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of Applied Sciences

School of
Engineering

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Mathematics and Physics

Bachelor thesis (Computer Science)

Formula Student

Path Planning Algorithm

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Date	25.02.2022

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Abstract

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Zusammenfassung

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Preface

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Introduction

1.1 Initial situation

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1.2 Objective / Problem definition / Requirements

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risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum. [1]

1.2.1 Subsection

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Figure 1.1: Bildli

SubSubSection

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Table 1.1: Eine Tabelle

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Theoretical Principles

2.1 Robot Operating System (ROS)

The Robot Operating System (ROS) is not, like the name may suggest, a full-fledged operating system, but a set of software libraries and tools for the development of robot applications. The open-source robotics middleware comes shipped with capable developer tools, drivers and advanced algorithms. [3]

There are currently two major versions of ROS which are seeing releases, ROS 1 and ROS 2. [4] Beginning with releases after 'Foxy Fitzroy', releases in odd years will be non-LTS (Long Term Support) and will only be supported for 1.5 years, while new releases in even years are going to be long-term supported and will be supported for 5 years. [5]

The work done in this thesis have been done using the ROS 2 release 'Foxy Fitzroy', released on June 5th, 2020. This release will be supported till the end of May 2023. [4]

2.1.1 ROS Graph

There are 5 main concepts of ROS 2 that make up the ROS (2) graph:

1. Nodes
2. Topics
3. Services
4. Parameters
5. Actions

The ROS graph is a network of ROS 2 elements which processes data simultaneously. The graph encompasses all executables and the connections

between them.

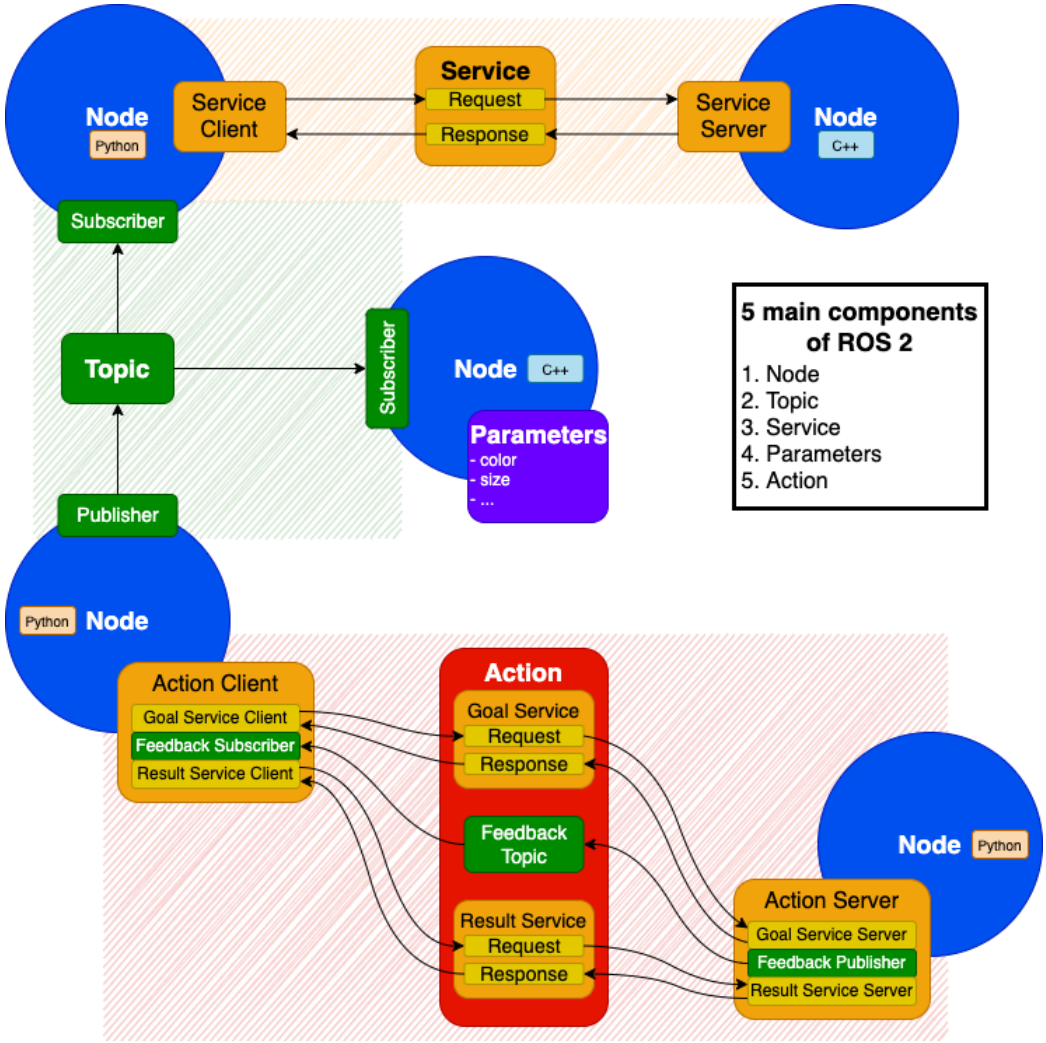

Figure 2.1: The five main concepts of ROS 2 pictured as a network of nodes.

Nodes

A node is a fundamental ROS 2 element that serves a single, modular purpose in a robotics system.

Topics

Nodes publish information over topics, which allows any number of other nodes to subscribe to and access that information.

Services

Services are based on a call-and-response model, versus topics' publisher-subscriber model. Services only provide data when they are specifically called by a client.

Parameters

Nodes have parameters to define their default configuration values.

Actions

Actions are built on topics and services and consist of a goal, feedback, and a result. Actions are like services that allow you to execute long-running tasks, provide regular feedback, and are cancelable.

2.2 Nvidia Jetson

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2.3 Languages and Tools

- ROS 2
- Python
- LaTeX
- Git
- VS Code

- Azure DevOps
- GitHub
- other Tools

Approach / Methods

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Results

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Discussion and Conclusion

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Registers

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Appendix

A.1 Project Management

A.2 Miscellaneous