ROS2 Nav2, from Edouard Renard, Udemy

NOTES by ALESSANDRO PUGLISI

1) INTRODUCTION

COURSE INFORMATION

course on **Nav2 stack** for ROS2 → learn by doing !

- All done on Gazebo

KNOWLEDGE PREREQUISITE
- ROS2 basics
- Python
- Linux basics

PROGRAM
- Discover Nav2 stack by experimenting (perform SLAM on simulated robot, generate MAP and make robot Navigate on that Map)
  [PRACTICAL OVERVIEW]

- Understand how Nav2 stack works

- How to create custom simulated world in Gazebo
  + step to adapt robot for Nav2 stack

- Write code to interact with Navigation from existing ROS2 Node

WHAT IS Nav2 STACK, WHY WE NEED IT?

⇓

WHY NAVIGATION?

FIRST, *let's* consider:

Benefit of ROS2

↓

- Create base layer of your robotics application (easily)
- Standard for robotics application
- Use for ANY Robot
- "avoid reinventing the wheel" → work on high level
- Open source community
- Plug and Play packages
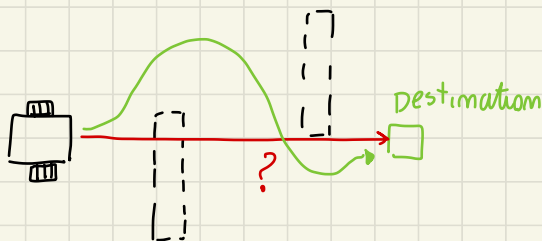
⇓

ROS speed up development time!

To implement navigation from scratch is too complex and time consuming...

⇒ we have **navigation stack** !

Nav2 in ROS2 is successor of Nav1 in ROS1

↓

Nav2 stack := A "stack" is a collection of ROS packages to achieve a specific goal

What we want to achieve in **navigation**?

Main Goal:
make Robot move
from A to B in safe way

Destination

(find path to reach destination
without obstacle / people
collisions)

⇓
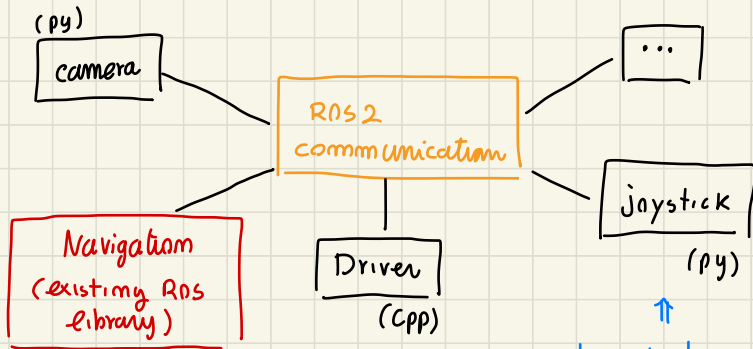
Achieved in a 2 STEP process

1) create environment map (SLAM)

2) Make Robot navigate from A to B on that map

all done using
Nav2 functionality
and tools

Once basic concept of Nav2 are clear:

⇓

Nav2 stack can be easily integrated in ROS2 application

(py)

camera

ROS 2
communication

...

joystick

Navigation
(existing ROS
library)

Driver

(Cpp)

(py)

⇑

by indipendent py
mode, we can give commands
to the stack and make
robot navigate with
simplifyed API

2) **SETUP AND INSTALLATION**

This course is done With   this ensure stable Nav2

{ • ROS2 Humble (long term 2022 support ROS ↑ distribution)

{ • Ubuntu 22.04

      ↳ anyway this is valid for other ROS2 distribution

      (With ROS2 Foxy, when the course was done,

           several bugs and issue occurs)

• FIRST, install ROS2 Humble in Ubuntu 22.04

• THEN, install packages needed for Nav2

      ros-humble-navigation2   } will install collection of

      ros-humble-nav2-bringup   packages

   + turtlebot3: it is a mobile base robot with an already implemented
          complete simulation

     ros-humble-turtlebot3✱ ← install all turtlebot3 packages

• FINALLY, install additional tools that will be used ...

     colcom: build tool for ROS2, Not installed by default
        ↓   when you install ROS2
     python3-colcom-commmom-extensions

     git : needed to get code for GitHub repo

     terminator: to open different terminal on same window
     (usefull to split horiz/vert the terminal)
       { CTRL + SHIFT + O (horiz split)
       { CTRL + SHIFT + E (vertical split)
     good also for customization of terminal

VSCode IDE to write code im C++, Pythom
     ↓
Im <u>Extemsioms</u> for ROS2 code { • ROS (valid also for ROS2)
                                    this well imstall also additiamal extensioms
                                    • CMake (good for CMake.txt codimg)

Note for GAZEBO:
  IF Gazebo give errors when lcumched, try rummimg
                • /usr/share/gazebo/setup sh
                    ↑
            IF this salve the issue ⇒ add to   .bashrc