

HEY, WALDO-WATCHERS!  
SAW SOME TRULY TERRIFIC  
SIGHTS TODAY—SOMEONE  
BURNING TROUSERS WITH  
AN IRON; A LONG THIN MAN  
WITH A LONG THIN TIE;  
A GLOVE ATTACKING A MAN.  
PHEW! INCREDIBLE!

Waldo



TO:  
WALDO-WATCHERS  
OVER THE MOON,  
THE WILD WEST,  
NOW

# 미아 찾기 로봇 시스템

ROS2 project  
C-2(My Kids Founder)

1.Solution Overview

2.Key Issues and Challenges

3.Required Solution Improvements

4.Lesson Learned

5. Team Contribution

# MISSING AND ENDANGERED CHILD



NAME 4 YEARS OLD

LAST SEEN: DECEMBER 24,2020

CONCERNED FAMILY MEMBERS HAVE NOT SEEN  
\_\_\_\_\_ IN OVER A YEAR

PARENTS REFUSING TO COOPERATE  
UNKNOWN LAST LOCATION POSSIBLY THE  
SHELBY, JEFFERSON, BULLITT COUNTY AREA

RACE: WHITE

HAIR: BLONDE

EYE COLOR: BLUE

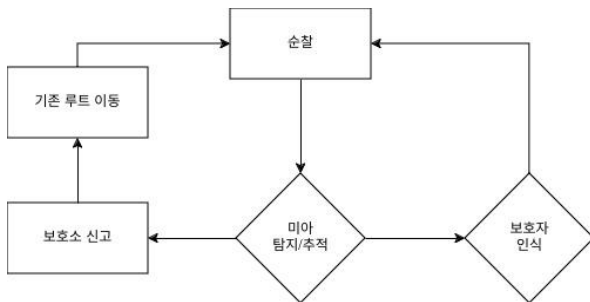
POSSIBLE BIRTH MARK ON STOMACH

If located, please contact the Shelby County Sheriff's Office  
501 Main St Suite 8  
Shelbyville, KY 40065  
Ph : 502-633-4324 Dispatch: 502-633-2323



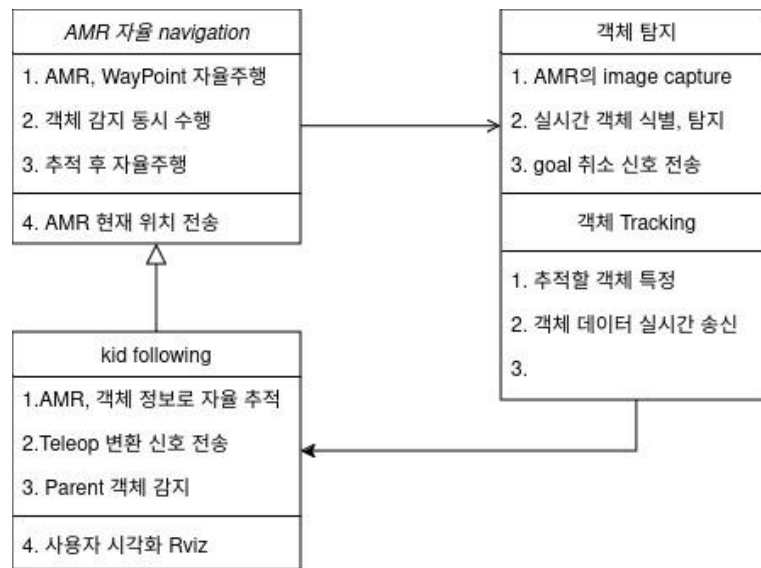
# 1. Solution Overview-(Situation&Scenario)

## ● situation&scenario



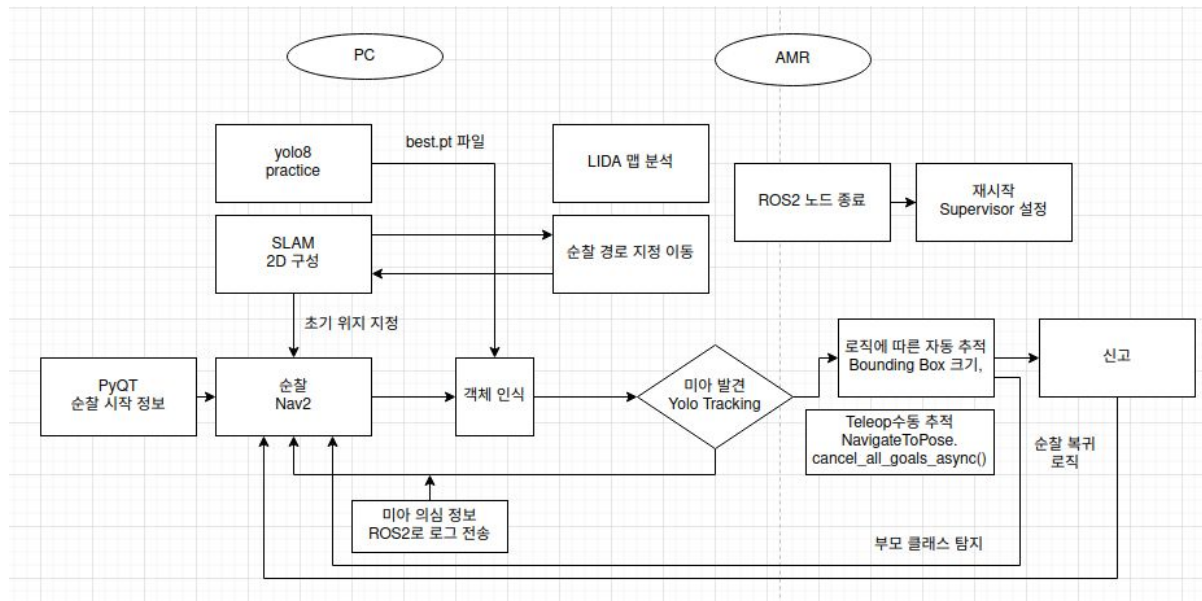
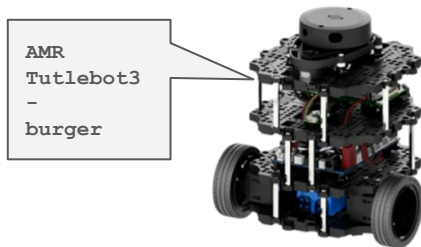
1.목적	<ul style="list-style-type: none"> <li>AMR이 kid 객체를 실시간으로 추적하며 따라가도록 설계.</li> </ul>
2.환경	<ul style="list-style-type: none"> <li>ROS 2 네트워크에서 다른 노드와 데이터 통신</li> <li>YOLOv8 모델아이와 부모를 감지하여 올바른 대상을 추적.</li> </ul>
3.제약	<ul style="list-style-type: none"> <li>로봇이 지정된 범위에서만 이동</li> <li>추적 중인 객체가 parent와 겹치X</li> </ul>

## ● Business Requirement





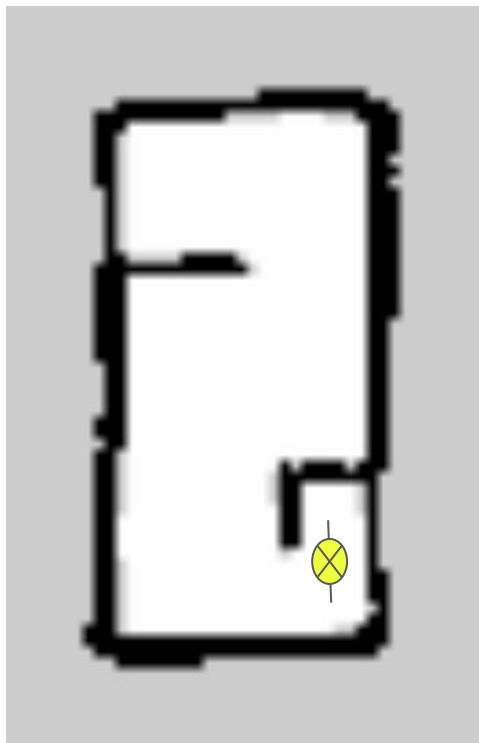
# 1. Solution Overview(system design)



## Main Moduel

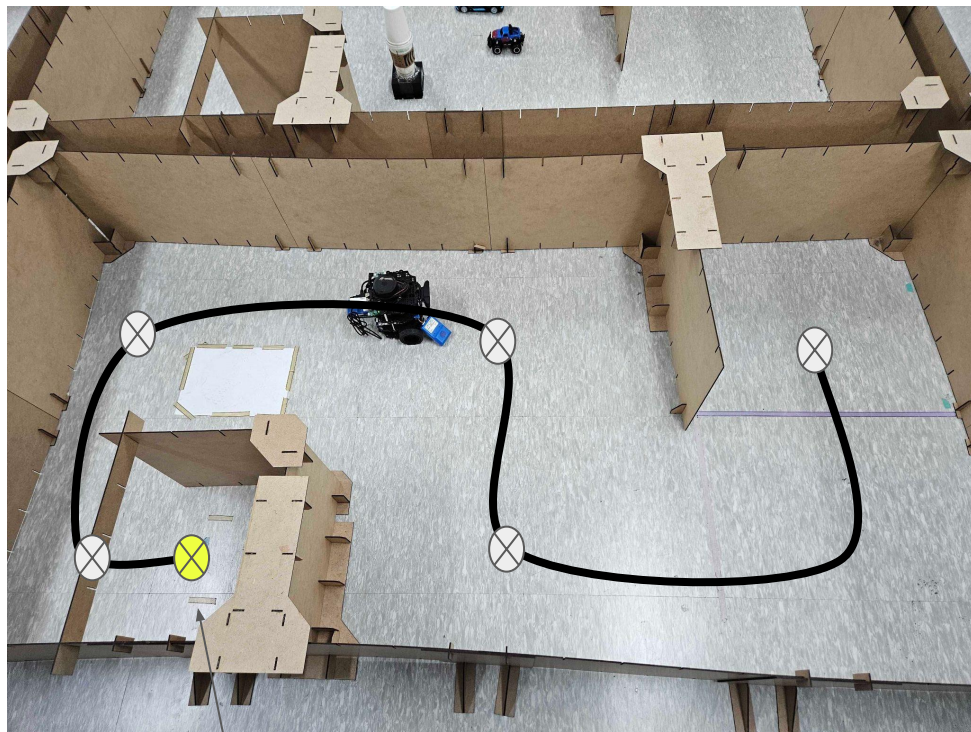
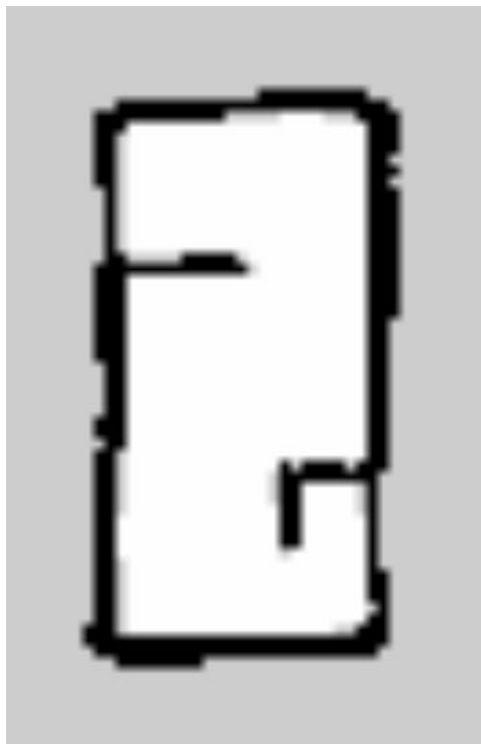
- YOLOv8 Tracking
- OpenCV
- GUI(pyQT,Rviz2)
- Nav2
- SLAM(Cartographer)

inital\_pose



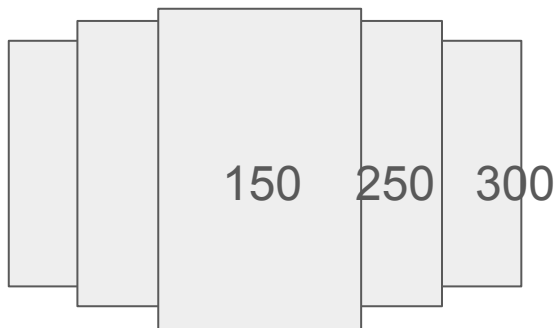
```
position.x = 0.11807980388402939 # X-coordinate  
position.y = 0.17090362310409546 # Y-coordinate  
position.z = 0.0 # Z should be 0 for 2D navigation
```

# Waypoint설정



initial pose

# 추적 기능



```
if target_width < 150: # Target is far, move forward faster
    twist.linear.x = 0.4
elif target_width < 250: # Target is moderately far, move forward slowly
    twist.linear.x = 0.2
elif target_width > 300: # Target is too close, move backward
    twist.linear.x = -0.1
else: # Target is at the desired distance
    twist.linear.x = 0.0
```

```
if target_center_x < self.frame_center - 30: # Target is to the right
    twist.angular.z = -0.15
elif target_center_x > self.frame_center + 30: # Target is to the left
    twist.angular.z = 0.15
else: # Target is centered
    twist.angular.z = 0.0
```

## 2. Key Issues and Challenges

1. NavToPose 두 점 왕복 시 계속 벽에 걸림  
-> Waypoint로 경유지 추가 설정
2. Data Publisher&Service 속도가 느림  
=> Compressed img 로 전송
3. Kid Object와 Dummy Object 색이 같아 bbox 면적이 비슷해지면 인식이 혼동됨  
=> 학습 데이터 증가 계획, 시간 부족
4. Kid Object가 2개일 경우 어느 쪽을 추적을 할 지 못 정함  
=> kid 객체들에게 번호 부여하는 코드



### 3. Required Solution Improvements

#### ❖ 기능

1. 장애물
2. 사용자 UI개발(Flask, SQLite3) , Monitoring system 구현
3. 외부 시스템과의 협력
  - 외부 신호 전송 시스템 구축

#### ❖ 성능

1. 객체 학습 모델 개선
  - 학습량, Accuracy 개선
  - Tracking
2. 테스트 강화 - unit test, simulation(gazebo), AMR
3. scenario

## 4. Lesson Learned

1. 오류 메시지와 로그를 분석하여 디버깅 능력 향상
2. 다양한 상황에 적용 가능한 해결 방법을 배웠음
3. ROS2 system에서 system design 의 중요성
4. ROS2 통신 구조
5. ROS2 툴의 사용, 시스템상 필요성, 주요 처리 기능 -Rviz, Nav2
6. 실패를 통한 학습

# 5.Team Contribution

