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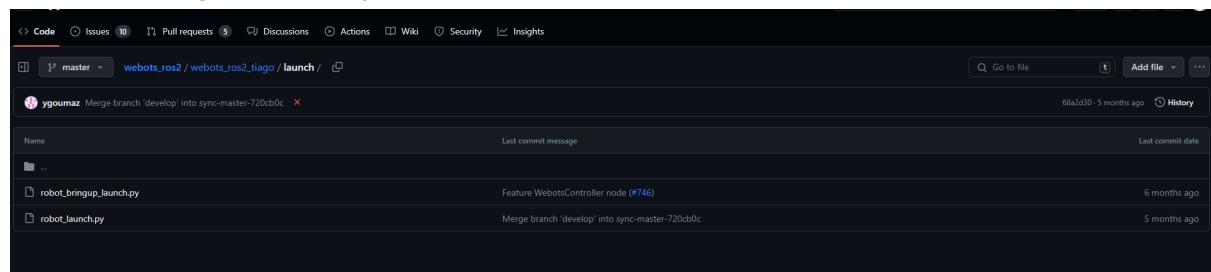
Lecture Week 3

Report Week 3 Video 1:

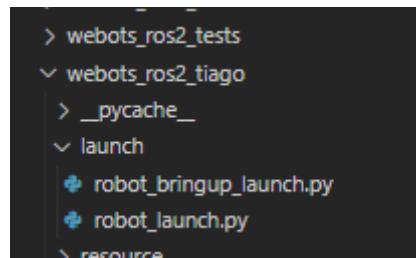
Pada Minggu pembelajaran ke 3, saya mengalami kesulitan dalam menghadapi error dalam program integrasi antara ros2 dan webots

```
indraandriansyah@DESKTOP-96IK7A2:~/ros2_ws/src$ cd ros2_ws/src/
indraandriansyah@DESKTOP-96IK7A2:~/ros2_ws/src$ ros2 launch webots_ros2_tiago tiago.launch.py
File 'tiago.launch.py' was not found in the share directory of package 'webots_ros2_tiago' which is at '/opt/ros/foxy/share/webots_ros2_tiago'
indraandriansyah@DESKTOP-96IK7A2:~/ros2_ws/src$
```

Pada gambar diatas tidak ditemukan adanya tiago.launch.py pada direcrectory webots_ros2_tiago. Hal ini juga dapat dibuktikan dari hasil git clone dari repository github webots https://github.com/cyberbotics/webots_ros2.



Kemudian setelah dilakukan git clone ke dalam direktori linux, tidak ditemukan pula launch.py di vs code.



Usaha:

Saya mencoba melakukan instalasi ulang terhadap webots dan melakukan git clone ulang namun hasilnya tetap nihil. Setelah itu, saya mencoba memanggil satu persatu file dari direktori pada folder webots_ros2_tiago yaitu robot_bringup_launch.py dan robot_launch.py.

1. robot_bringup_launch.py

```
which is at '/opt/ros/foxy/share/webots_ros2_tiago'  
indraandriansyah@DESKTOP-96IK7A2:~/ros2_ws/src$ ros2 launch webots_ros2_tiago robot Bringup  
_Launch.py  
file 'robot Bringup_Launch.py' was not found in the share directory of package 'webots_ros2_  
tiago' which is at '/opt/ros/foxy/share/webots_ros2_tiago'  
indraandriansyah@DESKTOP-96IK7A2:~/ros2_ws/src$
```

Ketika melakukan pemanggilan file, program tidak menemukan file robot Bringup_launch.py tersebut pada directory package.

2. robot_launch.py

```
file 'robot_bridge.launch.py' was not found in the share directory of package 'webots_ros2_tiago' which is at '/opt/ros/foxy/share/webots_ros2_tiago'
[robd@andrantriansyah DESKTOP-96IKTAZ: /root/.msys64/Apps/ROS2/devel] $ ros2 launch webots_ros2_tiago robot.launch
[INFO] [Launch]: All log files can be found below /home/robd@andrantriansyah/.ros/log/2023-11-18-18-34-33-923325-DESKTOP-96IKTAZ-17530
[INFO] [Launch]: Default logging verbosity is set to INFO
Webots R2023a was not found in your system.
- If you want to manually install Webots R2023a please download it from https://github.com/cyberbotics/webots/releases/tag/R2023a.
- If you already have Webots R2023a installed please then specify the 'WEBOTS_HOME' environment variable.

Do you want Webots R2023a to be automatically installed in C:\Program Files\Webots ([Y]/[N]):? Y
Installing Webots R2023a... This might take some time.
Task exception was never retrieved
future: <Task finished name='Task-2' coro=<LaunchService._process_one_event() done, defined at /opt/ros/foxy/lib/python3.8/site-packages/launch/launch_service.py:226> exception=InvalidLaunchFileError>
Traceback (most recent call last):
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/launch_description_sources/any_launch_file_utilities.py", line 53, in get_launch_description_from_any_launch_file
    return loader.launch_file_path
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/launch_description_sources/python_launch_file_utilities.py", line 68, in get_launch_description_from_python_launch_file
    return getattr(launch_file_module, "generate_launch_description")()
  File "/opt/ros/foxy/lib/python3.8/site-packages/webots_ros2_driver/webots_launcher.py", line 145, in generate_launch_description
    webots = WebotsLauncher()
  File "/opt/ros/foxy/lib/python3.8/site-packages/webots_ros2_driver/webots_launcher.py", line 71, in __init__
    handle_webots_installation()
  File "/opt/ros/foxy/lib/python3.8/site-packages/webots_ros2_driver/utils.py", line 267, in handle_webots_installation
    _install_webots(installation_directory)
  File "/opt/ros/foxy/lib/python3.8/site-packages/webots_ros2_driver/utils.py", line 226, in _install_webots
    urllib.request.urlretrieve(url + archive_name, archive_path, reporthook_on_download_progress_changed)
  File "/usr/lib/python3.8/urllib/request.py", line 257, in urlretrieve
    ftp = open(file_name, "wb")
FileNotFoundError: [Errno 2] No such file or directory: '/mnt/c/Temp/webots-R2023a_setup.exe'

The above exception was the direct cause of the following exception:

Traceback (most recent call last):
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/launch_service.py", line 228, in _process_one_event
    await self._process_event(next_event)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/launch_service.py", line 248, in _process_event
    visit_all_entities_and_collect_futures(future_identity, self._context)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/utilities/visit_all_entities_and_collect_futures.py", line 45, in visit_all_entities_and_collect_futures
    futures_to_return += visit_all_entities_and_collect_futures(sub_entity, context)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/utilities/visit_all_entities_and_collect_futures_impl.py", line 45, in visit_all_entities_and_collect_futures
    futures_to_return += visit_all_entities_and_collect_futures(sub_entity, context)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/utilities/visit_all_entities_and_collect_futures_impl.py", line 38, in visit_all_entities_and_collect_futures
    sub_entities = entity.visit(context)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/action.py", line 108, in visit
    return self.execute(context)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/actions/include_launch_description.py", line 139, in execute
    launch_description = self._load_launch_description(context)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/include_launch_description_source.py", line 84, in get_launch_description
    self._get_launch_description(self._expanded_location)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/include_launch_description_source.py", line 53, in _get_launch_description
    return get_launch_description_from_any_launch_file(location)
  File "/opt/ros/foxy/lib/python3.8/site-packages/launch/include_launch_description_source.py", line 56, in get_launch_description_from_any_launch_file
    raise InvalidLaunchFileError(incorrectly_likely_exceptions)
launch.InvalidLaunchFileError: Caught exception while trying to load file from directory: '/mnt/c/Temp/webots-R2023a_setup.exe' ☺
```

Kemudian saya mencoba melakukan pemanggilan menggunakan robot_launch.py. Hasil nya bahwa file ditemukan dan diproses untuk instalasi webots R2023a namun instalasi tidak berhasil dikarenakan terjadi invalid load data.

Berdasarkan laporan error di atas maka saya tidak dapat membuka webots di ubuntu serta melanjutkan proses pembelajaran program untuk week 3 kali ini.

Rangkuman Pembelajaran Week 3

Video 1



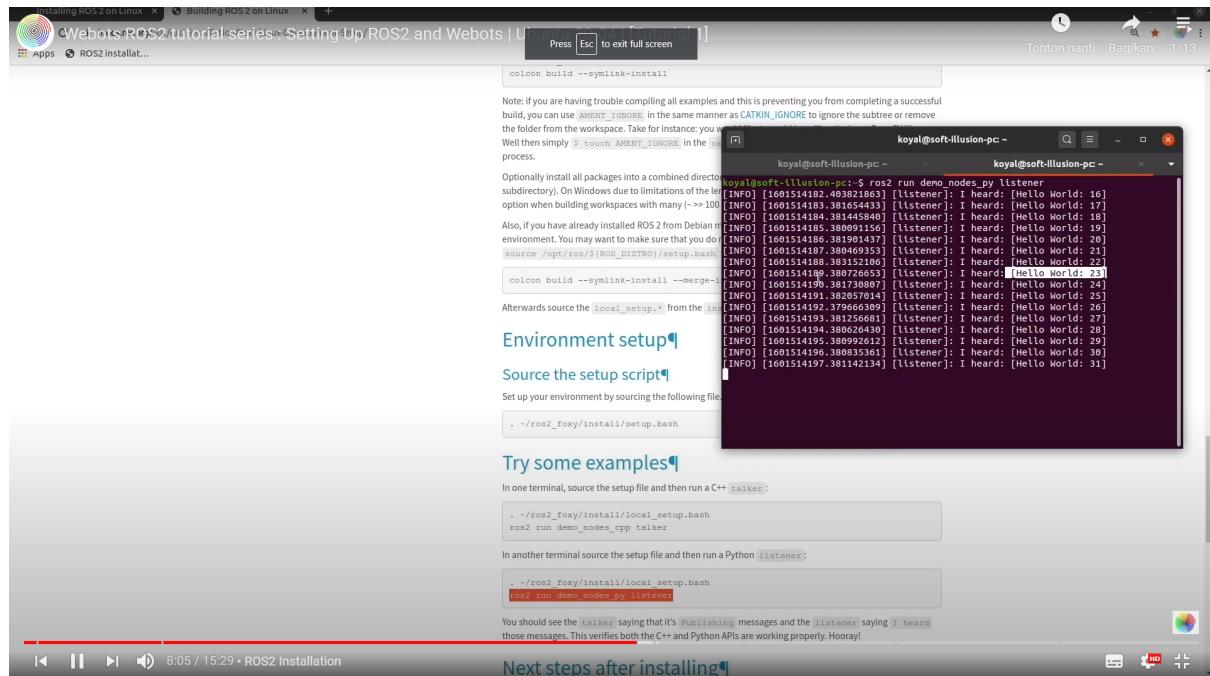
Pada Video Pertama Week 3 kali ini membahas tentang cara melakukan Setting up environment terdiri dari instalasi ROS2 dan Webots.

1. Instalasi ROS2

Pada Video ini menjelaskan bagaimana cara melakukan instalasi ROS2. Instalasi dapat dilakukan dengan mengikuti langkah-langkah yang ada dari dokumen website ROS2 ini <https://docs.ros.org/en/foxy/Installation/Alternatives/Ubuntu-Development-Setup.html> atau <https://docs.ros.org/en/foxy/Installation/Alternatives/Ubuntu-Install-Binary.html>.

Two side-by-side screenshots of the ROS2 documentation website. Both screenshots show the "Ubuntu (binary)" and "Ubuntu (source)" sections of the "Installation" page. The left screenshot is for "Ubuntu (binary)" and the right is for "Ubuntu (source)". Both pages include tables of contents, system requirements, and notes about the pre-built binary. The "Ubuntu (source)" page also includes sections for "Distributions", "Tutorials", "How-to Guides", "Concepts", and "Contact". The bottom of both pages shows a footer with links to "The ROS 2 Project", "Related Projects", "Glossary", "Citations", and "Other Versions".

Setelah melakukan instalasi, kita dapat melakukan pengetesan program simple menggunakan ros2 talker dan listener:



```
colcon build --symlink-install

Note: if you are having trouble compiling all examples and this is preventing you from completing a successful build, you can use AMENT_IGNORE in the same manner as CATKIN_IGNORE to ignore the subtree or remove the folder from the workspace. Take for instance you want to ignore the examples folder. Well then simply touch AMENT_IGNORE in the root of the workspace.

Optional install all packages into a combined directory. On Windows due to limitations of the legacy file system, it is recommended to use the --symlink-install option when building workspaces with many (~ > 100) packages. Also, if you have already installed ROS 2 from Debian in your environment. You may want to make sure that you do:
source /opt/ros/$ROB_DISTRO)/setup.bash

colcon build --symlink-install --merge-into=~/ros2_foxy/install

Afterwards source the local_setup.* from the installed workspace.

Environment setup¶
Source the setup script¶
Set up your environment by sourcing the following file

.. ~/ros2_foxy/install/setup.bash

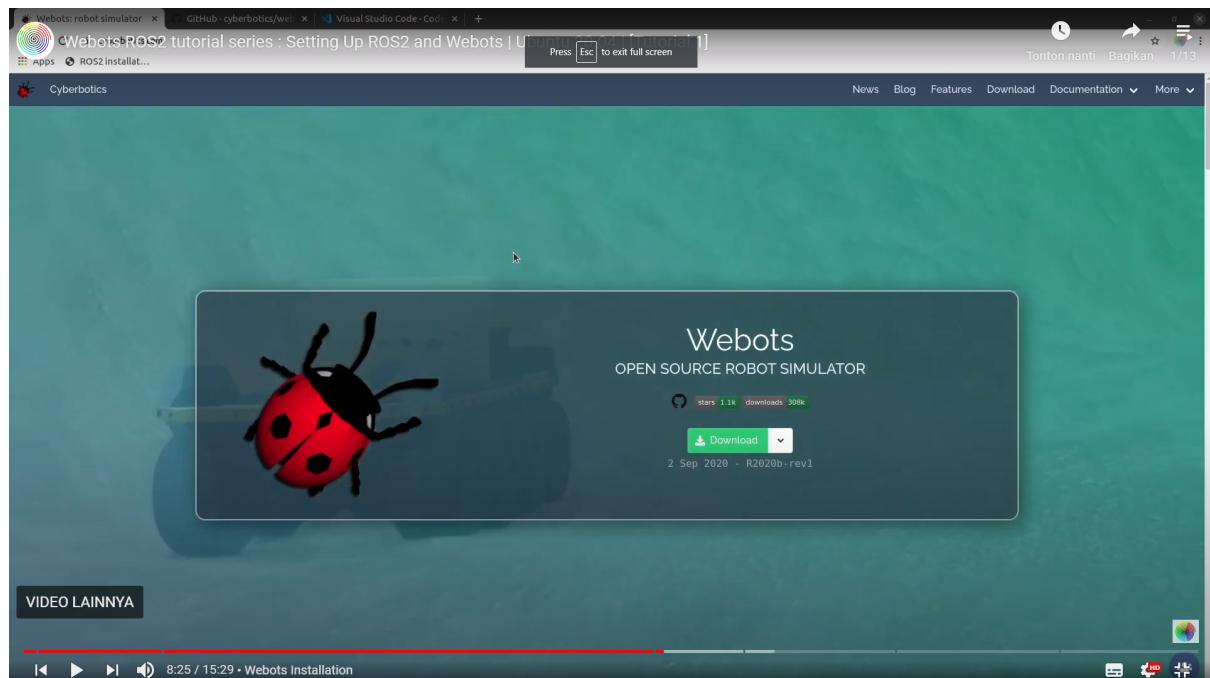
Try some examples¶
In one terminal, source the setup file and then run a C++ [talker]:
.. ~/ros2_foxy/install/local_setup.bash
ros2 run demo_nodes_cpp talker

In another terminal source the setup file and then run a Python [listener]:
.. ~/ros2_foxy/install/local_setup.bash
ros2 run demo_nodes_py listener

You should see the [talker] saying that it's Publishing messages and the [listener] saying I heard those messages. This verifies both the C++ and Python APIs are working properly. Hooray!
```

Jika Program Talker dan Listener berjalan dengan lancar maka instalasi ROS2 berhasil.

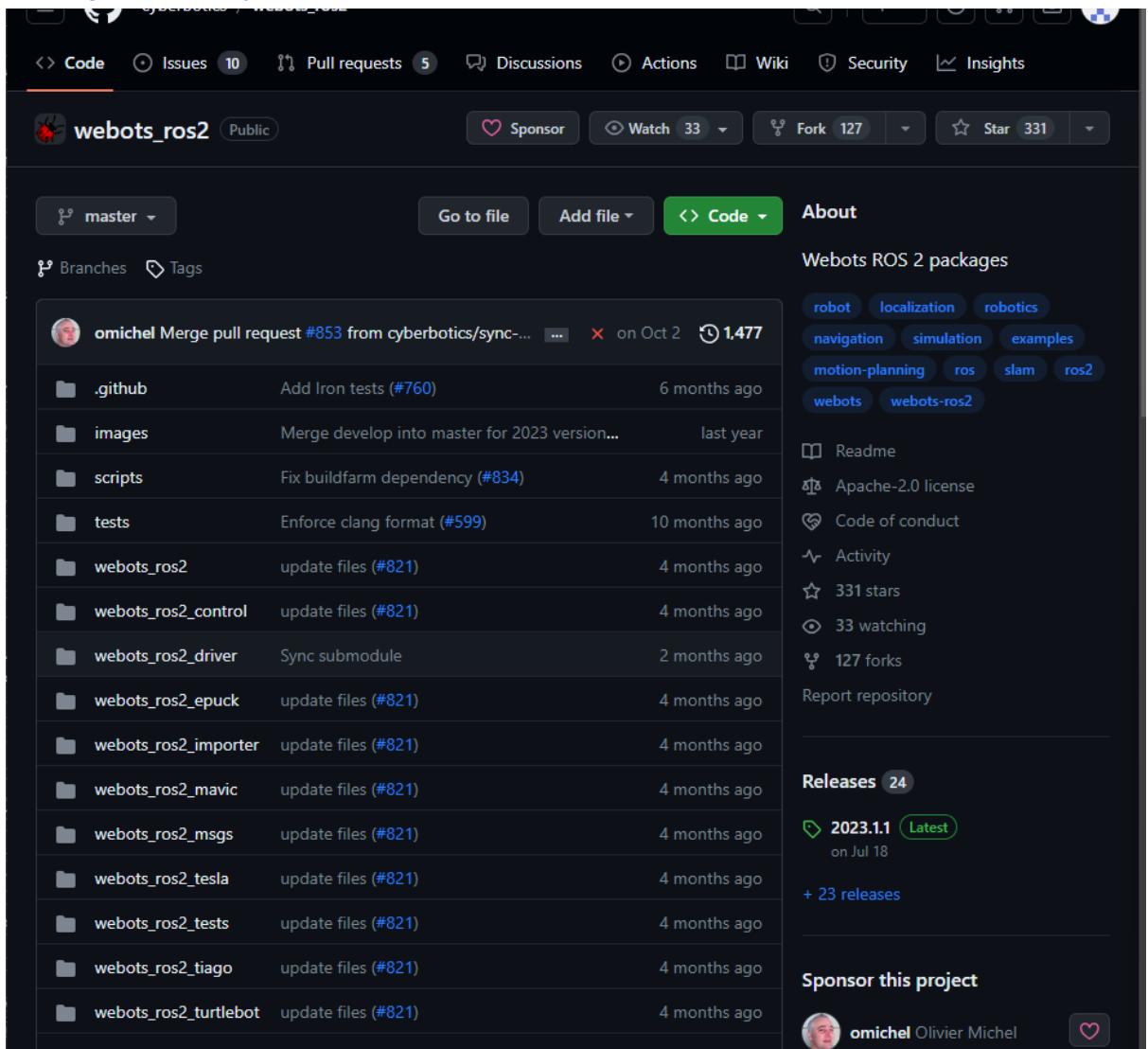
2. Instalasi Webots



Instalasi Webots dapat diakses melalui website <https://cyberbotics.com/> untuk versi terbaru . Webots dapat diunduh sesuai dengan perangkat yang kita gunakan.Namun untuk mengunduh versi lama dapat diakses pada laman github <https://github.com/cyberbotics/webots/releases> .

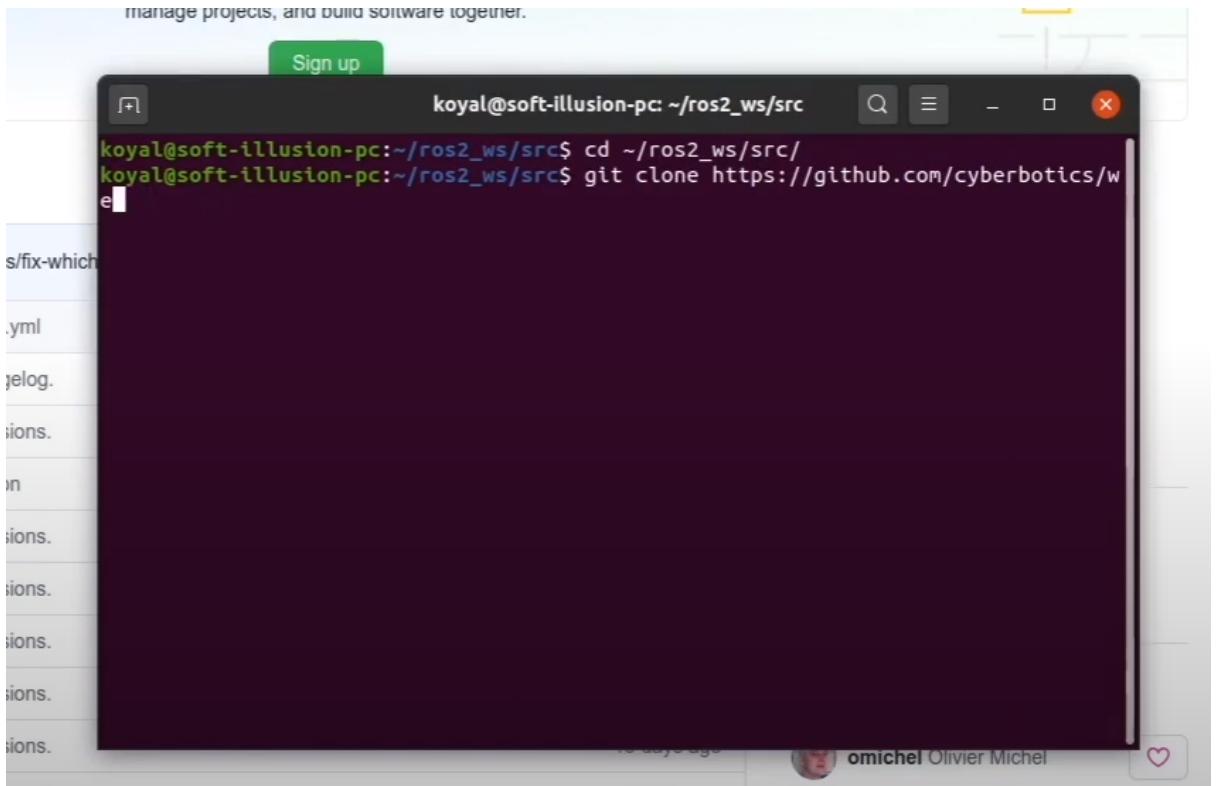
3. Instalasi Webots Repository

Setelah melakukan instalasi Webots, kita melakukan instalasi repository webots-ros2. Repository ini dapat diakses di github
https://github.com/cyberbotics/webots_ros2.



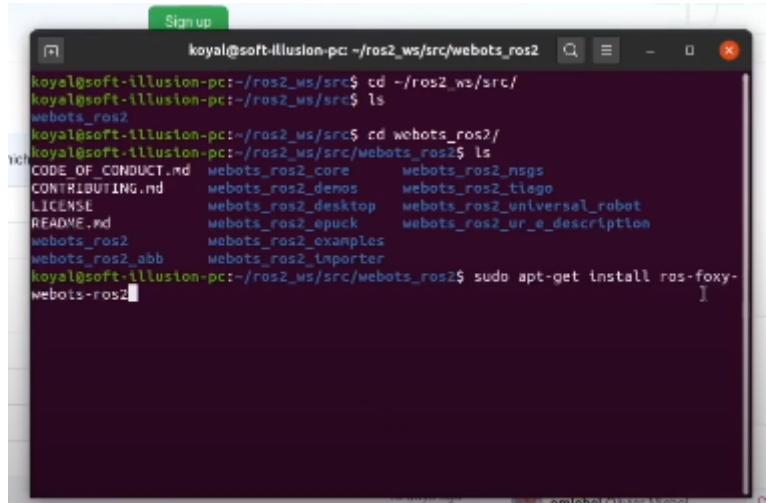
The screenshot shows the GitHub repository page for 'webots_ros2'. The repository is public and has 10 issues, 5 pull requests, and 33 watchers. It has 127 forks and 331 stars. The master branch is selected. The repository contains several submodules and files, including .github, images, scripts, tests, webots_ros2, webots_ros2_control, webots_ros2_driver, webots_ros2_epuck, webots_ros2_importer, webots_ros2_mavic, webots_ros2_msgs, webots_ros2_tesla, webots_ros2_tests, webots_ros2_tiago, and webots_ros2_turtlebot. The last commit was a merge pull request from 'cyberbotics/sync...' by 'omichel' on Oct 2, 2023. The repository is associated with the 'robot', 'localization', 'robotics', 'navigation', 'simulation', 'examples', 'motion-planning', 'ros', 'slam', 'ros2', 'webots', and 'webots-ros2' labels. The 'About' section provides details about the repository's purpose and its relationship to Webots ROS 2 packages. It also lists the Apache-2.0 license, code of conduct, activity, and reporting options. The 'Releases' section shows a latest release from Jul 18, 2023, and 23 other releases. The 'Sponsor this project' section features a link to the sponsor's profile.

Untuk memasukkan repository ke dalam ubuntu menggunakan command git clone



```
koyal@soft-illusion-pc:~/ros2_ws/src$ cd ~/ros2_ws/src/
koyal@soft-illusion-pc:~/ros2_ws/src$ git clone https://github.com/cyberbotics/webots_ros2
```

Maka tampilan webots_ros2 akan terlihat seperti di bawah:



```
koyal@soft-illusion-pc:~/ros2_ws/src$ cd ~/ros2_ws/src/
koyal@soft-illusion-pc:~/ros2_ws/src$ ls
webots_ros2
koyal@soft-illusion-pc:~/ros2_ws/src$ cd webots_ros2/
koyal@soft-illusion-pc:~/ros2_ws/src/webots_ros2$ ls
CODE_OF_CONDUCT.md  webots_ros2_core      webots_ros2_msgs
CONTRIBUTING.md     webots_ros2_demos    webots_ros2_tiago
LICENSEL           webots_ros2_desktop   webots_ros2_universal_robot
README.md          webots_ros2_epuck    webots_ros2_ur_e_description
webots_ros2         webots_ros2_examples
webots_ros2_abb     webots_ros2Importer
koyal@soft-illusion-pc:~/ros2_ws/src/webots_ros2$ sudo apt-get install ros-foxy-webots-ros2
```

Kemudian isi dari webots-ros2 ini dapat kita lihat menggunakan visual studio:

```

robot_launch.py 2
=====
1 #!/usr/bin/env python
2
3 # Copyright 1996-2023 Cyberbotics Ltd.
4 #
5 # Licensed under the Apache License, Version 2.0 (the "License");
6 # you may not use this file except in compliance with the License.
7 # You may obtain a copy of the License at
8 #
9 #     http://www.apache.org/licenses/LICENSE-2.0
10 #
11 # Unless required by applicable law or agreed to in writing, software
12 # distributed under the License is distributed on an "AS IS" BASIS,
13 # WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
14 # See the License for the specific language governing permissions and
15 # limitations under the License.
16
17 """Launch Webots and the controller."""
18
19 import os
20 import launch
21 from launch.substitutions import LaunchConfiguration
22 from launch.actions import DeclareLaunchArgument
23 from launch.substitutions.path_join_substitution import PathJoinSubstitution
24 from launch import LaunchDescription
25 from launch_ros.actions import Node
26 from ament_index_python.packages import get_package_share_directory, get_packages_with_prefix
27 from launch.launch_description_sources import PythonLaunchDescriptionSource
28 from launch.actions import IncludeLaunchDescription
29 from webots_ros2_driver.webots_launcher import WebotsLauncher
30 from webots_ros2_driver.webots_controller import WebotsController
31 from webots_ros2_driver.wait_for_controller_connection import WaitForControllerConnection
32
33
34 def generate_launch_description():
35     package_dir = get_package_share_directory('webots_ros2_tiago')
36     world = LaunchConfiguration('world')
37     mode = LaunchConfiguration('mode')
38     use_rviz = LaunchConfiguration('rviz', default=False)
39     use_nav = LaunchConfiguration('nav', default=False)
40     use_slam_toolbox = LaunchConfiguration('slam_toolbox', default=False)
41     use_slam_cartographer = LaunchConfiguration('slam_cartographer', default=False)
42     use_sim_time = LaunchConfiguration('use_sim_time', default=True)

```

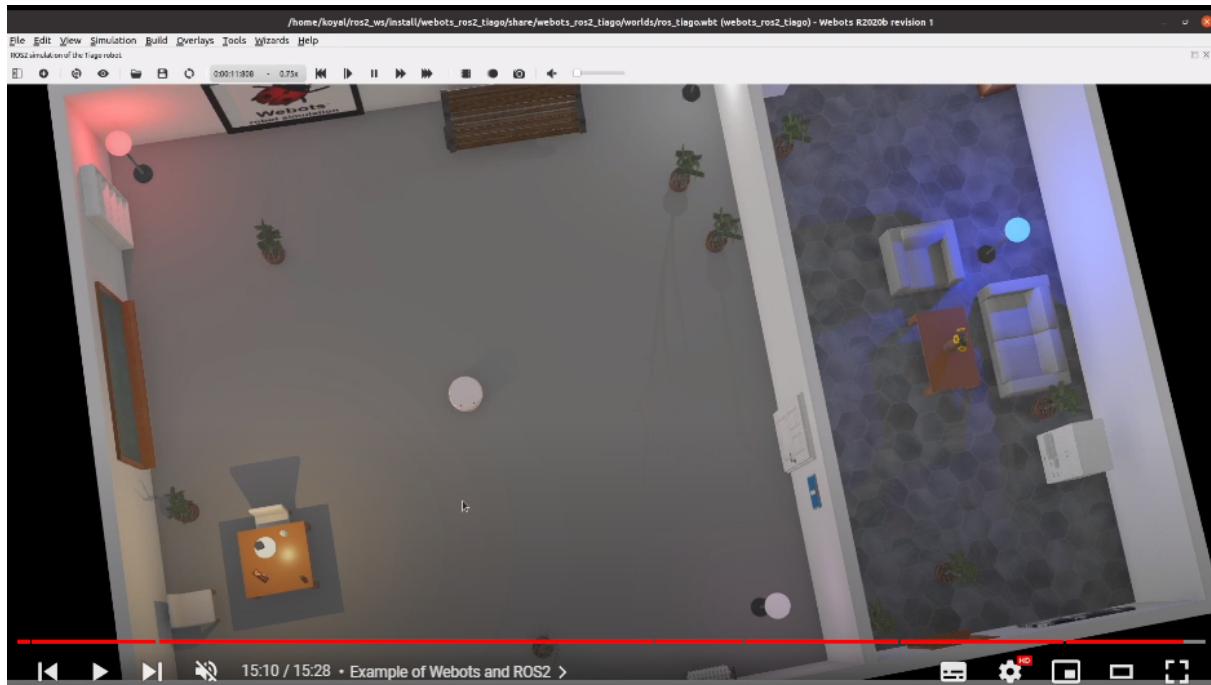
setelah melakukan integrasi webots-ros2, kita dapat membuka aplikasi webots dengan memanggilnya di dalam terminal dengan memanggil `tiago.launchpy` pada file `webots_ros2_tiago`.

```

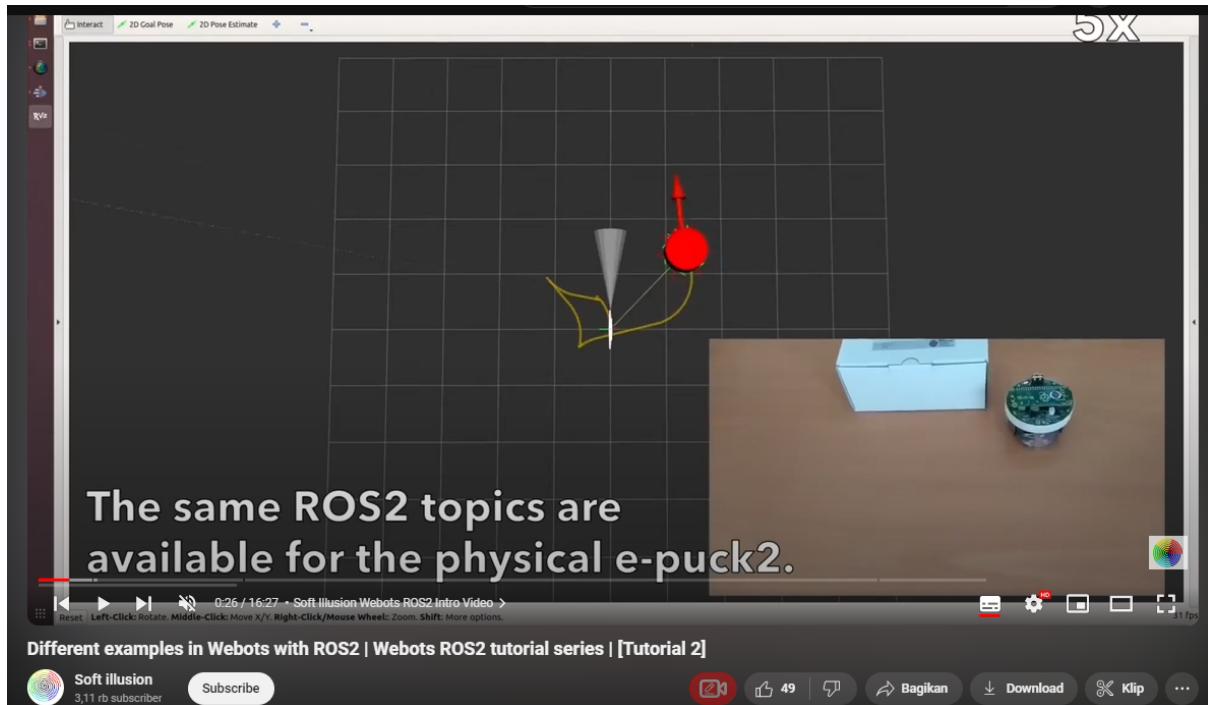
tiago.launch.py X
=====
1 #!/usr/bin/env python
2
3 # Copyright 1996-2020 Cyberbotics Ltd.
4 #
5 # Licensed under the Apache License, Version 2.0 (the "License");
6 # you may not use this file except in compliance with the License.
7 # You may obtain a copy of the License at
8 #
9 #     http://www.apache.org/licenses/LICENSE-2.0
10 #
11 # Unless required by applicable law or agreed to in writing, software
12 # distributed under the License is distributed on an "AS IS" BASIS,
13 # WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
14 # See the License for the specific language governing permissions and
15 # limitations under the License.
16
17 """Launch Webots and the controller."""
18
19 import os
20 import launch
21 import launch_ros.actions
22 from launch.actions import IncludeLaunchDescription
23 from launch.launch_description_sources import PythonLaunchDescriptionSource
24
25 from ament_index_python.packages import get_package_share_directory
26
27
28
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```

Maka webots dapat diakses



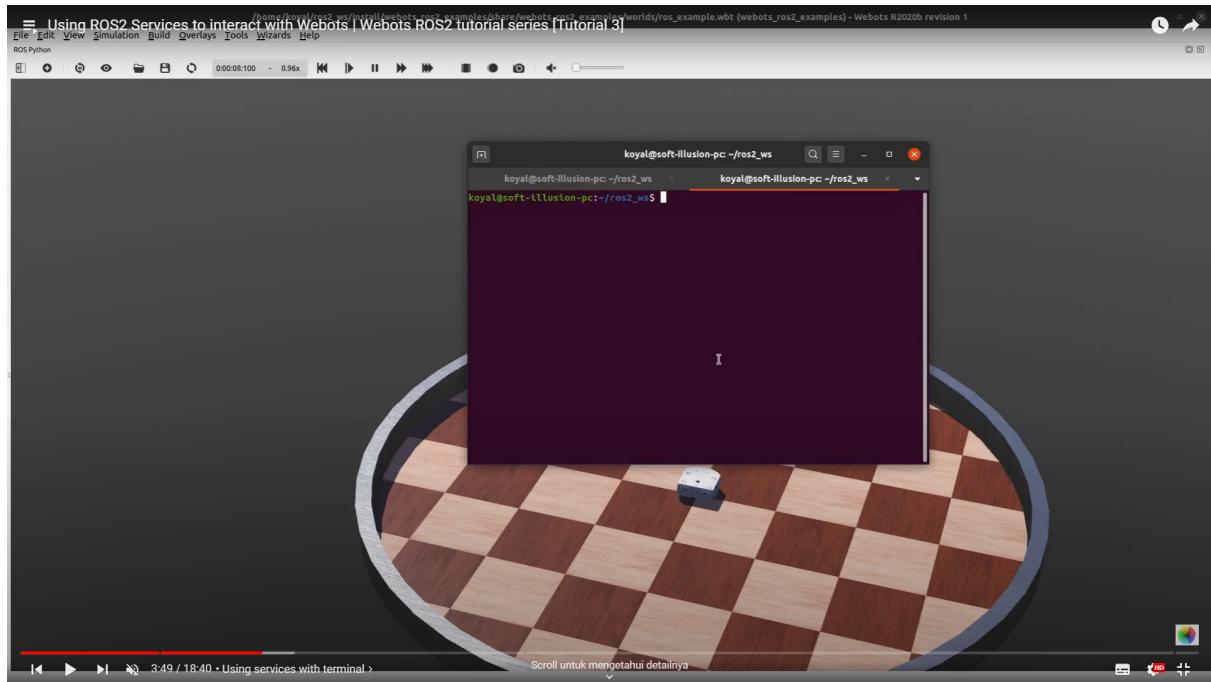
Report Week 3 Video 2:



Pada Video 2, menjelaskan perbedaan contoh di webots dengan ROS2

Video ini kita akan menginstall ROS2 for E-Puck pada dokumen website ROS2. Setelah melakukan instalasi kita akan menginstal keyboard E-Puck sebagai controller. Kemudian melakukan instalasi Mapping agar E-Puck mampu menganalisa area. Terakhir kita melakukan integrasi yang sama pada armed_robots.

Report Week 3 Video 3:



Pada video 3 menunjukkan cara mengendalikan robot dengan ROS2.

1. Kita akan menjalankan simulasi ROS2 yang diambil dari website. Selanjutnya, kita akan mencoba menggerakkan robot dengan memasukkan nilai 0,5 dan 0,1 untuk left_speed dan right_speed.
2. membuat service dengan menggunakan node. Kita akan menggunakan client_vel untuk membuat service yang memungkinkan kita untuk mengatur left_speed dan right_speed langsung dari kode.
3. kita akan membuat service_node_vel di dalam setup.py. Setelah itu, kita akan menjalankan colcon build dengan nama package kita di prompt. Kemudian, kita akan menjalankan perintah "ros2 run webots_ros2_examples services_node_vel 1 1". Robot akan berjalan, dan jika angka diubah menjadi 0 0, robot akan berhenti. Angka-angka tersebut mewakili left_speed dan right_speed.