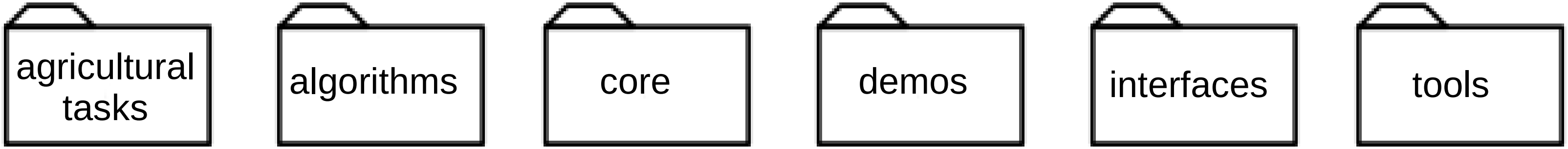
Workspace organization



agricultural tasks

algorithms

core

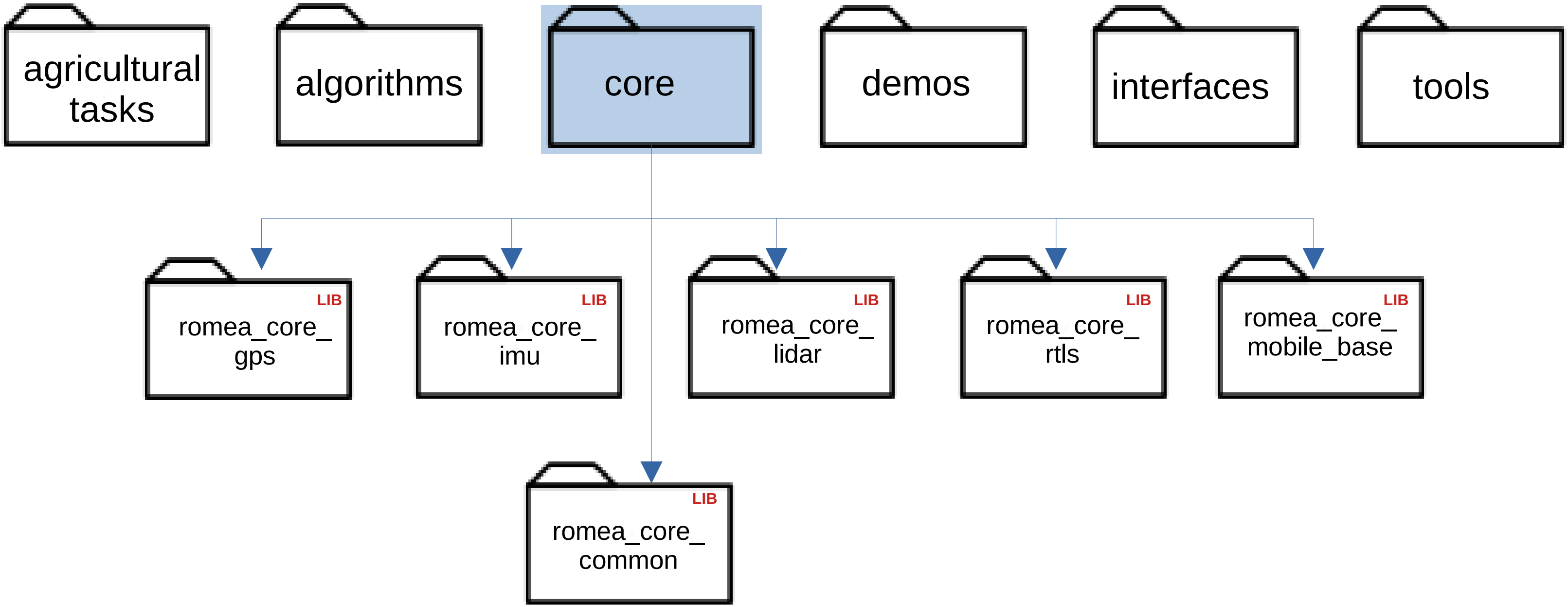
demos

interfaces

tools

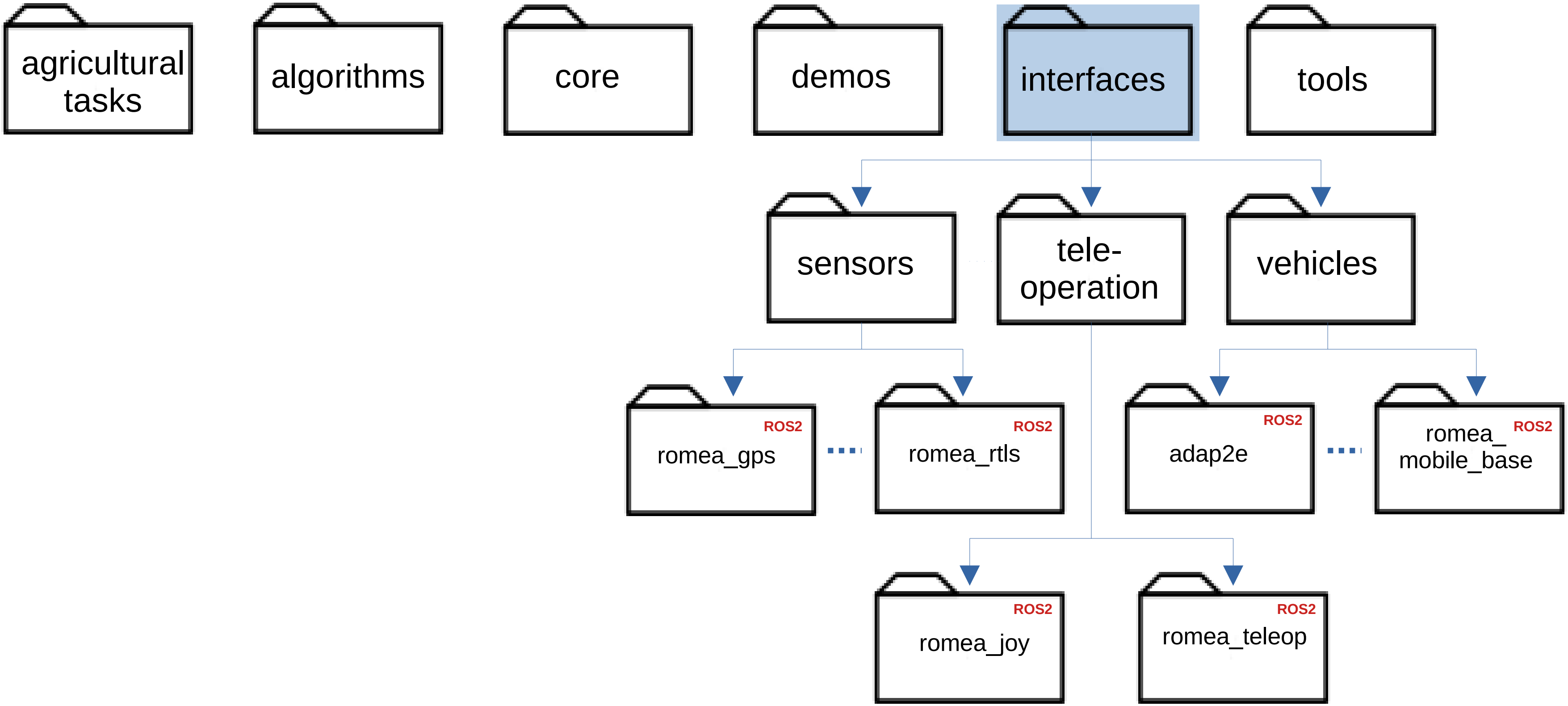
Workspace organization

Core librairies



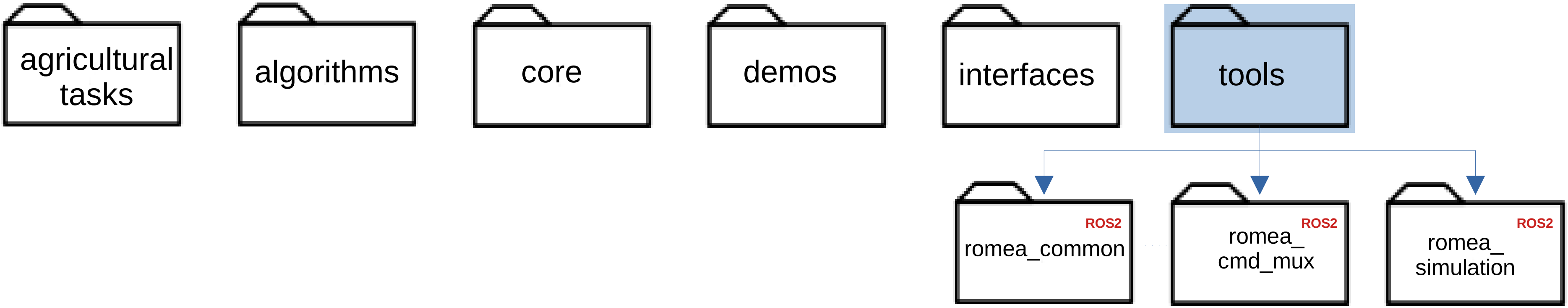
Workspace organization

Device interfaces packages



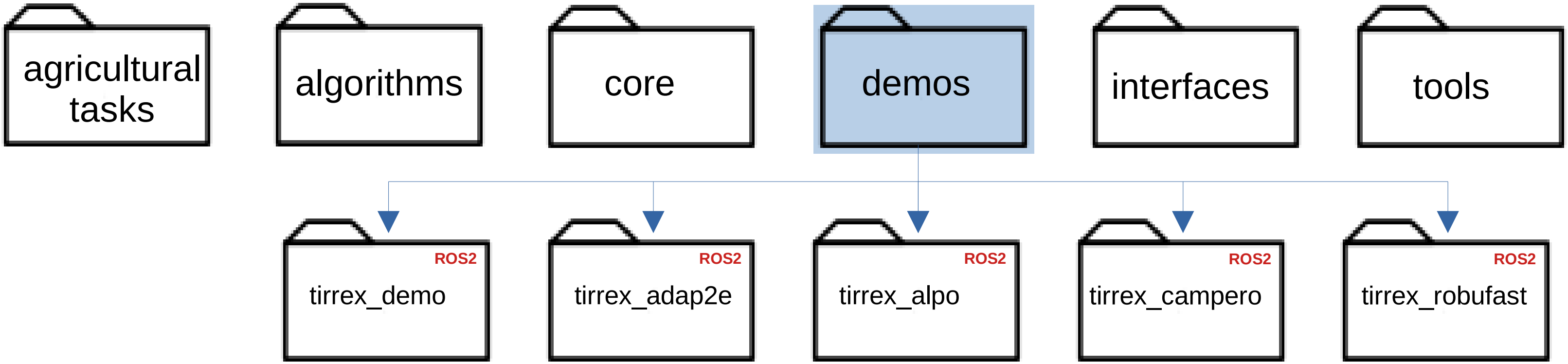
Workspace organization

Tools packages



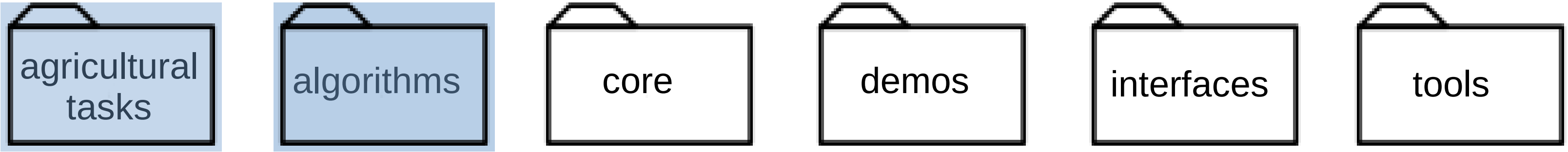
Workspace organization

Demo packages



Workspace organization

Future packages



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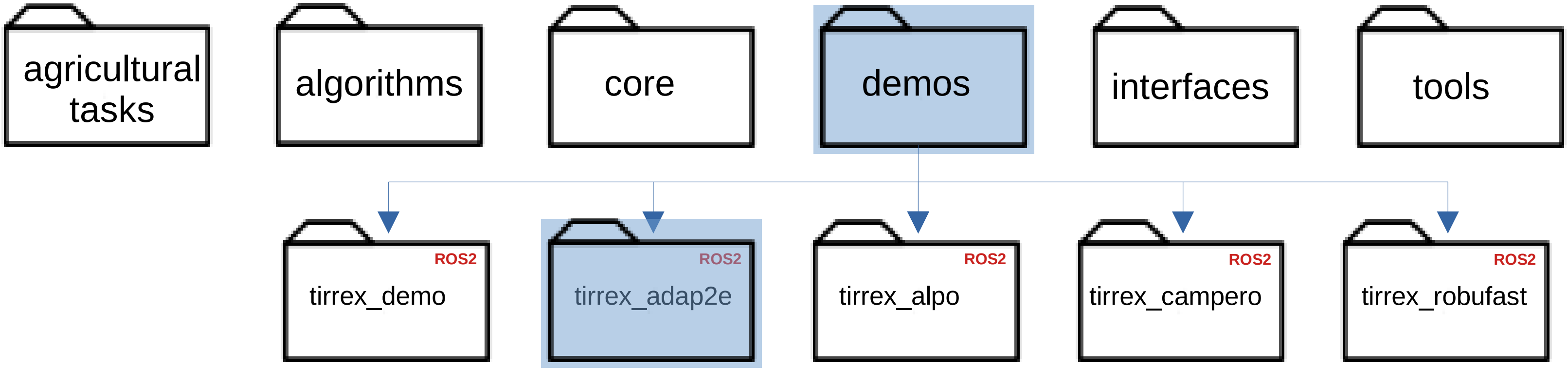
Ouverture de certains algorithmes de l'INRAE

- localisation wgs84 (last quater of 2023)
- suivi de trajectoire (2024)

Workspace organization

Demo packages



agricultural tasks

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ROS2

tirrex_demo

ROS2

tirrex_adap2e

ROS2

tirrex_alpo

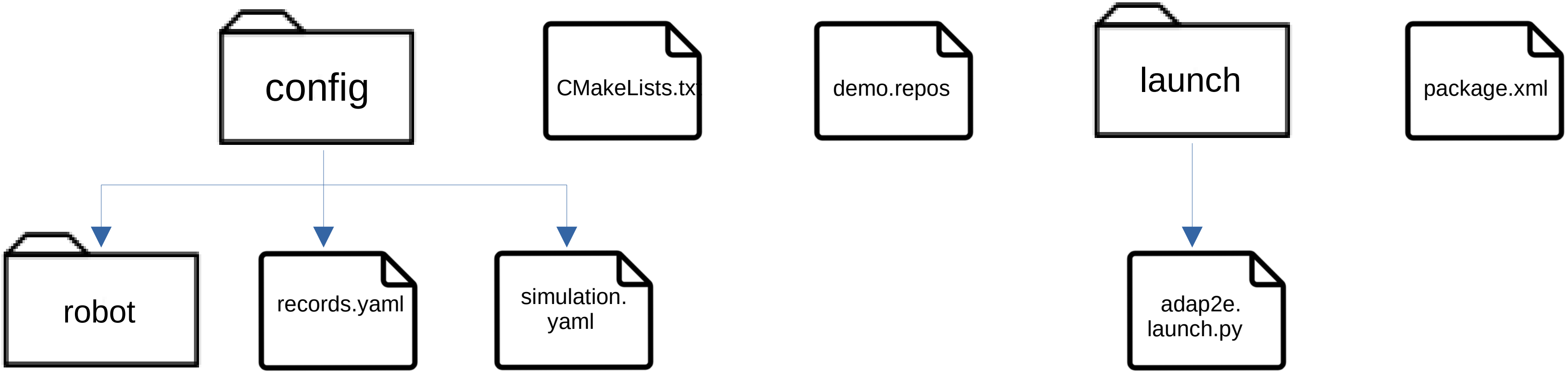
ROS2

tirrex_campero

ROS2

tirrex_robufast

Demo organization



config

CMakeLists.tx

demo.repos

launch

package.xml

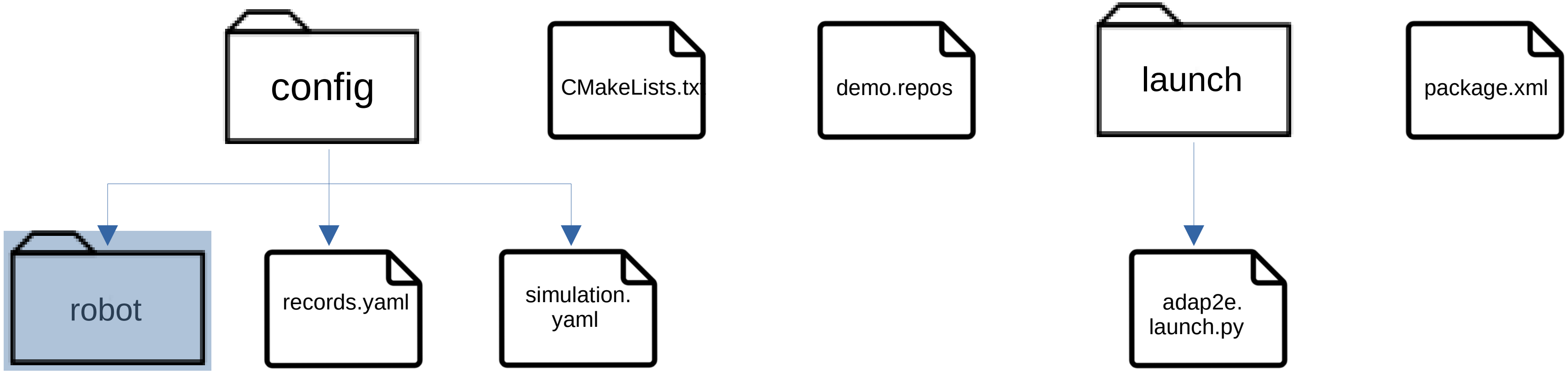
robot

records.yaml

simulation.
yaml

adap2e.
launch.py

Demo organization



config

CMakeLists.tx

demo.repos

launch

package.xml

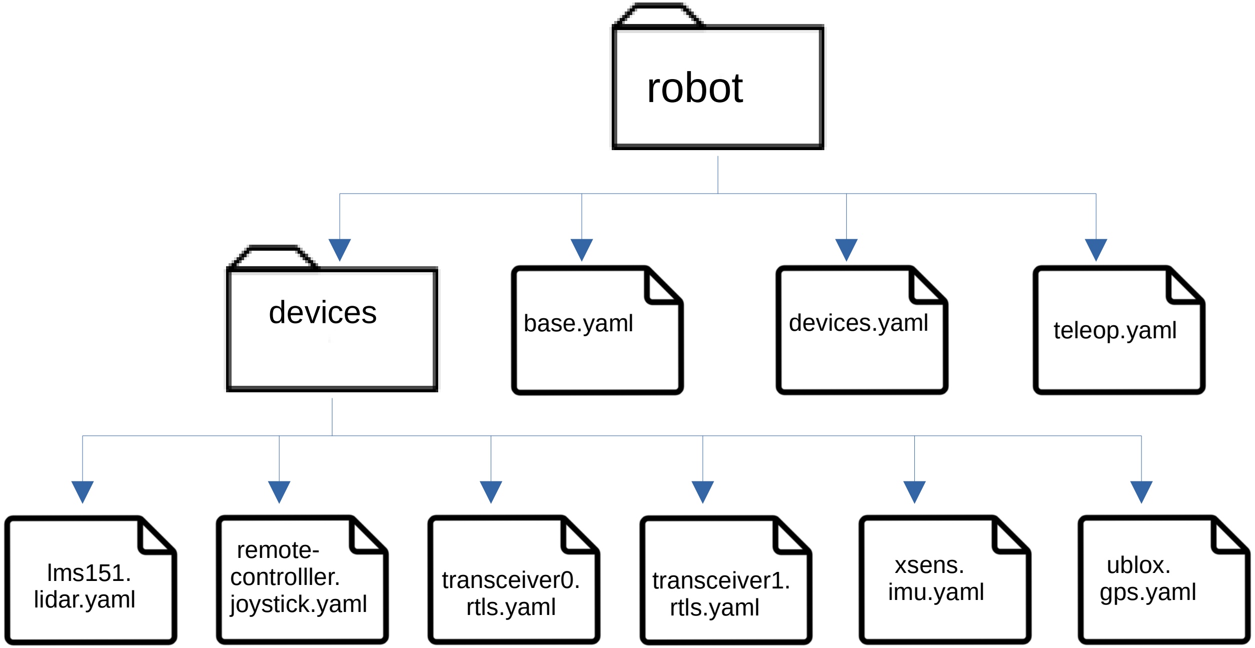
robot

records.yaml

simulation.
yaml

adap2e.
launch.py

Robot configuration



URDF description :

```
ros2 run romea_demo robot_description.py
  mode:live or simulation
  robot_namespace:adap2e
  robot_configuration_directory:robot_directory_path
```

Launch :

```
ros2 launch romea_demo robot.launch.py
  mode:=live or simulation
  robot_namespace:=adap2e
  robot_configuration_directory:=robot_directory_path
  urdf_description:= user_description ( optional, by default
urdf_description parameter is the result of urdf description script)
```

More info :

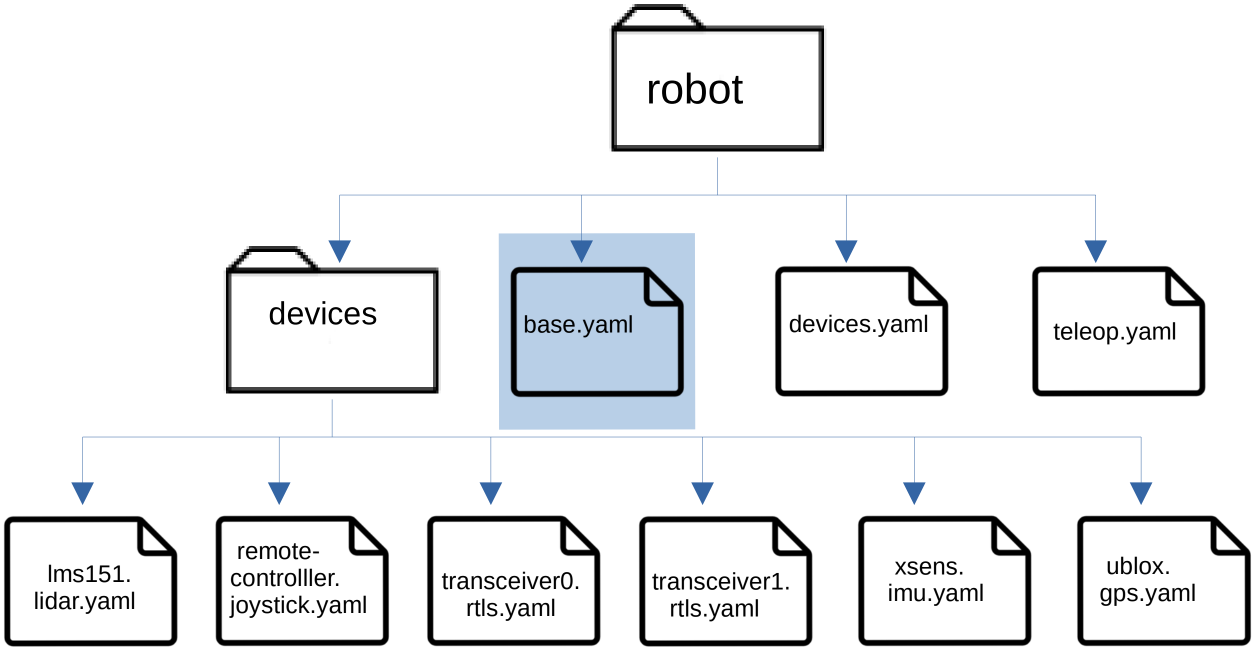
tirrex_demo package

Examples :

```
-ros2 run tirrex_demo robot_description.py mode:live robot_namespace:adap2e robot_configuration_directory:path_to_demo/config/robot  > robot.urdf
-ros2 launch tirrex_demo robot.launch.py mode:=live robot_namespace:=adap2e robot_configuration_directory:=path_to_demo/config/robot
 (warning in simulation mode gazebo must be launch before by using ros2 launch gazebo_ros gazebo.launch.py)
```

Robot configuration

Mobile base



Meta-description:

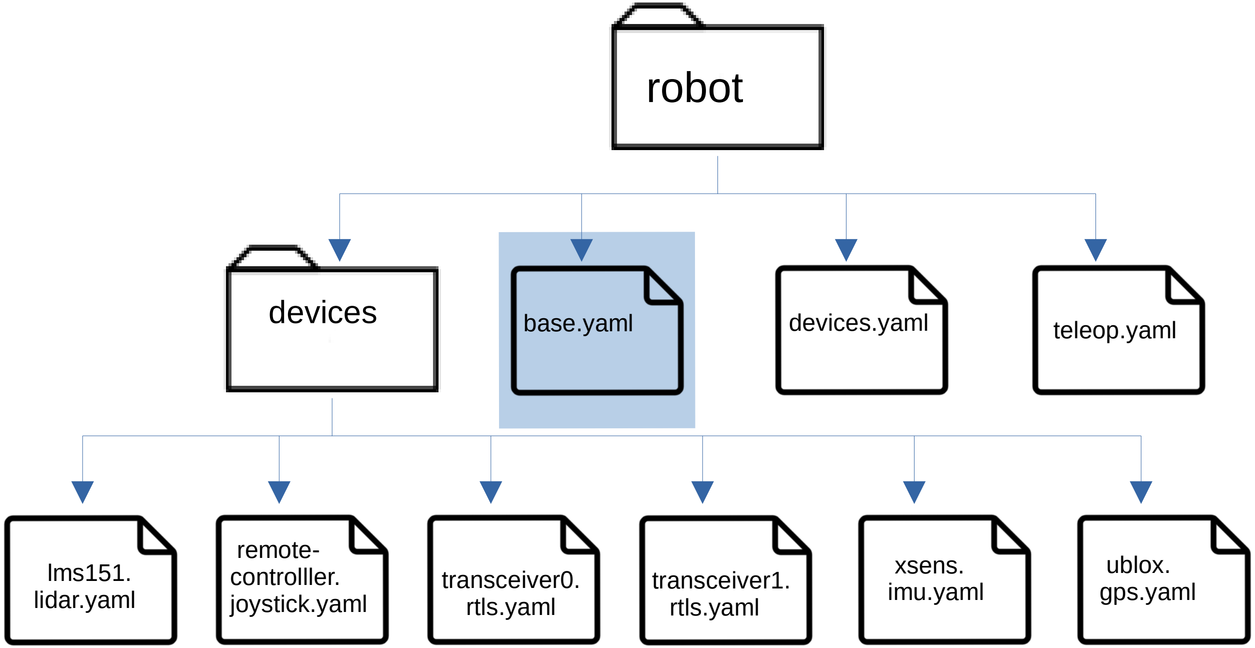
```
name: "adap2e"
configuration:
  type: adap2e
  model: fat
records:
  joint_states : true
  controller/odom : true
  controller/odometry : true
  controller/kinematic : true
simulation:
  initial_xyz: [0.0, 0.0, 0.0]  # meters
  initial_rpy: [0.0, 0.0, 0.0]  # degrees
```

Supported robots :

- adap2e (fat and slim models)
- alpo (pom and 4x4 models)
- aroco
- campero (rubber model)
- effitbote3 (simulation only)
- robucar

Robot configuration

Mobile base



URDF Description:

ros2 run romea_mobile_base_bringup urdf_description.py
mode: live or simulation
robot_namespace:adap2e
meta_description_file_path:path to base meta-description file

Launch :

ros2 run romea_mobile_base_bringup mobile_base.launch.py
mode:=live or simulation
robot_namespace:=adap2e
meta_description_file_path:=path to base meta-description file

More info :

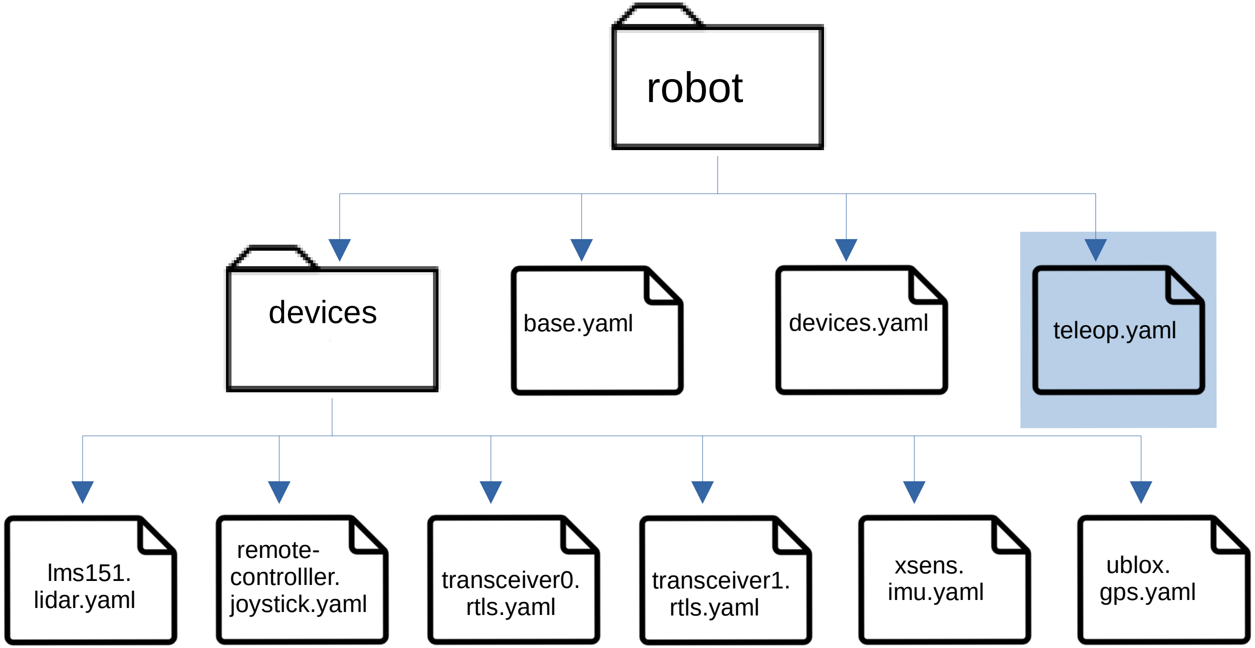
- romea_mobile_base stack

Examples :

-ros2 run romea_mobile_base_bringup urdf_description.py mode:live robot_namespace:adap2e meta_description_file_path:path_to_demo/config/robot/base.yaml > base.urdf
-ros2 launch romea_mobile_base_bringup robot.launch.py mode:=live robot_namespace:=adap2e meta_description_file_path:=path_to_demo/config/robot/base.yaml
(warning in simulation mode gazebo must be launch before by using ros2 launch gazebo_ros gazebo.launch.py)

Robot configuration

Teleoperation



Meta-description:

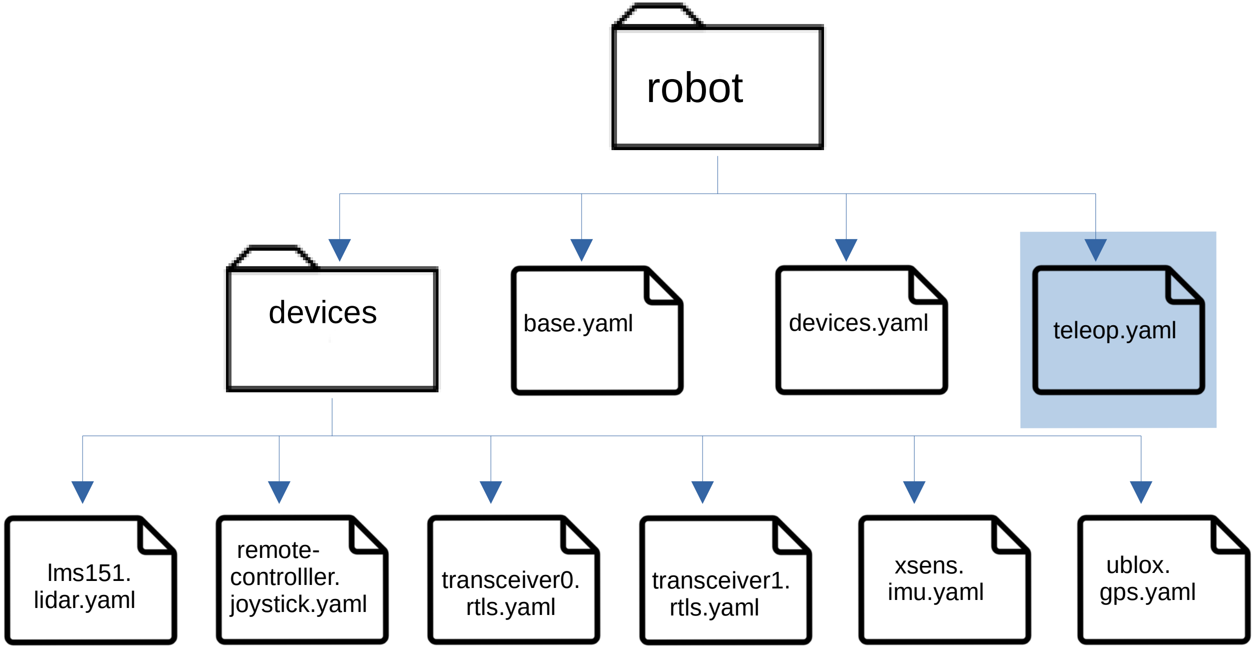
```
 cmd_output:
   message_type:     romea_mobile_base_msgs/TwoAxleSteeringCommand
   message_priority: 100
 cmd_range:
   maximal_linear_speed:
     slow_mode: 1.0  # m/s
     turbo_mode : 2.0 # m/s
   #maximal_front_steering_angle: 20.0 # degree, optional
   #maximal_rear_steering_angle:  0.0 # degree, optional
```

Supported command type:

- one axle steering (alpo)
- two_alxle_steering (aroco,robucar,adap2e)
- skid_steering (campero rubber, effibote3)
- omni_steering (campero mecanum)

Robot configuration

Teleoperation



Joystick mapping (TODO) :

ros2 run romea_teleop_bringup joystick_remapping.py

base_meta_description_file_path: path to mobile base meta-description file

joystick_meta_description_file_path: path to joystick meta-description file

teleop_configuration_file_path **:** path to teleop configuration file

Launch:

ros2 launch romea_teleop_bringup mobile_base_teleop.launch.py

robot_namespace:adap2e

base_meta_description_file_path: path to mobile base meta-description file

joystick_meta_description_file_path: path to joystick meta-description file

teleop_configuration_file_path **:** path to teleop configuration file

More info :

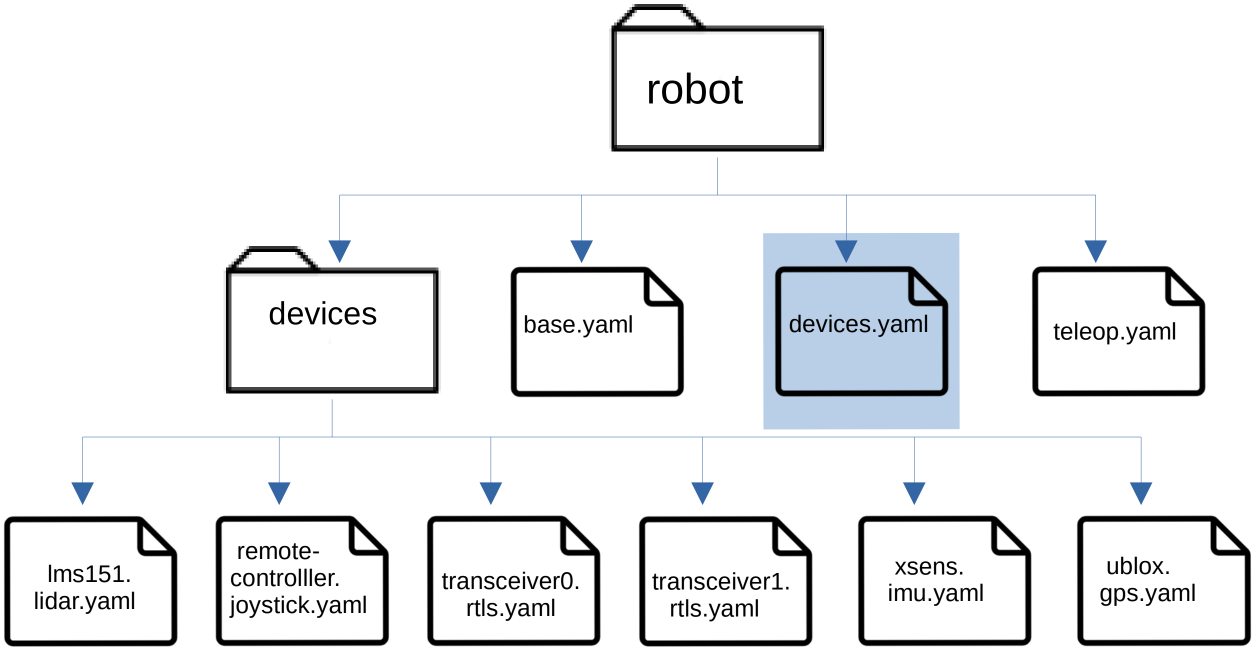
- romea_teleop stack

Examples :

-ros2 launch romea_teleop_bringup mobile_base_teleop.launch.py robot_namespace:=adap2e base_meta_description_file_path:=path_to_demo/config/robot/base.yaml joystick_meta_description_file_path:=path_to_demo/robot/devices/remote_controller.joytick.yaml teleop_configuration_file_path:=path_to_demo/config/ robot/teleop.yaml

Robot configuration

Devices selection



Devices configuration:

```
remote_controller:
  type: joystick
  available_mode: all
lms151:
  type: lidar
  available_mode: live
ublox:
  type: gps
  available_mode: none
xsens:
  type: imu
  available_mode: none
transceiver0:
  type: rtls
  available_mode: simulation
transceiver1:
  type: rtls
  available_mode: simulation
```

More info :

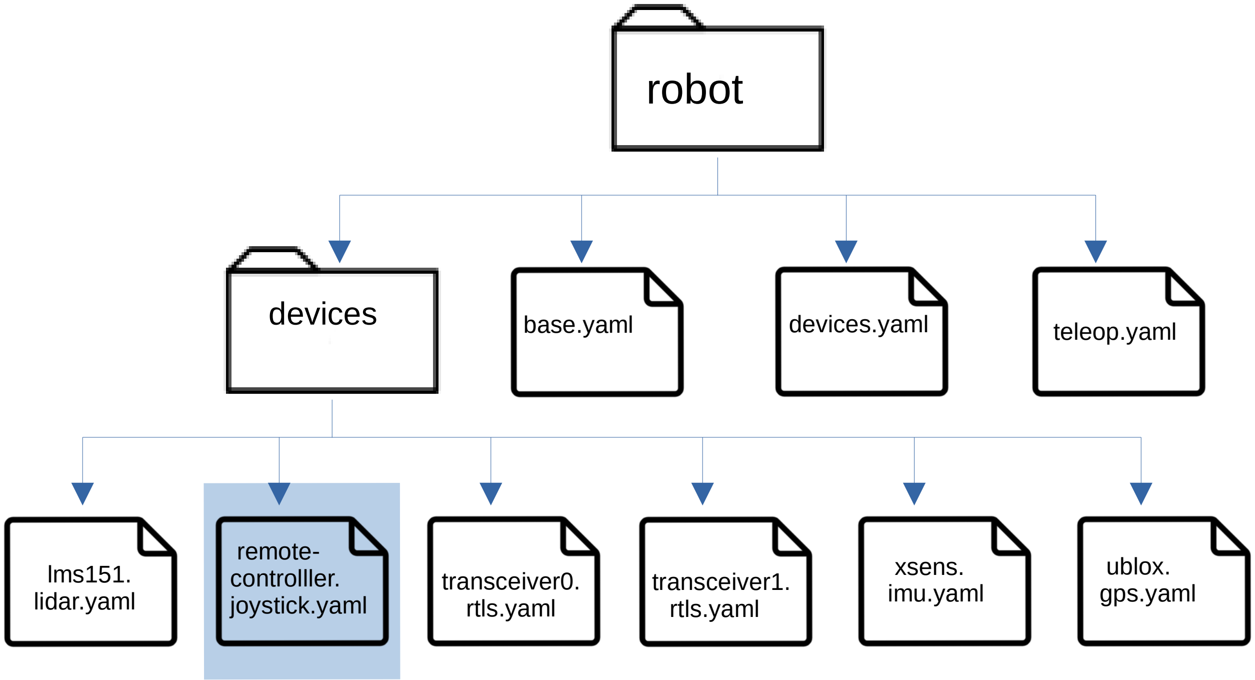
- tirrex_demo package

Examples :

```
-ros2 launch romea_demo_robot_devices.launch.py configuration_filaneme:=path_to_demo/config/robot/devices.yaml
```

Robot configuration

Joystick



robot

devices

base.yaml

devices.yaml

teleop.yaml

lms151.
lidar.yaml

remote-
controlller.
joystick.yaml

transceiver0.
rtls.yaml

transceiver1.
rtls.yaml

xsens.
imu.yaml

ublox.
gps.yaml

Meta-description :

```
name: "joystick"
driver:
  pkg: "joy"
  device: "/dev/input/js0"
  autorepeat_rate: 10.0
  deadzone: 0.1
configuration:
  type: xbox
records:
  joy: true
```

Supported driver packages:

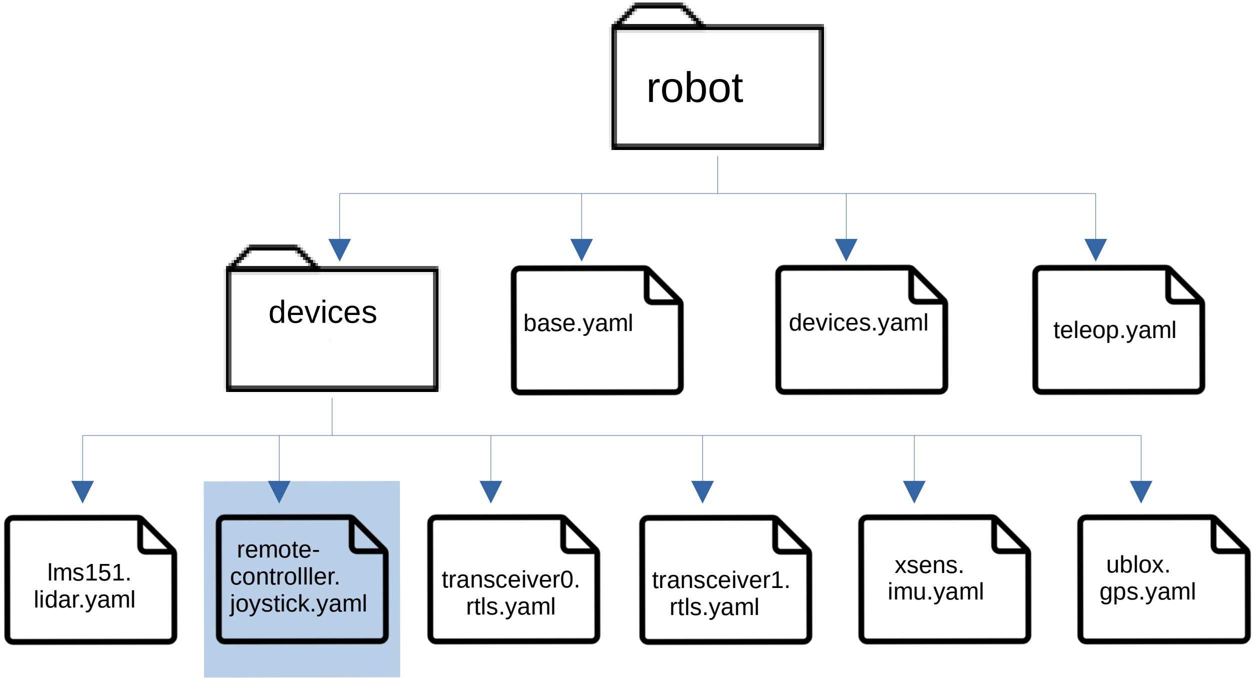
- joy
- ds4_driver

Supported joysticks:

- xbox (360, one)
- dualshock4

Robot configuration

Joystick



Launch :

ros2 launch romea_joy_bringup joystick_driver.launch.py

robot_namespace:=adap2e (optional, default = "")

meta_description_file_path:= path to joystick meta-description file

More infos :

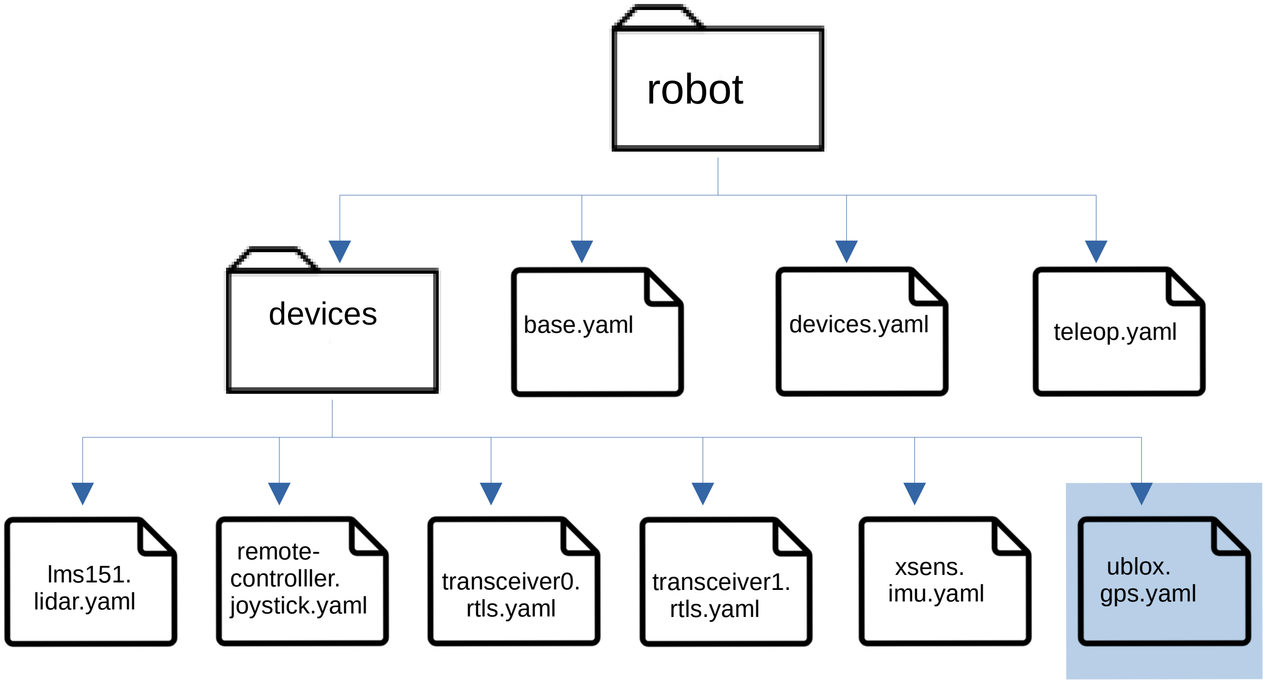
-romea joy stack

Example :

-ros2 launch romea_joystick_bringup joystick_driver.launch.py robot_namespace:=adap2e meta_description_filename:=path_to_demo/robot/config/devices/remote-controller.joystick.yaml

Robot configuration

GPS



Meta-description :

```
  name: "gps"
  driver:
    pkg: "romea_ublox_driver"
    device:  "/dev/ttyACM0"
    baudrate: 115200
  ntrip:  # optional
    pkg: "ntrip_client"
    host: caster.centipede.fr
    port: 2101
    username: centipede # optional
    password: centipede # optional
    mountpoint: MAGC
 configuration:
    type: drotek
    model: f9p
    rate: 10 # hz
geometry:
  parent_link: "base_link"
  xyz: [0.0, 0.0, 1.5]  #meters
records:
  nmea_sentence: true
  gps_fix: false
  vel: false
```

Supported driver packages :

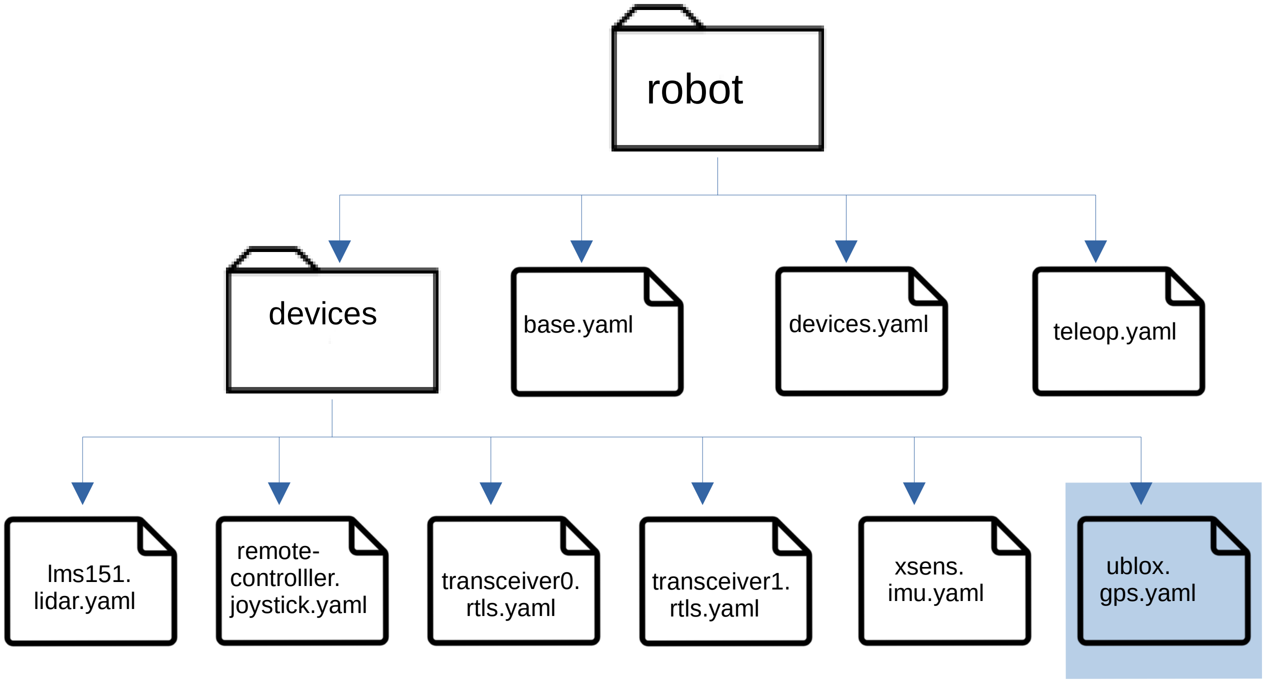
- nmea_navsat_driver
- romea_ublox_driver
- ntrip_client

Supported GPS receivers

- ublox **(** drotek fp9, ublox evk m8)
- ashtech proflex800

Robot configuration

GPS



URDF Description :

ros2 run roma_gps_bringup urdf_description.py
robot_namespace:adap2e
meta_description_file_path: absolute path to gps meta-description file

Launch :

ros2 run roma_gps_bringup gps_driver.launch.py
robot_namespace:=adap2e
meta_description_file_path:= absolute path to gps meta-description file

More info :

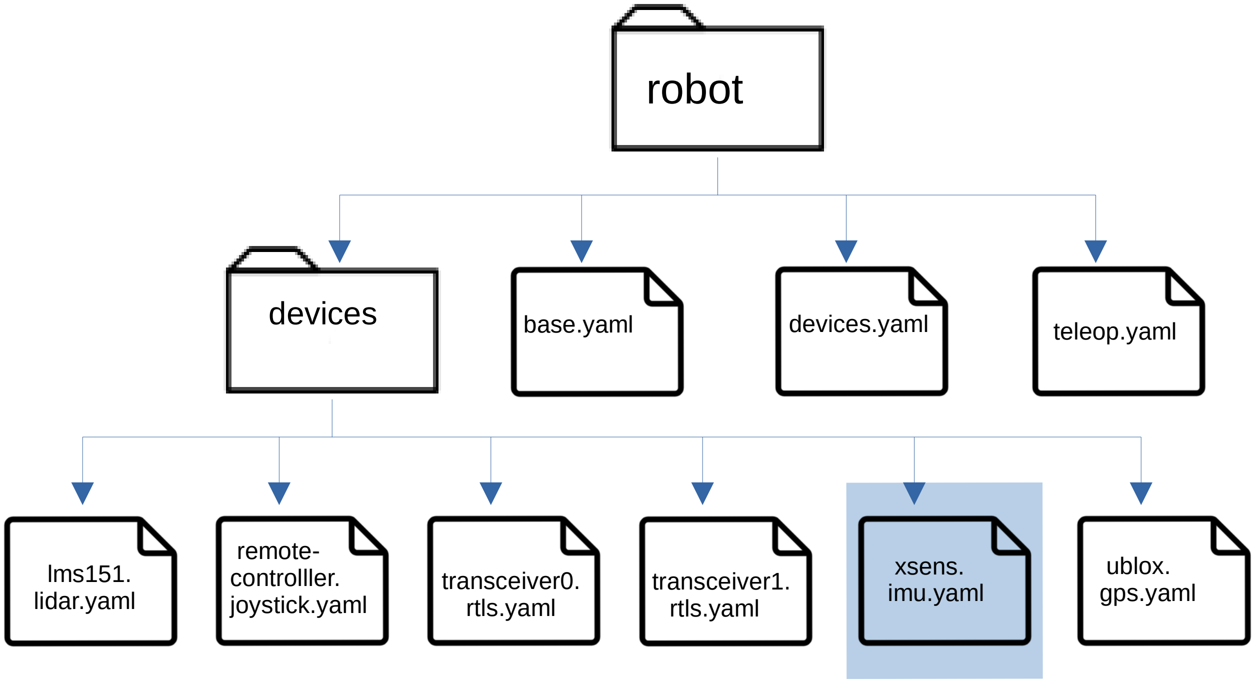
- [romea gps stack]

Examples :

-ros2 run romea_gps_bringup urdf_description.py robot_namespace:adap2e meta_description_file_path:path_to_demo/config/robot/ublox.gps.yaml > ublox.urdf
-ros2 launch romea_gps_bringup gps_driver.launch.py robot_namespace:=adap2e meta_description_file_path:=path_to_demo/config/robot/ublox.gps.yaml

Robot configuration

IMU



Meta-description :

```
name: "imu"
driver:
  pkg: "xsens_driver"
  device:  "/dev/ttyUSB0"
  baudrate: 115200
configuration:
  type: xsens
  model: mti
  rate: 100  #hz
geometry:
  parent_link: "base_link"
  xyz: [0.0, 0.0, 1.0]  #meters
  rpy: [0.0, 0.0, 0.0]  #degrees
records:
  data: true
```

Supported driver packages :

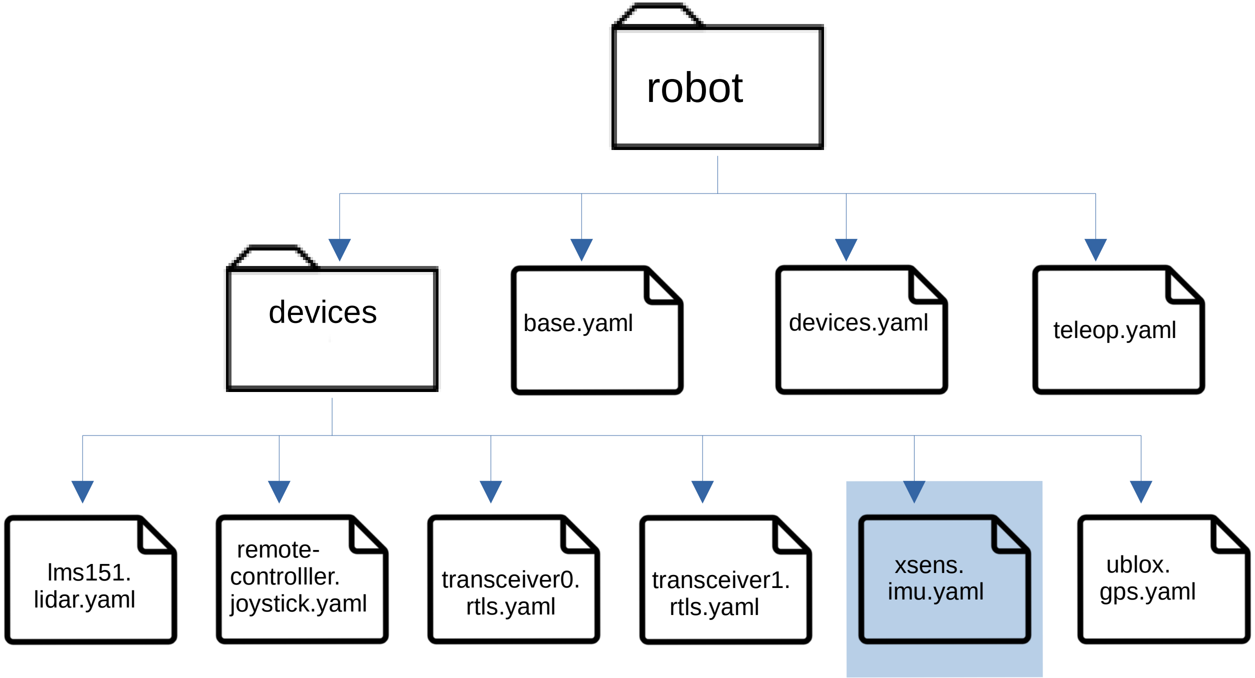
- bluespace_ai_xsens_mti_driver
- xsens_driver

Supported IMU sensors:

- xsens (models mti and mti6xx)

Robot configuration

IMU



robot

devices

base.yaml

devices.yaml

teleop.yaml

lms151.
lidar.yaml

remote-
controlller.
joystick.yaml

transceiver0.
rtls.yaml

transceiver1.
rtls.yaml

xsens.
imu.yaml

ublox.
gps.yaml

URDF Description :

ros2 run roma_imu_bringup urdf_description.py
robot_namespace:adap2e
meta_description_filename:path to imu meta-description file

Launch :

ros2 run roma_imu_bringup imu_driver.launch.py
robot_namespace:=adap2e
meta_description_filename:=path to imu meta-description file

More info :

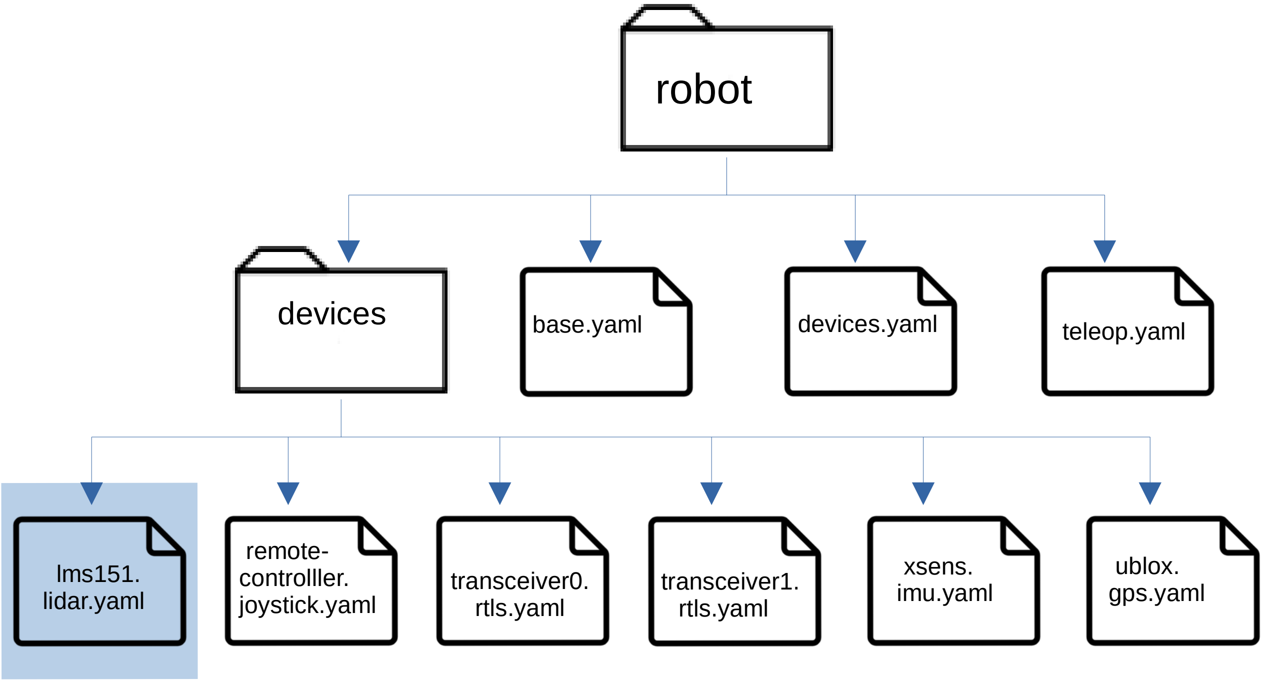
- romea imu stack

Examples :

```
-ros2 run romea_imu_bringup urdf_description.py robot_namespace:adap2e meta_description_filanem:path_to_demo/config/robot/devices/xsens.imu.yaml  > xsens.urdf
-ros2 launch romea_imu_bringup imu_driver.launch.py robot_namespace:=adap2e meta_description_file_path:=path_to_demo/config/robot/devices/xsens.imu.yaml
```

Robot configuration

LIDAR



Meta-description:

```
name: "lidar"
driver:
  pkg: "sick_scan"
  ip:  "192.168.1.112"
  port: 2112
configuration:
  type: sick
  model: lms151
  rate: 50  # hz
  resolution:  0.5 # degree
geometry:
  parent_link: "base_link"
  xyz: [2.02, 0.0, 0.34]  # meters
  rpy: [0.0, 0.0, 0.0]  # degrees
records:
  scan: true
  cloud: false
```

Supported driver packages :

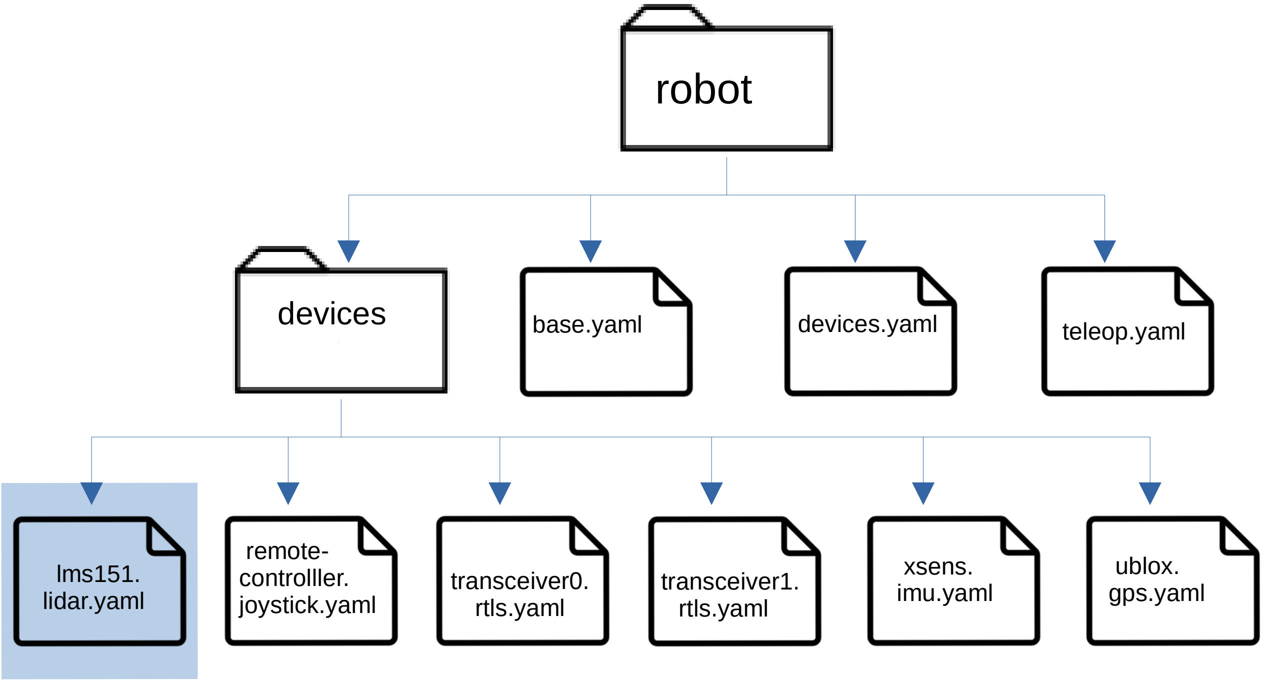
- **sick_scan**

Supported lidars :

- **sick (lms1xx,tim5xx)**

Robot configuration

LIDAR



URDF Description :

```
ros2 run roma_lidar_bringup urdf_description.py
  robot_namespace:adap2e
  meta_description_filename:path to lidar meta-description file
```

Launch :

```
ros2 run roma_lidar_bringup lidar_driver.launch.py
  robot_namespace:=adap2e
  meta_description_filename:=path to lidar meta-description file
```

More info :

- **romea_lidar_stack**

Examples :

```
-ros2 run romea_lidar_bringup urdf_description.py robot_namespace:adap2e meta_description_file_path:path_to_demo/config/robot/lms151.lidar.yaml  > lms151.urdf
-ros2 launch romea_lidar_bringup lidar_driver.launch.py robot_namespace:=adap2e meta_description_file_path:path_to_demo/config/robot//lms151.lidar.yaml
```

Robot configuration

Bridge (Campero, Alpo….)

Adap2e

Meta-description:

```
name: "lidar"
driver:
  pkg: "sick_scan"
  ip:  "192.168.1.112"
  port: 2112
configuration:
  type: sick
  model: lms151
  rate: 50  # hz
  resolution:  0.5 # degree
geometry:
  parent_link: "base_link"
  xyz: [2.02, 0.0, 0.34]  # meters
  rpy: [0.0, 0.0, 0.0]  # degrees
records:
  scan: true
  cloud: false
```

Campero

Meta-description:

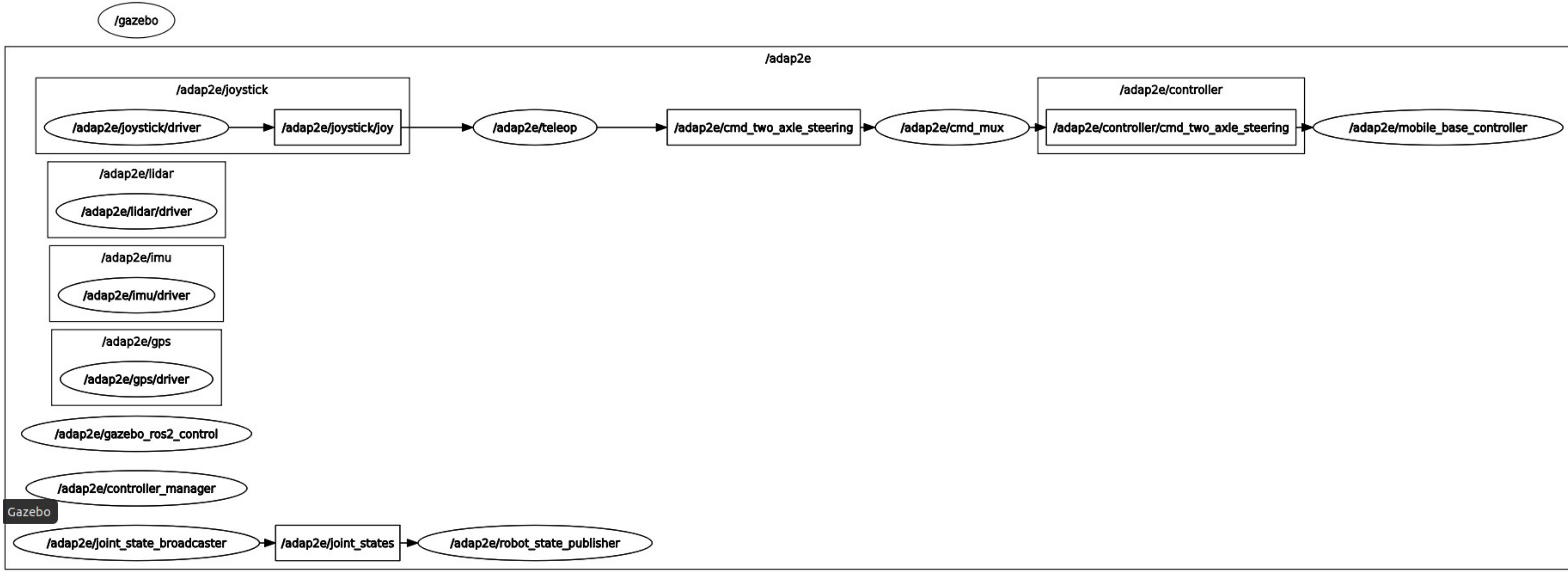
```
name: "front_lidar"
configuration:
  type: sick
  model: lms151
  rate: 50  # hz
  resolution:  0.5 # degree
geometry:
  parent_link: "base_link"
  xyz: [0.490, -0.300, 0.3513]  # meters
  rpy: [180.0, 0.0, -45.0]  # degrees
records:
  scan: true
bridge:
  scan: /campero_bridge/front_laser/scan
```

Complete remapping used by algorithms, applications…
/robot_name/front_lidar/scan : /campero_bridge/front_laser/scan

❗ Only a driver or a bridge into a Meta-description

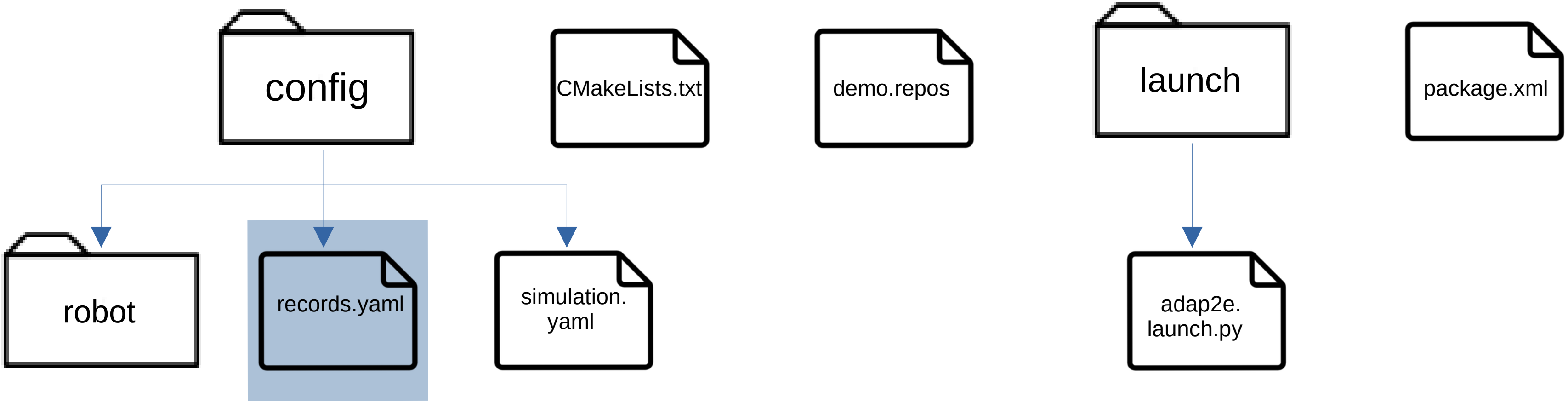
Robot Simulation

Nodes graph



Demo configuration

Record/Replay



Records configuration:

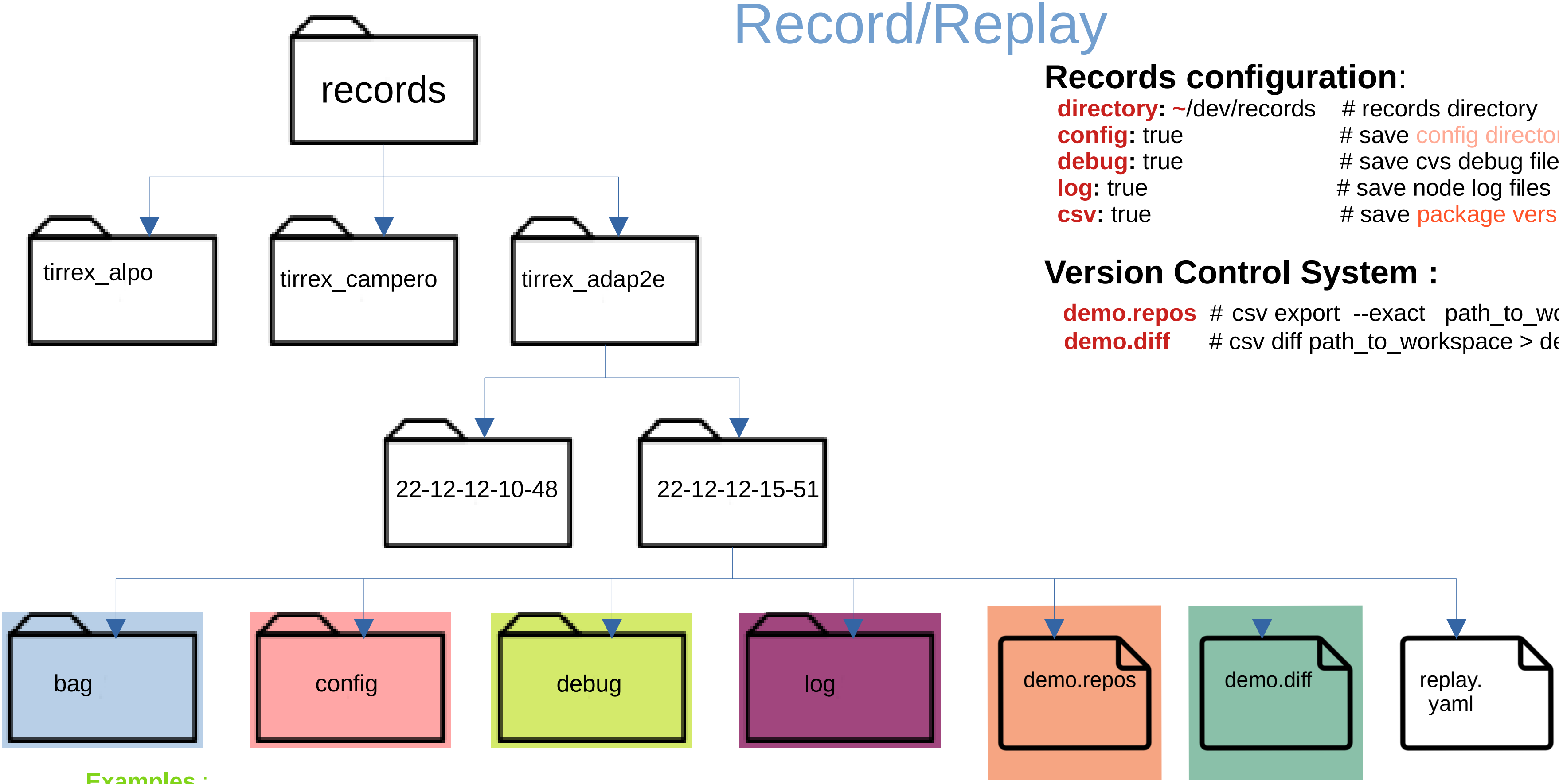
```
directory: ~/dev/records    # records directory
config: true                # save config directory
debug: true                 # save cvs debug files into debug directory
log: true                   # save node log files into log directory
csv: true                   # save package versions and source codes diff
```

Examples :

- ros2 launch tirrex_adap2e adap2e.launch.py mode:=simulation record:= true

Demo configuration

Record/Replay



records

tirrex_alpo

tirrex_campero

tirrex_adap2e

22-12-12-10-48

22-12-12-15-51

bag

config

debug

log

demo.repos

demo.diff

replay.
yaml

Records configuration:

```
directory: ~/dev/records    # records directory
config: true                # save config directory
debug: true                 # save cvs debug files into debug director
log: true                   # save node log files into log directory
csv: true                   # save package versions and source codes diff
```

Version Control System :

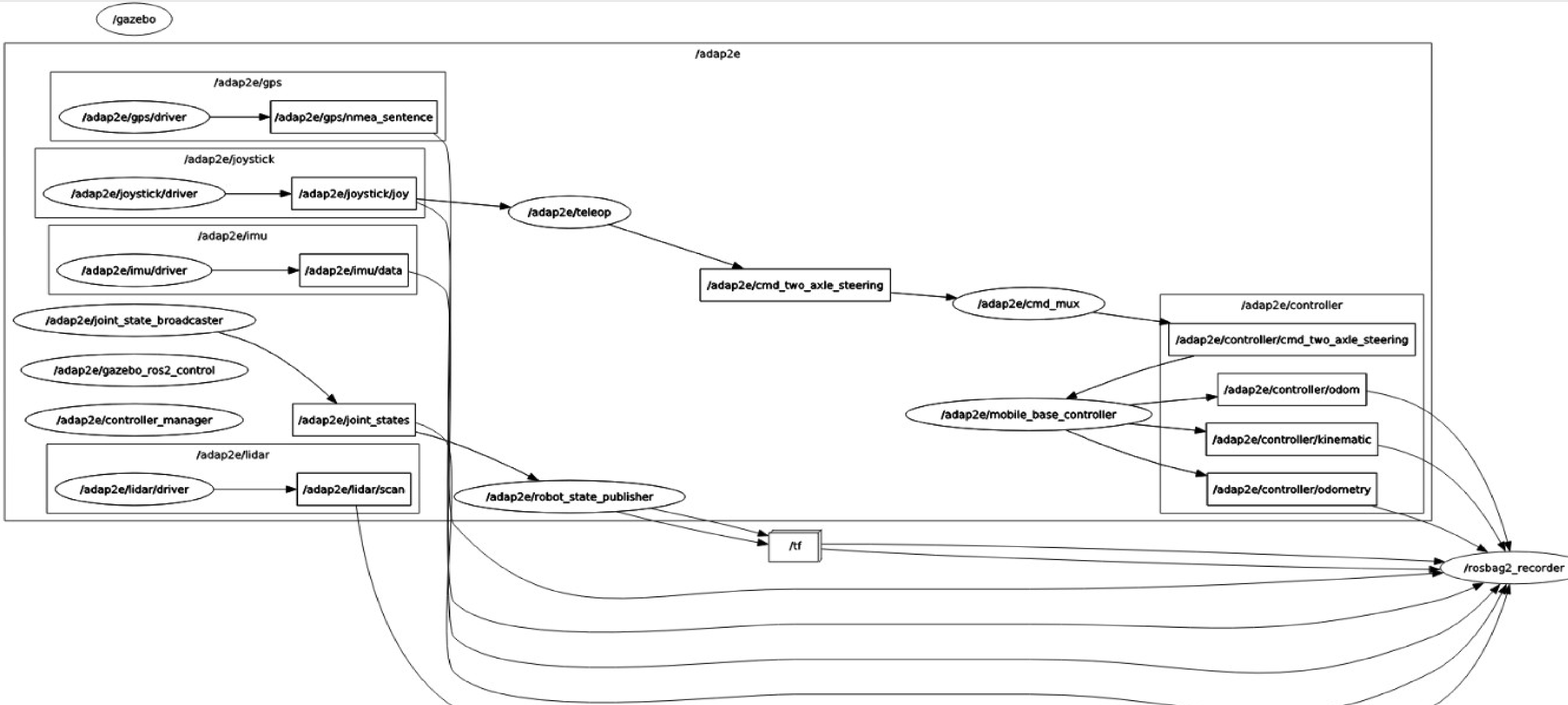
```
demo.repos  # csv export  --exact  path_to_workspace >  demo.repos
demo.diff   # csv diff path_to_workspace > demo.diff
```

Examples :

- ros2 launch tirrex_adap2e adp2e.launch.py mode:=simulation record:= true
- ros2 launch tirrex_demo replay.launch.py   replay_directory:=~dev/records/tirrex_adap2e/22-12-12-15-51

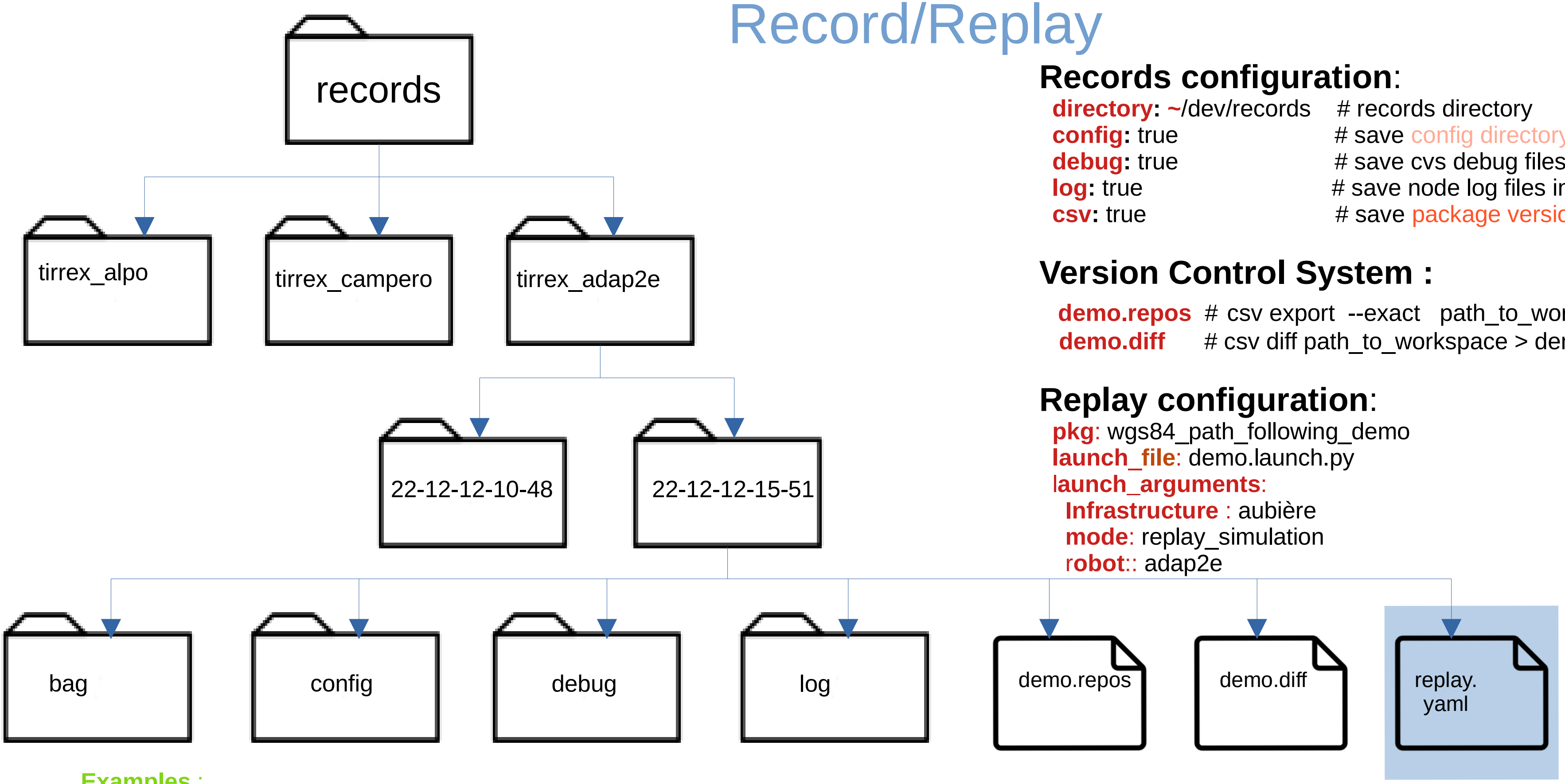
Demo configuration

Record/Replay



Demo configuration

Record/Replay



Records configuration:

```
directory: ~/dev/records     # records directory
config: true                 # save config directory
debug: true                  # save cvs debug files into debug director
log: true                    # save node log files into log directory
csv: true                    # save package versions and source codes diff
```

Version Control System :

```
demo.repos  # csv export  --exact  path_to_workspace >   demo.repos
demo.diff   # csv diff path_to_workspace > demo.diff
```

Replay configuration:

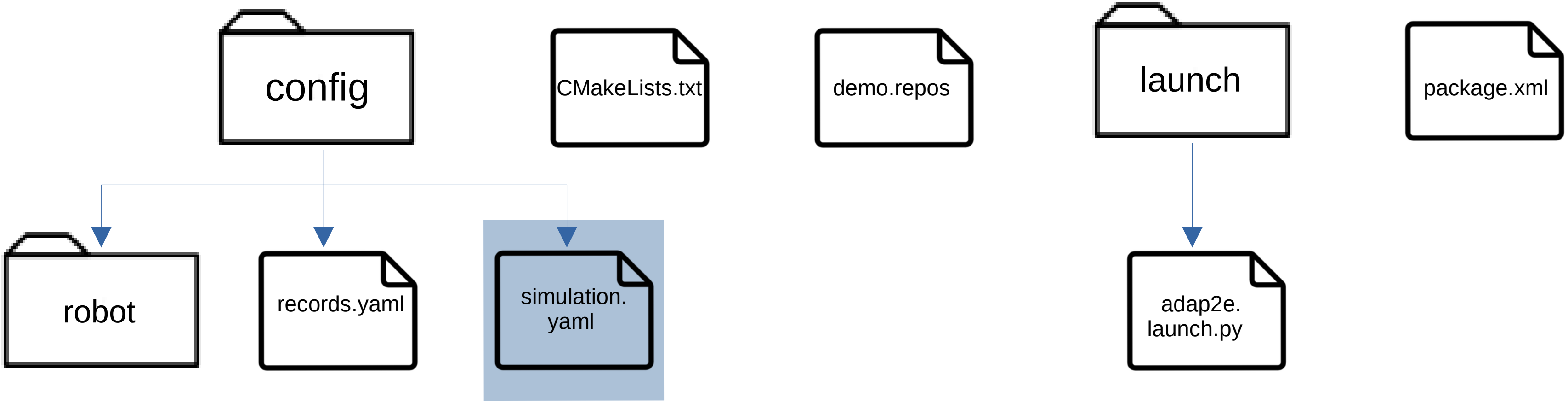
```
pkg: wgs84_path_following_demo
launch_file: demo.launch.py
launch_arguments:
  Infrastructure : aubière
  mode: replay_simulation
  robot:: adap2e
```

Examples :

- ros2 launch tiirex_adap2e adap2e.launch.py mode:=simulation records:= true
- ros2 launch romea_demo replay.launch.py   replay_directory:~dev/records/rtirrex_adap2e/22-12-12-15-51

Demo configuration

Simulation configuration



Simulation configuration :

```
world_package: romea_simulation_gazebo_worlds
world_name: romea_small_vineyard.world
wgs84_anchor:
  latitude: 45.76265802
  longitude: 3.11000985
  Altitude: 405.839
```

More Info :

romea_simulation stack

Examples :

```
-ros2 launch romea_simulation_bringup simulator.launch.py simulation_configuration_file_path:=path_to_demo/config/simulation.yaml  simulator_type :=gazebo
```