Simulation environment for production planning and optimizing

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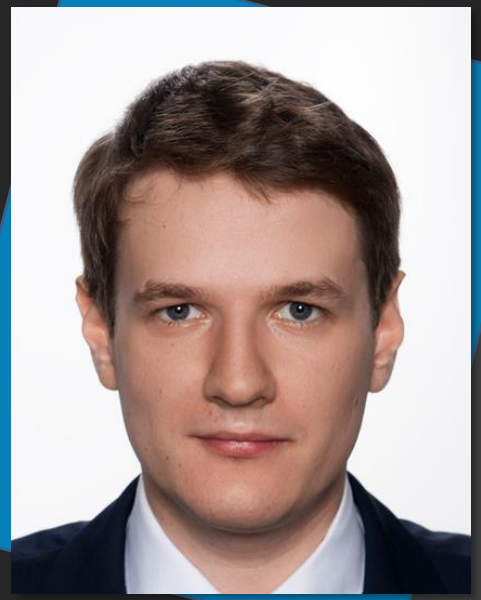
Agenda

- Who we are?
- Project tasks
- Simulation methods
- Our concept of AGV simulation environment
- Basic version of our solution
- Future plans
- Publications

Our team and interests

Jakub Szyguła



Dariusz Marek

- Embedded systems
- UAVs
- Networks research

Previous project tasks

Simulation methods for autonomous vehicles – the concept of simulation in Gazebo:

- Literature review and analysis of simulation methods for Automated Guided Vehicles (State-of-the-Art)
- Development of simulation test environment for Automated Guided Vehicles (Assess the behavior of Automated Guided Vehicles in industry)

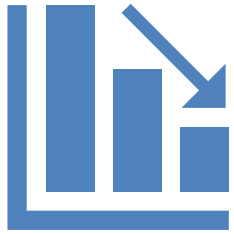
Previous project tasks

Analysis of the available simulation environments

The concept of the simulation methods for AGVs platforms for Industry 4.0

Preparation of the simulation methods for AGVs platforms

Why simulation methods?



Reducing the costs of designing, implementing and testing AGV systems

Protecting physical systems

Facilitating the planning of the logistics tasks

Assessment of the time required for the implementation in industry

Chosen simulator: Gazebo

The most popular simulation environment for robotics applications.

- ✓Has libraries that simulate the behavior of LiDAR sensors, cameras, IMU, and GPS;
- ✓Easily integrate with Robot Operating System (ROS) and other systems
- ✓Possibility to add and created one’s own modules with the new functionality of a simulation
- ✓Popular environment for industrial robots simulations

What we done?

- Simulation environment based on Gazebo Simulator
- Automatically generated map from points
- Multiple AGV’s movement simulation
- LiDAR on AGV’s to allows locating an obstacle
- Humans movement simulation
- Gathering the logs from the simulation environments:
  - number of AGV’s stops
  - time of AGV’s stops
  - time of AGV’s movements
  - time of simulation

What we done?

- Analysis of web-based geo-visualization methods applied for Automated Guided Vehicle using Satellite Navigation Systems (under corrections)
- General Concepts of a Simulation Method for Automated Guided Vehicle in Industry 4.0 (under corrections)

Project break

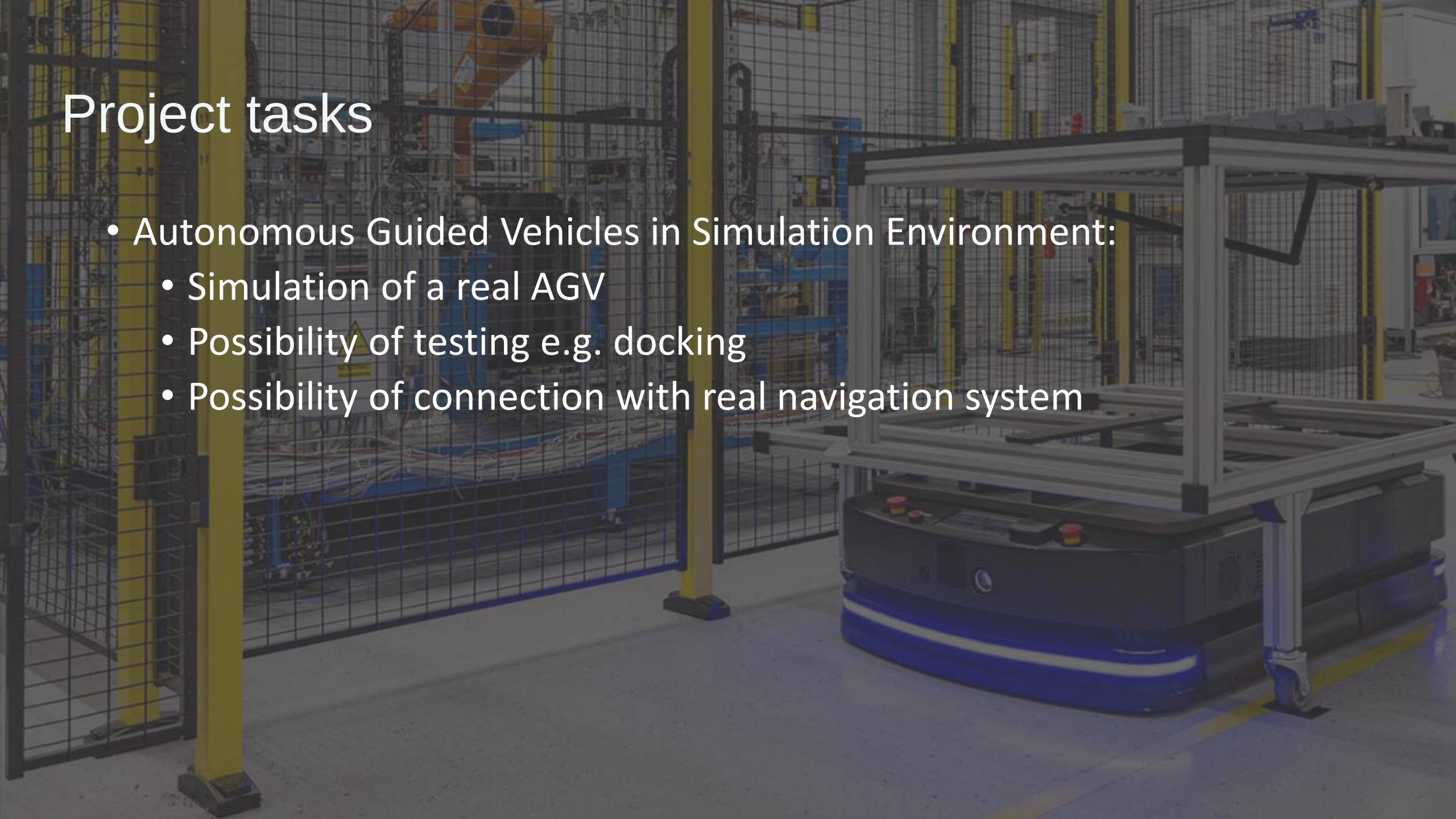
- Our PhDs
- Classes in winter semester

What are we doing now

- We are after the AUIT presentation of the real AGV Formica 1 in the AIUT company
- We are in the process of discussing the requirements of simulation model

Project tasks

- Autonomous Guided Vehicles in Simulation Environment:
  - Simulation of a real AGV
  - Possibility of testing e.g. docking
  - Possibility of connection with real navigation system



Future plans

Prepare requirements of simulated AGV model

Prepare requirements for simulated environment
(e.g., vehicle docking)

Prepare simulated AGV model

Testing created simulation AGV model

Adjustment simulated AGV to the real AGV model

Connection simulation AGV model to real system

Thank you for your attention!