FLOWCEAN WORKSHOP

IPIN 2025

Location	Sonaatti 1 Room
Date	Monday, September 15th, 9:00-12:00 EEST
Length	150min (including breaks)
Required Resources	Personal Laptop for participation on practical session (should be capable of running a Docker Image)

Description

Self-localization is critical for the safe and effective navigation for autonomous mobile robots. However, localization failures in highly dynamic, feature-poor, or ambiguous environments can lead to localization inaccuracy and ultimately failure. In this workshop session, we will present a data-driven approach to predict localization failure of autonomous robots in warehouse environments. We will discuss our approach, challenges we experienced, and our most recent findings. Furthermore, we will introduce our self-developed machine learning framework Flowcean and explore its functionalities, features, and its ROS2 integration in a hands-on programming session. Participants will have the opportunity to familiarize themselves with the framework and dive into topics on data collection, training of models, and evaluation in a simple robot use case.

Agenda

Lecture 1 - Introduction of the Flowcean Framework

* What is Flowcean and how does it extend other machine learning libraries?
* What are learning strategies, and how can we implement them?
* How is Flowcean integrated into ROS2?

Lecture 2 - Predicting Localization Failure of Autonomous Robots

* What are well-known challenges to robot localization algorithms?
* Why is it important to predict localization failures of autonomous robots?
* What is our approach and research?

Lecture 3 - Interactive

* What is Flowcean and how does it extend other machine learning libraries?
* What are learning strategies, and how can we implement them?
* How is Flowcean integrated into ROS2?