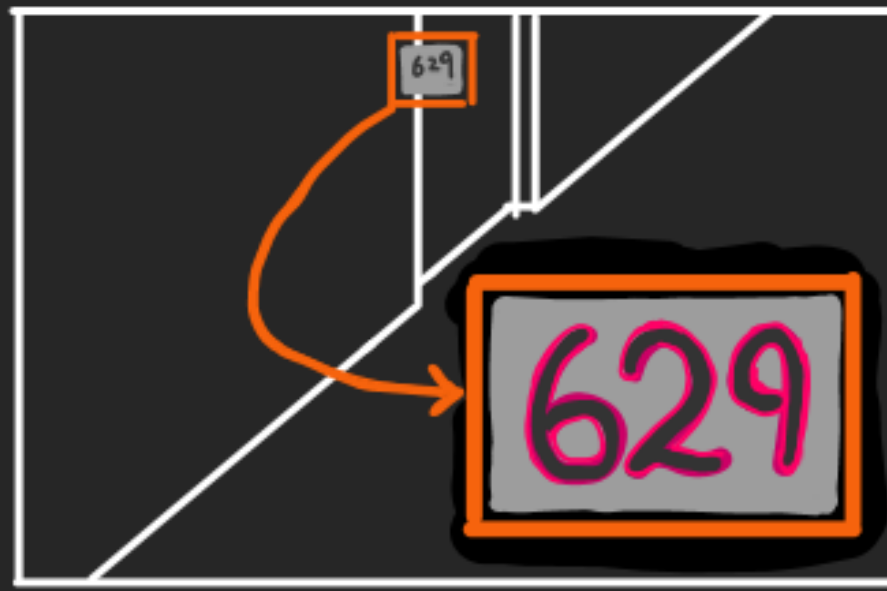
Lane Detection

Obstacle Detection

RoomNum Recognition



2D LiDAR 정보와 YOLO v3의 사물 인식을 조합하여
진행 경로상에 사람이 있을 경우 정지



방문 위의 번호판 영역을 인식하여 잘라내어
잘라낸 영역의 번호를 인식한다.
인식한 번호를 통해 위치정보를 보조한다.

Teleop node

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