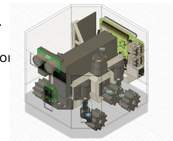
The Trackbot ROS noetic package was developed alongside the trackbot robot by Julian Rene Leclerc for the Robotics Project Course at the University of Tartu.

This package aims to control the robot movement by teleoperation methods and Language based AI inputs and serves partly as a assessment on the the use and integration of AI language models in robots.

The robot is equipped with 2 motors linked to 2 tracks providing movement. The un-motorised wheels are placed on a suspension allowing more adaptability to the terrain. An ultrasonic sensor and camera are placed in fro to avoid obstacle and analyse environment.



A RaspberryPi 3B+ is mounted providing the necessary computations and control for various operations

<u>teleop.py</u>

Gives the ability for the user to control the robot movement and speed through keyboard

Publish:
- t/speed: INT32 message setting speed of motors from 0 to 100%
- t/cmdvel: Twist message with linear and angular velocities
- /forceStop: Bool determining if the robot should be stopped

<u>hrl_movement.py:</u>

Converts distances and angles from HRLI.py into Twist message for core.py

Subscribe :
- t/hrl_linear_request: INT32 message indicating direction and distance of linear movement
- t/hrl_angular_request: INT32 message indicating angle of angular movement
- t/hrl_stop_request: Bool message indicating request to stop by HRLI

Publish:
- t/cmdvel: Twist message with linear and angular velocities

AUTHOR: JULIAN LECLERC

topic | service | action

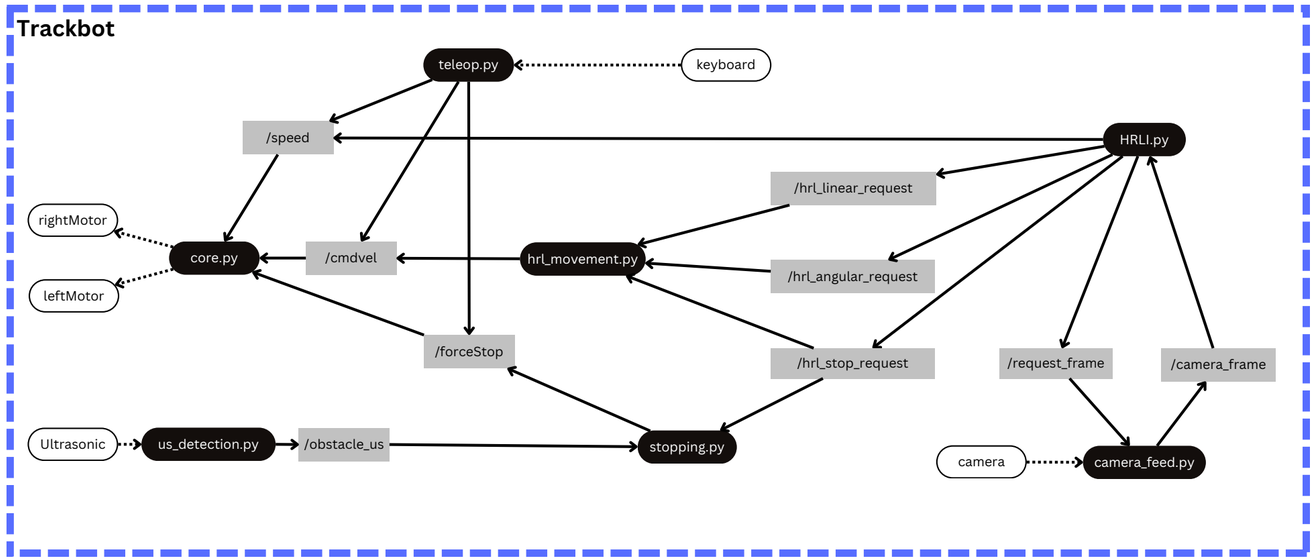
<u>Actuator list</u>:
- rightMotor
- leftMotor

<u>Sensor list</u>:
- Camera
- Ultrasonic sensor

<u>core.py:</u>

Controls motor speed and orientation to make robot move

Subscribe:
- t/speed: INT32 message setting speed of motors from 0 to 100%
- t/cmdvel: Twist message with linear and angular velocities
- /forceStop: Bool determining if the robot should be stopped



<u>HRLI.py:</u>

Human Robot Language Interface giving user basic control of robot through natural language, scope includes moving, analysing environment and general conversation. Connected to ChatGPT api.

Subscribe:
- t/camera_frame: Single Image output from camera

Publish:
- t/hrl_linear_request: INT32 message indicating direction and distance of linear movement
- t/hrl_angular_request: INT32 message indicating angle of angular movement
- t/hrl_stop_request: Bool message indicating request to stop by HRLI
- t/request_frame: INT32 trigger to request a frame from camera

<u>us_detection.py</u>:

Measures distance in front of the robot and detects obstacles through ultrasonic sensor

Publish:
- s/obstacle_us: Bool message indicating presence of obstacle

<u>stopping.py</u>:

Determines if the robot should be stopping or not based on other topics

Subscribe:
- s/obstacle_us: Bool message indicating presence of obstacle
- t/hrl_stop_request: Bool message indicating request to stop by HRLI

Publish:
- t/forceStop: Bool determining if the robot should be stopped

<u>camera_feed.py</u>:

Takes frames from camera for analysis

Subscribe:
- t/request_frame: INT32 trigger to request a frame from camera

Publish:
- t/camera_frame: Single Image output from camera