SOFTWARE TEAM

OVERLORD100

*Mobile platform is not a mobile application, it is a robot

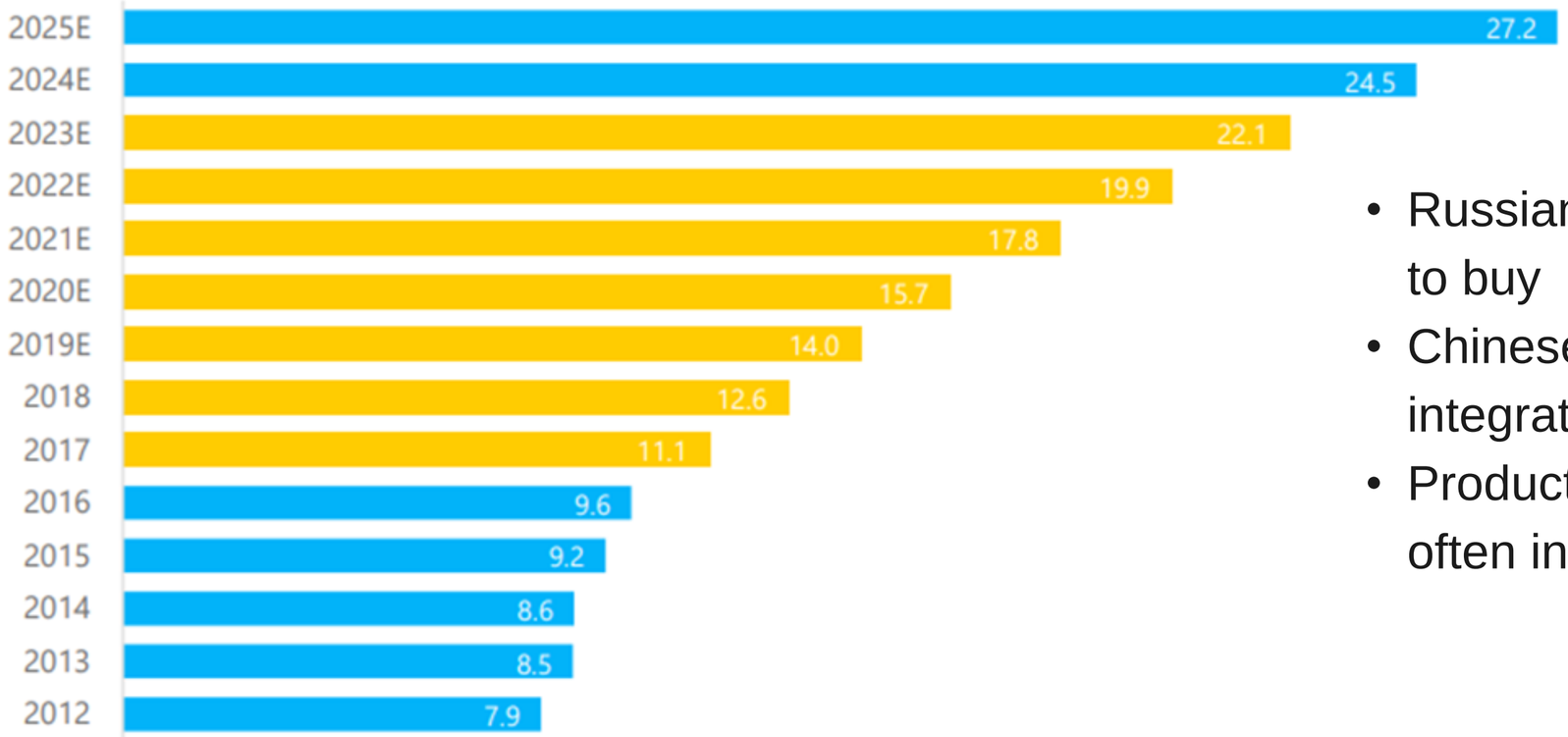
MOTIVATION

Warehouse automatization in Russia is not widespread

- High cost of robots
- High cost of integration
- Problems with components from other countries
- Not many solutions for industrial settings

MARKET RESEARCH

Global warehouse automation market



in USD billion

- Russian mobile platforms are hard to buy
- Chinese solutions are hard to integrate
- Products from Europe and USA are often inaccessible

OUR SOLUTION

Cheap **mobile platform** from components, available in Russia.

Features:

- web application with friendly UI
- virtual simulation

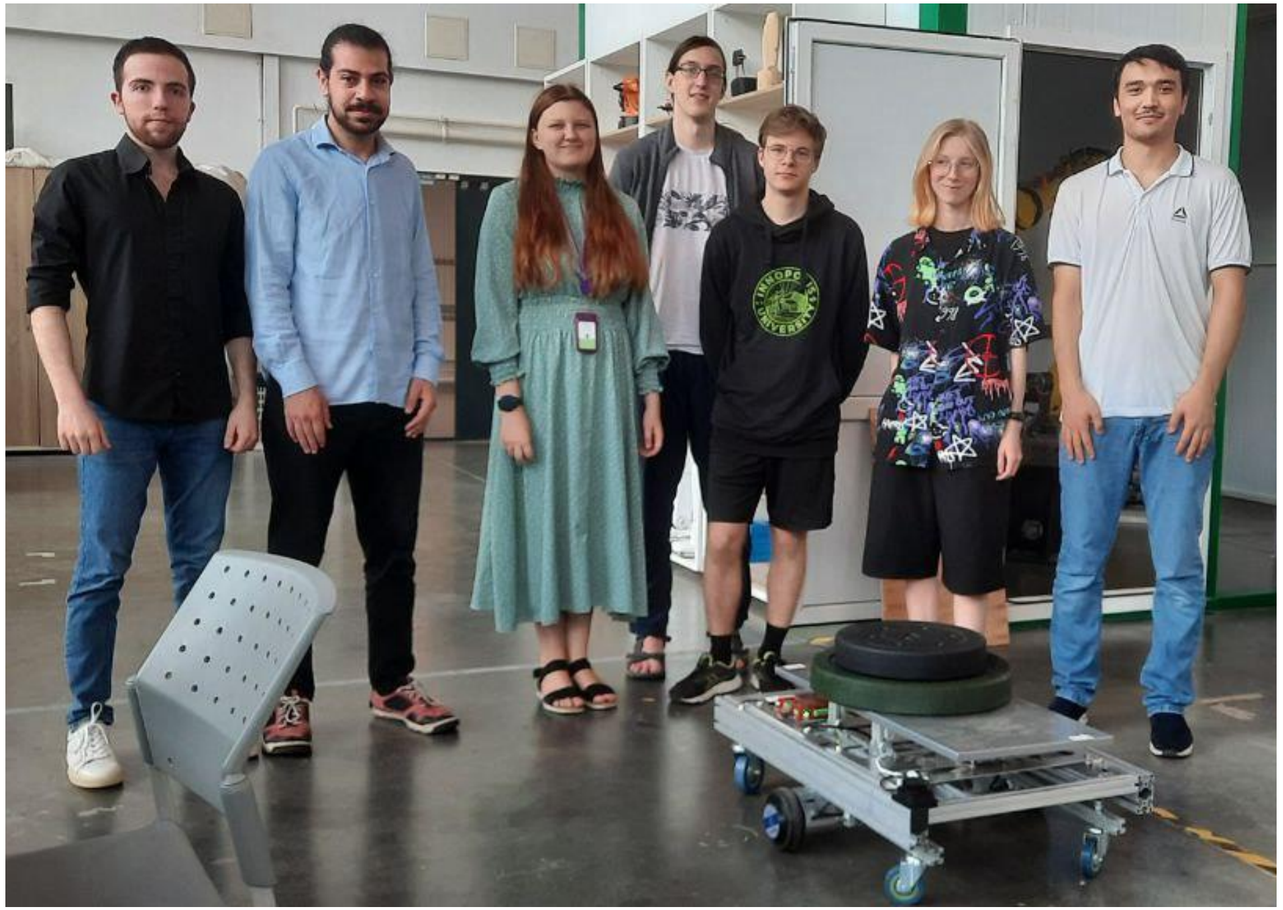
OUR TEAM

Ali Hamdan (Data management and API)

Yehia Sobeh (API, Frontend and Backend)

Anastasiia Shvets (Reports and documentation)

Saveliy Khlebnov (DevOps)

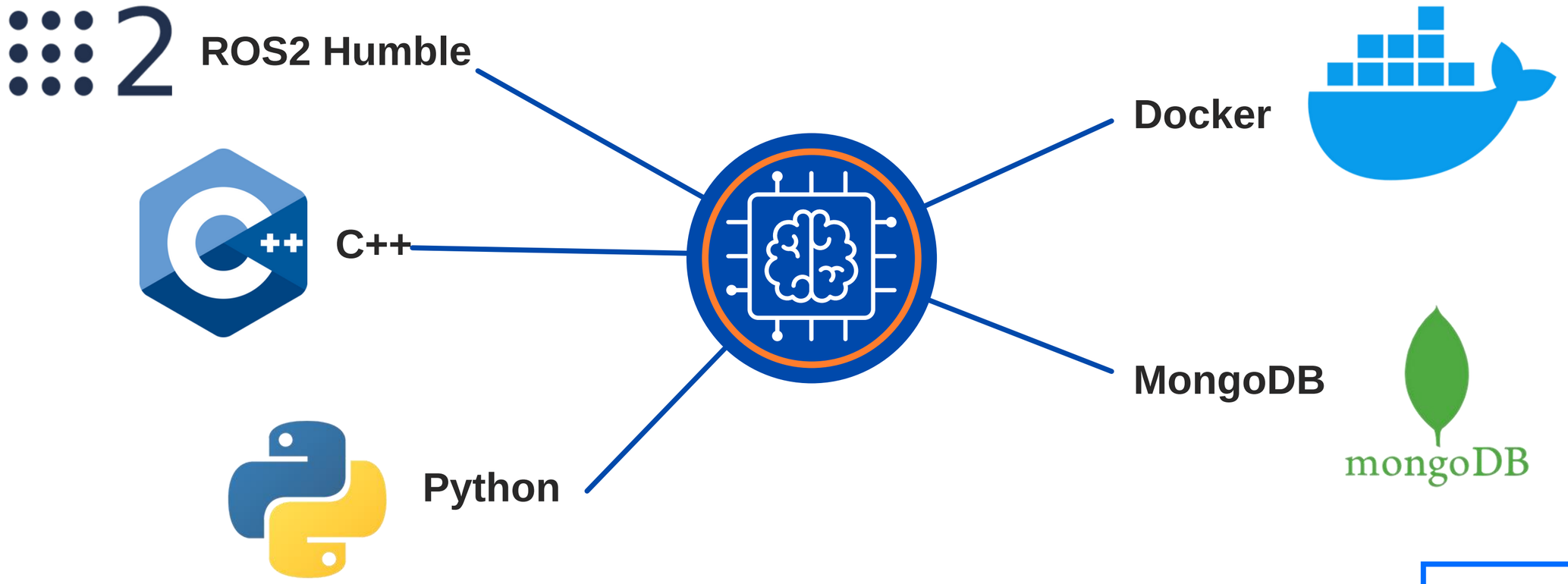


Iurii Podkorytov (SLAM developer)

Ekaterina Mozhegova (team lead, ROS developer)

Mukhammadrizo Maribjonov (Path Planner developer)

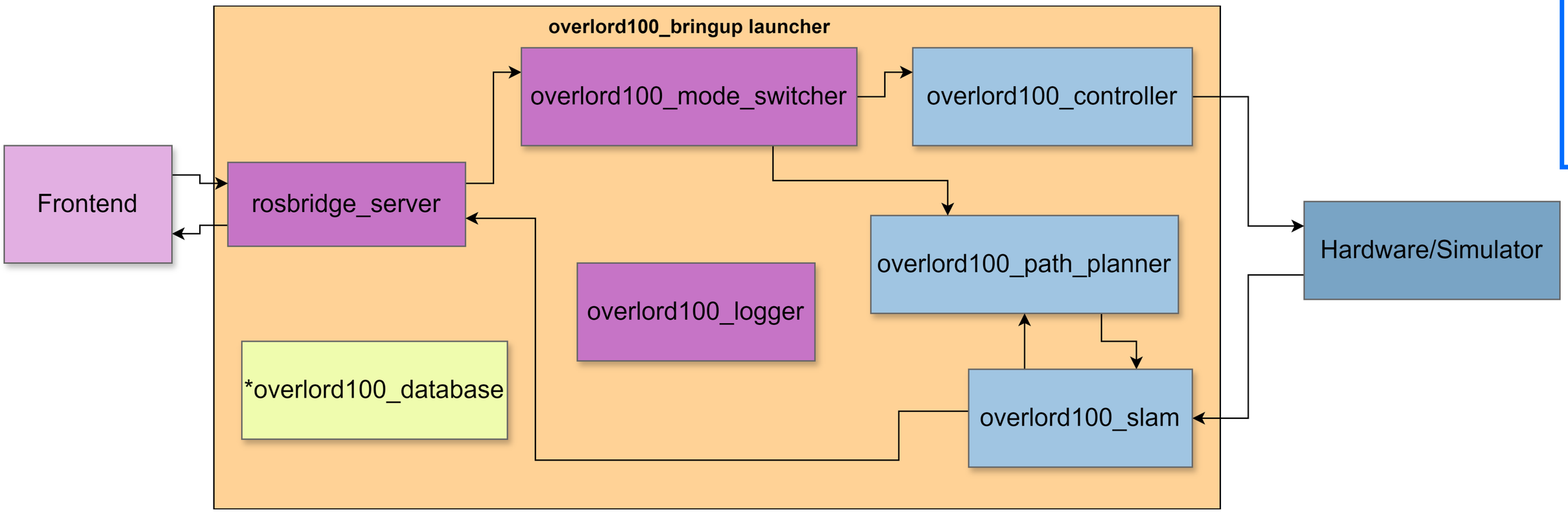
TECHNOLOGICAL STACK



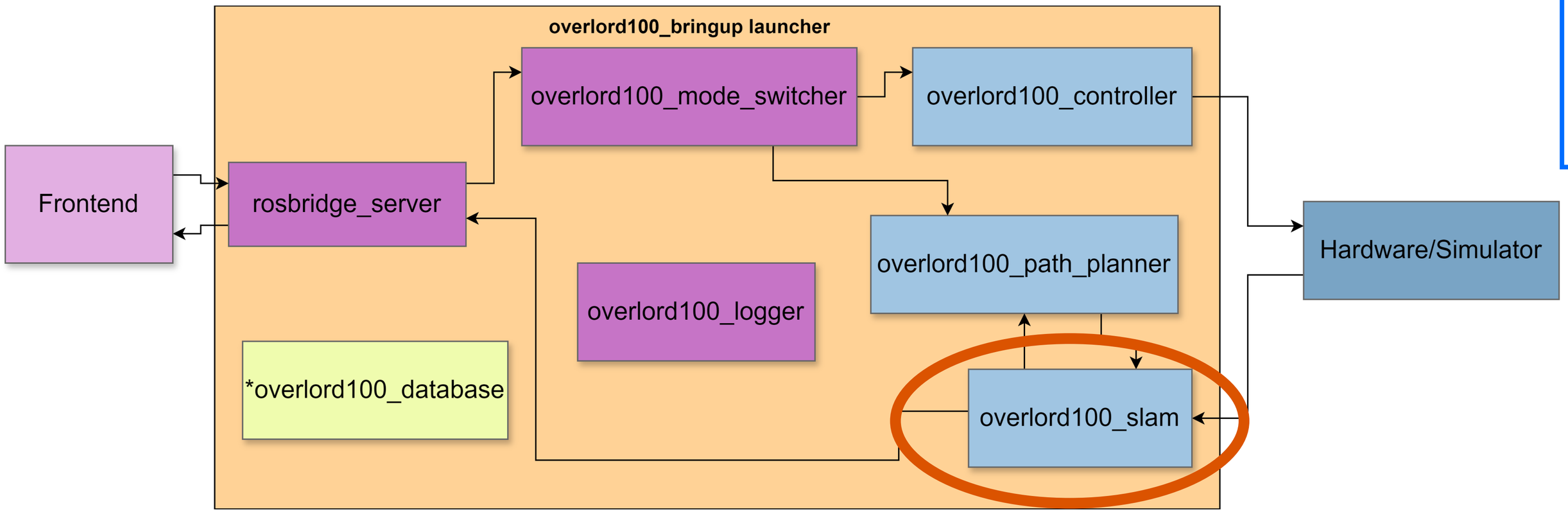
ROS2

- Open-source Robotics middleware suite
- Divides system into Nodes that exchange data
- Provides services for package management

ARCHITECTURE



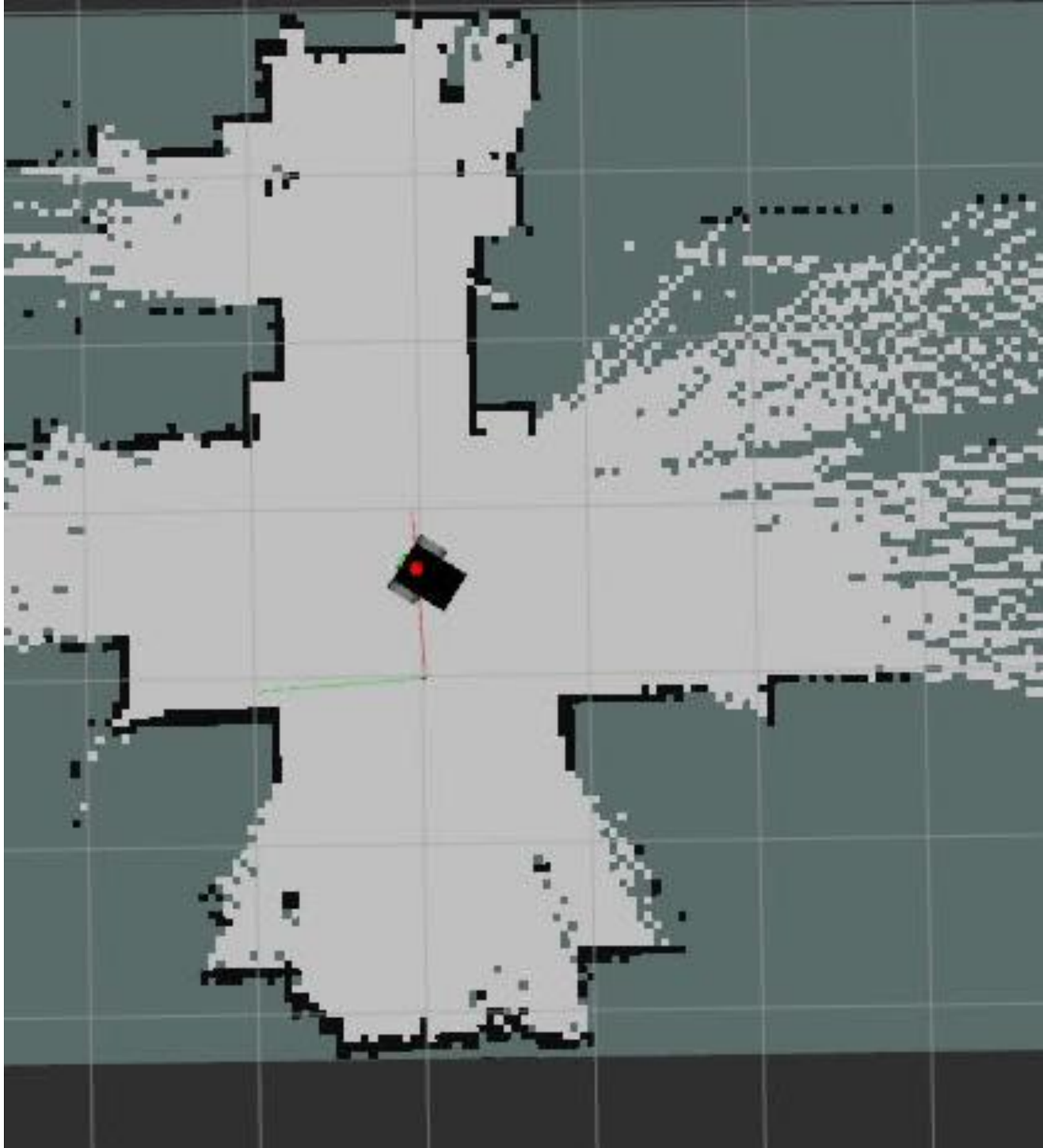
SLAM


overlord100_bringup launcher
Frontend
rosbridge_server
overlord100_mode_switcher
overlord100_controller
overlord100_path_planner
overlord100_logger
*overlord100_database
overlord100_slam
Hardware/Simulator

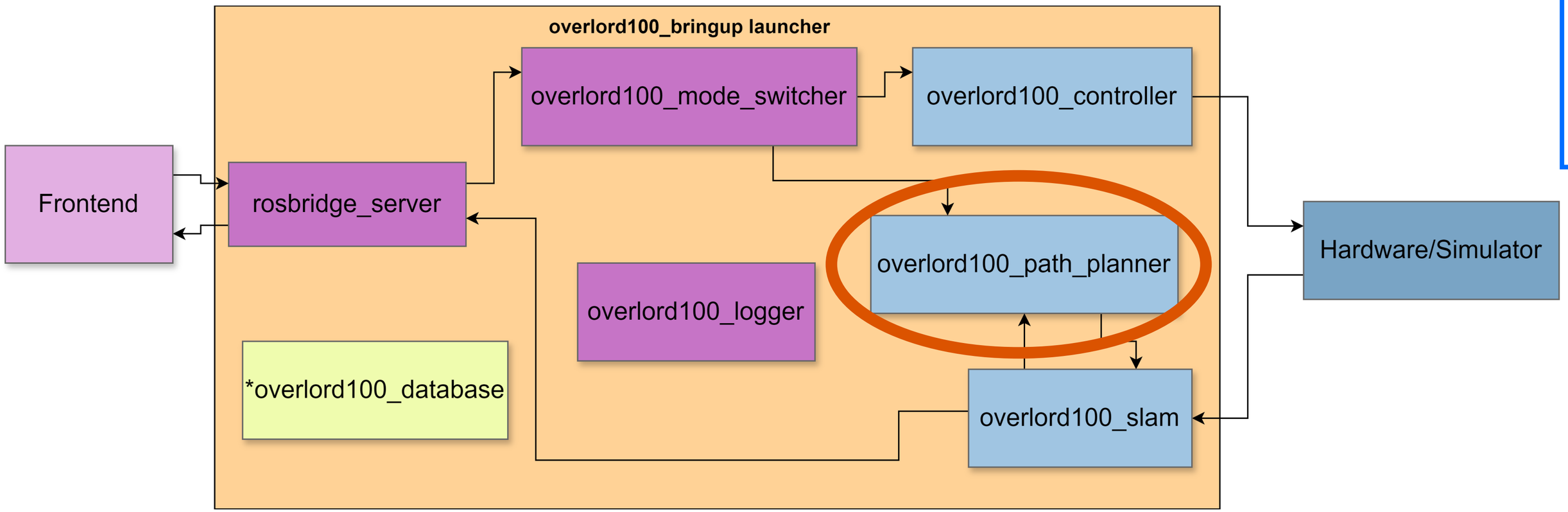
SLAM

Slam_toolbox package:

- Creates a map
- Locates the robot within the map



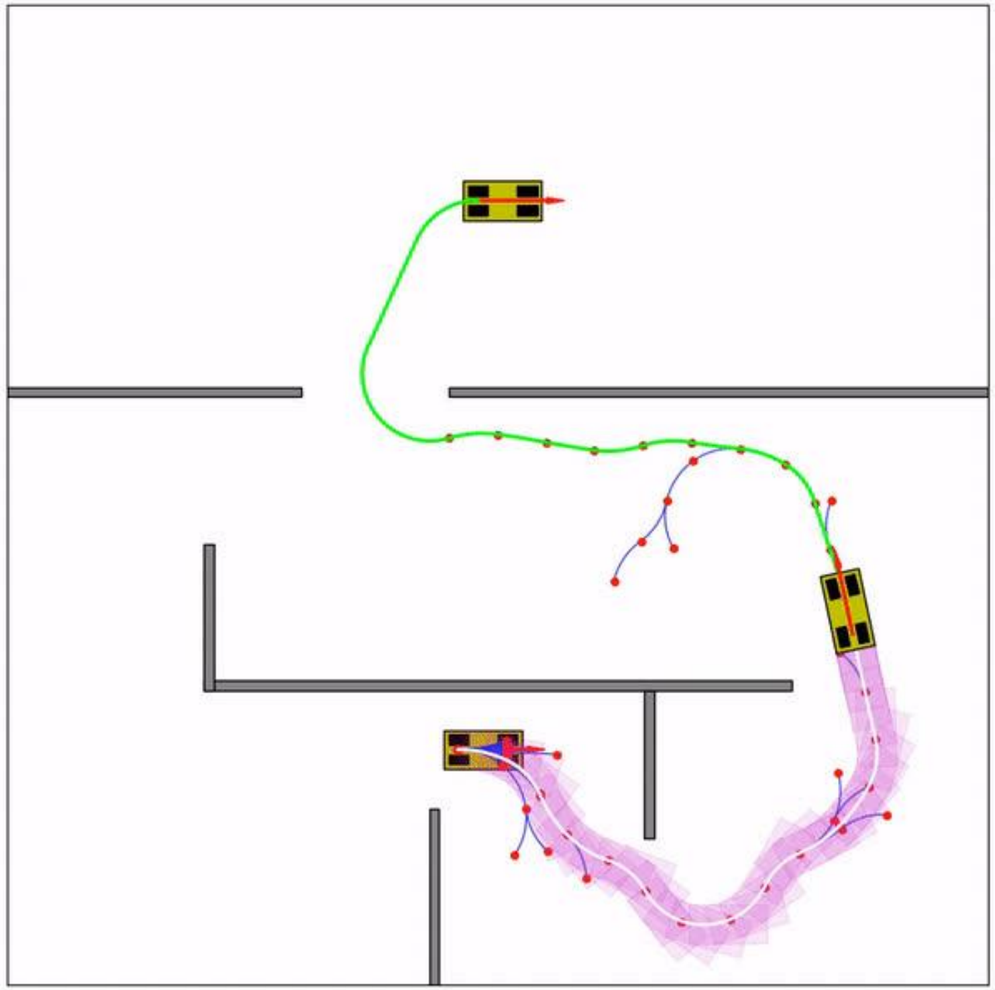
PATH PLANNER



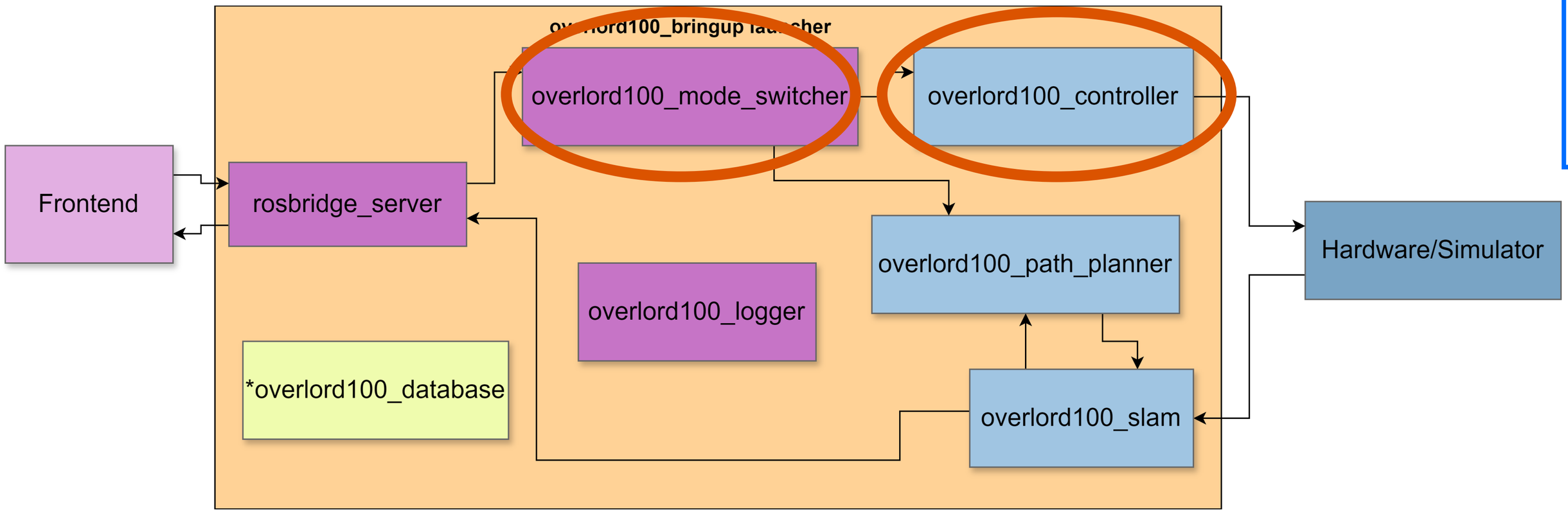
PATH PLANNER

Using Nav2 stack

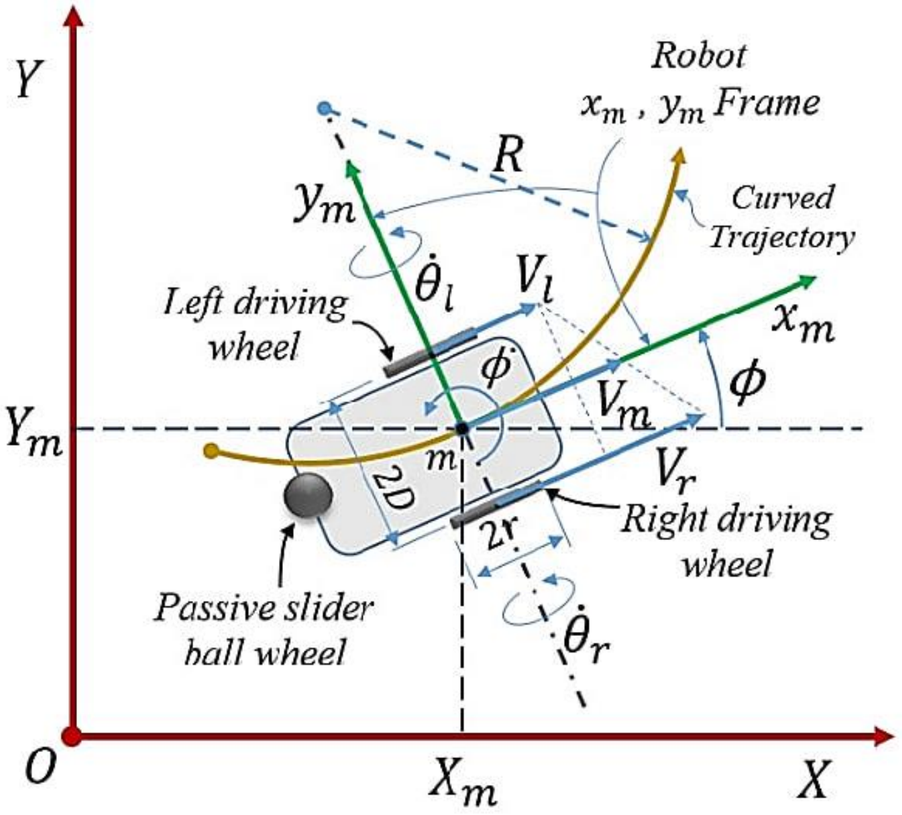
- Creates a path to a given orientation within a map
- Outputs needed velocity



CONTROLLER & MODE SWITCHER



CONTROLLER



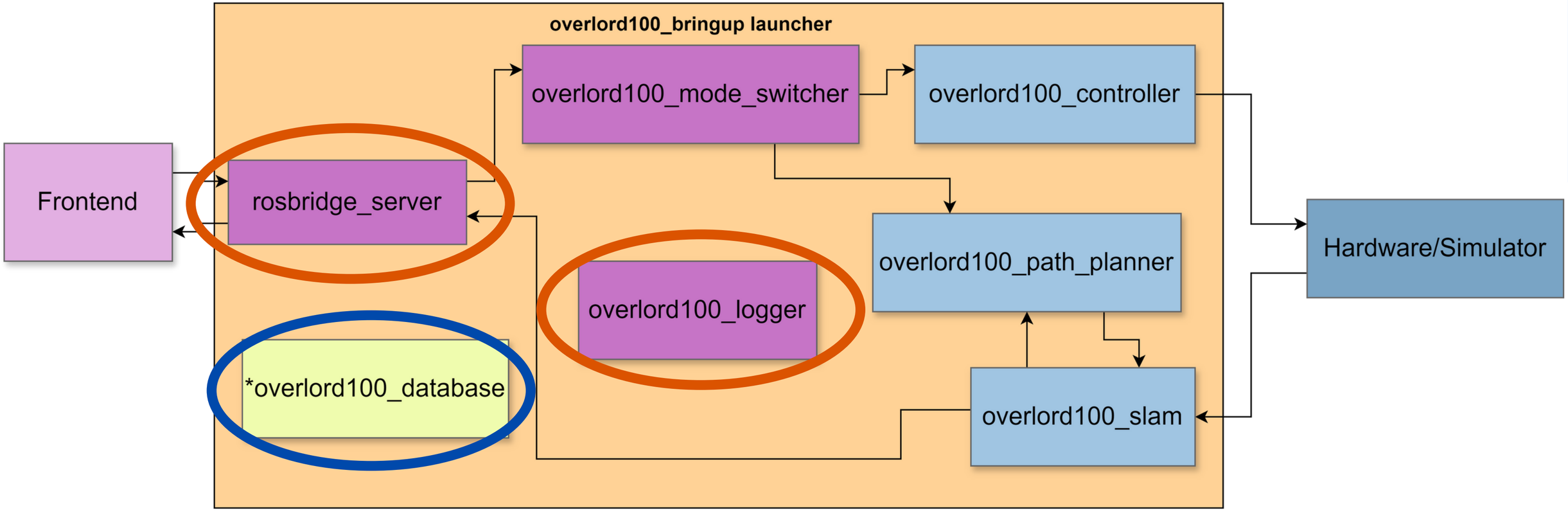
Transforms requests from other components of the project into commands to the hardware/simulation

MODE SWITCHER

AUTO

MANUAL

DATA MANAGEMENT AND API



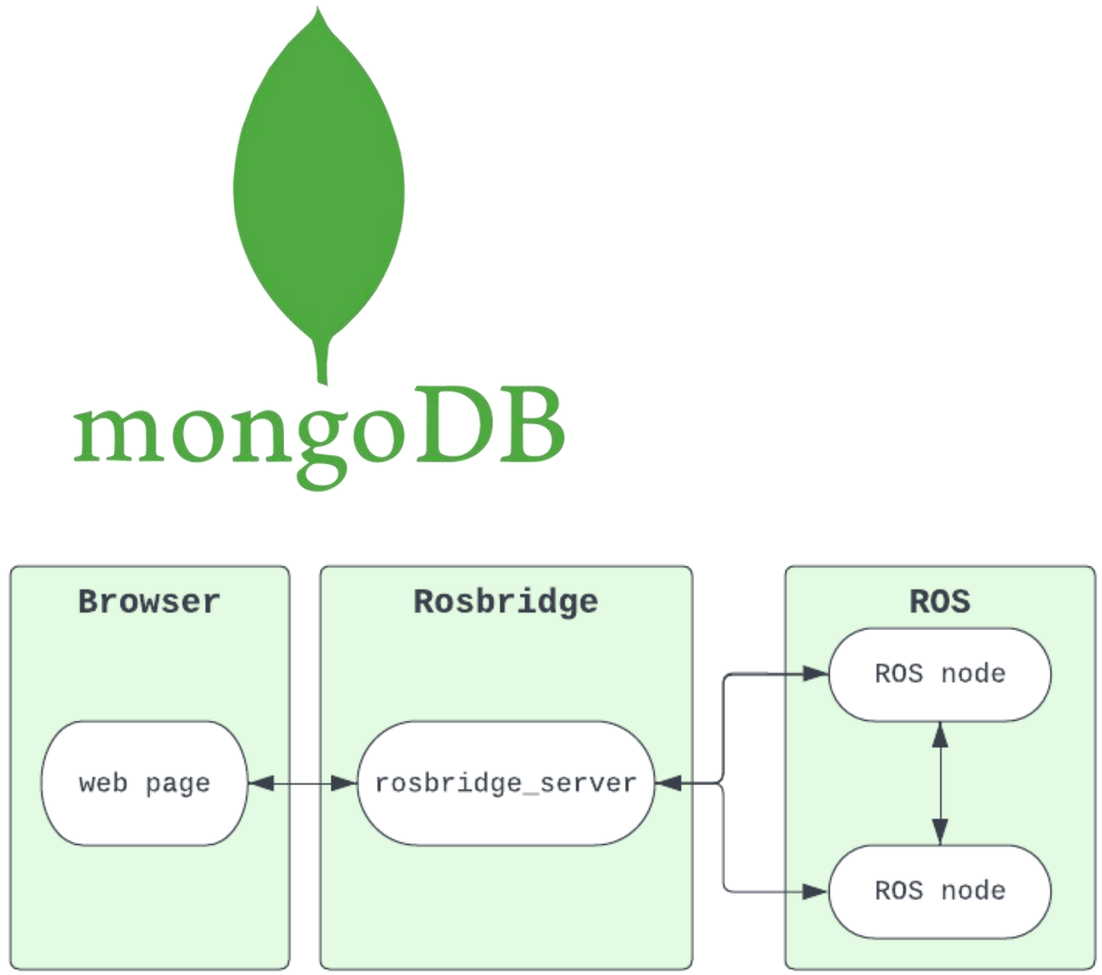
DATA MANAGEMENT AND API

Data Management:

- *MongoDB (implemented, but not integrated)
- ROS
- logger

API:

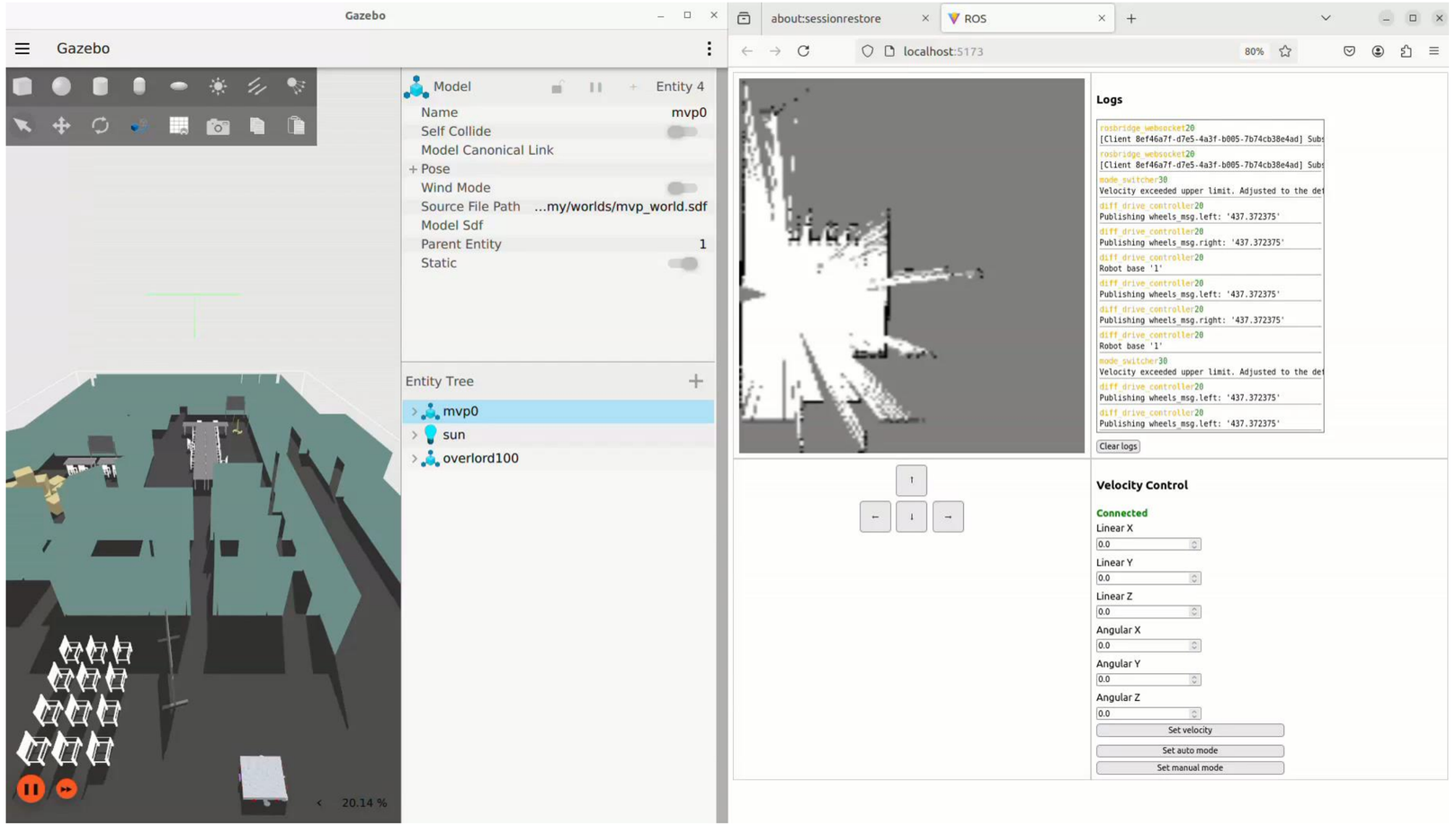
- Frontend-Backend: rosbridge-server
- Backend-Hardware: same for Hardware and Simulation



DEMO (HARDWARE)

Link to the video

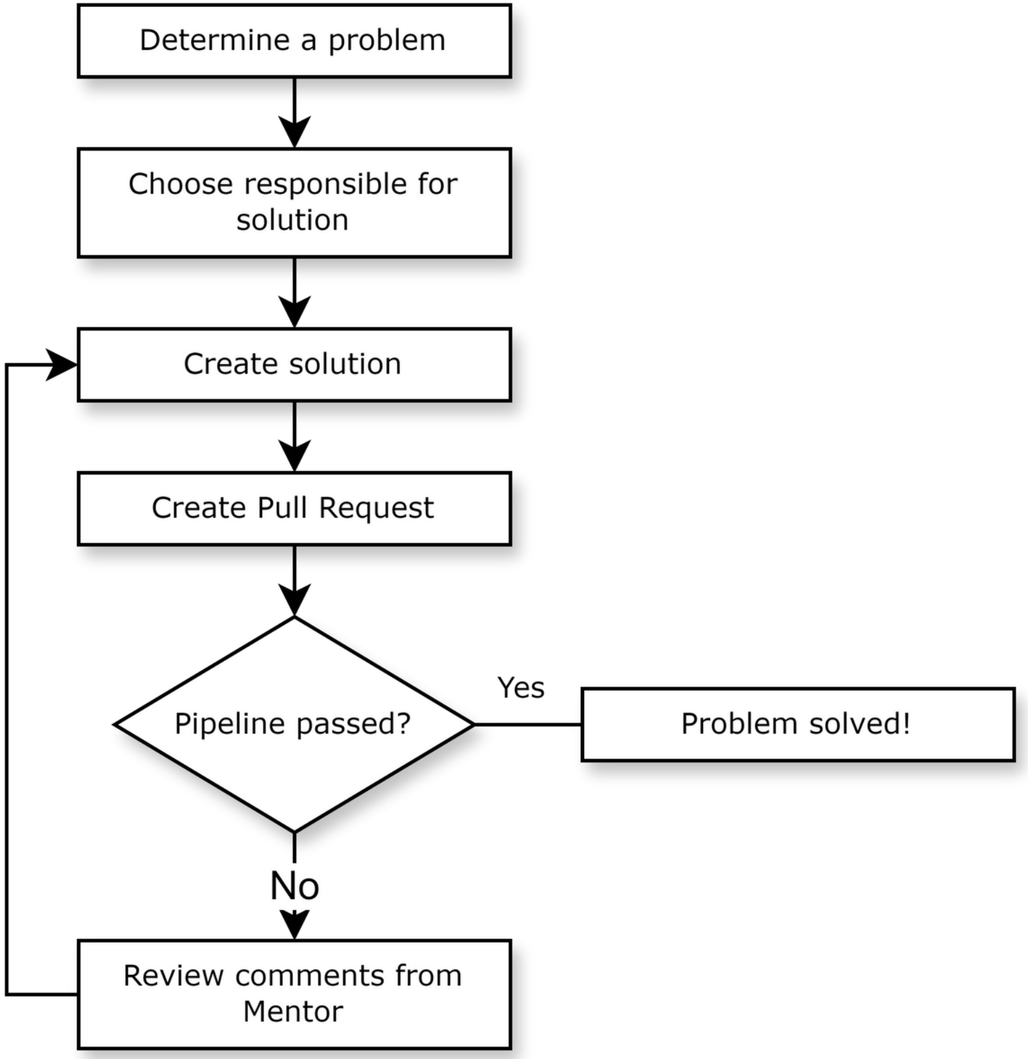
DEMO (SIMULATOR)



[Link to the video]

TESTING, WORKFLOW, DOCUMENTATION

- Components tested separately and project tested as a whole
  Test launches
- Github pipeline created to check if code is correct and project builds
- Documentation explaining all components



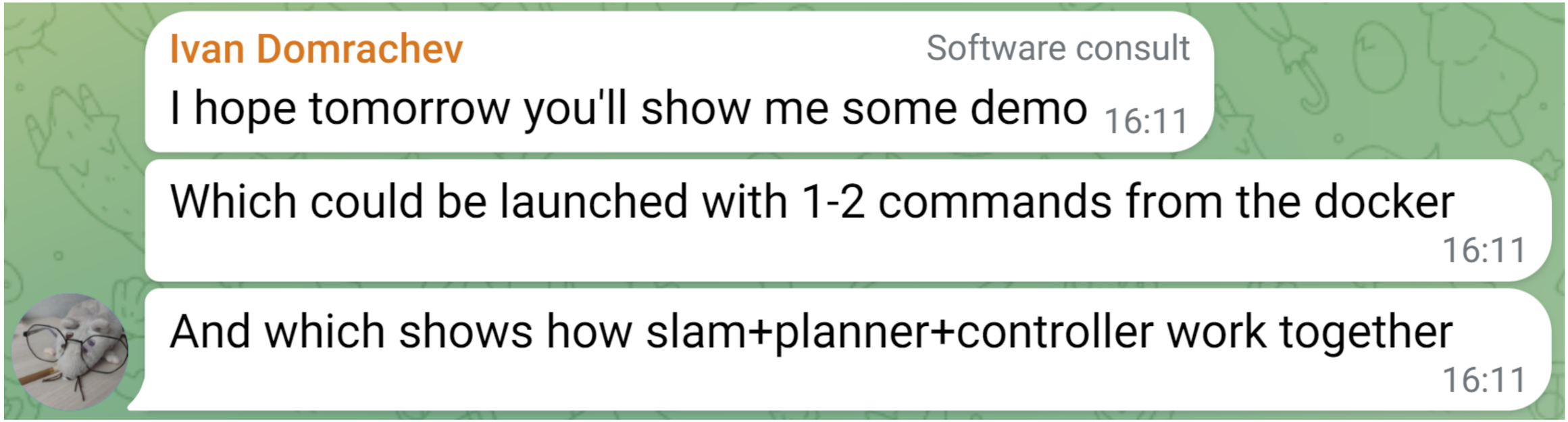
PROBLEMS

MISCOMMUNICATION
Large team: 4 teams (24 people) In the project. We had to study effective management techniques on the fly

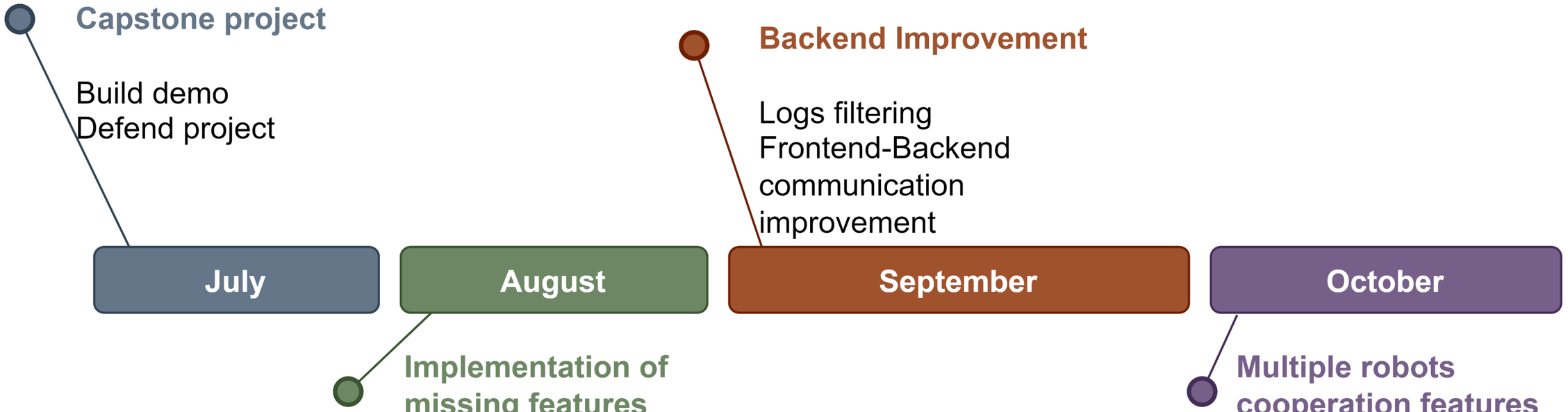
DEPENDENCIES ISSUE
Incompatible versions of OS and software dependencies

CONFIGURATION MANAGEMENT

- Weekly meetings with mentor
- Meetings on demand with other teams



FUTURE PLAN


Capstone project
Build demo
Defend project
Backend Improvement
Logs filtering
Frontend-Backend
communication
improvement
July
August
September
October
Implementation of
missing features
Behavior Tree
Sensors Fusion
Rendering of maps
with virtual walls
Multiple robots
cooperation features

CONCLUSION

Our goal, as a part of the larger project, was to develop software for a mobile platform. We have successfully developed basic functionality in only 7 weeks, proving that such software does not require huge funding or long-time work.

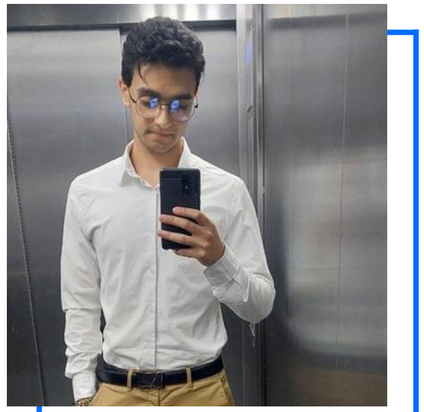
ACKNOWLEDGMENTS

IVAN DOMRACHEV

Mentor

ROBOTICS LAB

Innopolis University



KARIM ELDAKROURY

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THANK YOU

Follow our IRoS club!