An Analysis on Real-time Data based Path Planning Strategies for Wheeled Mobile Robots

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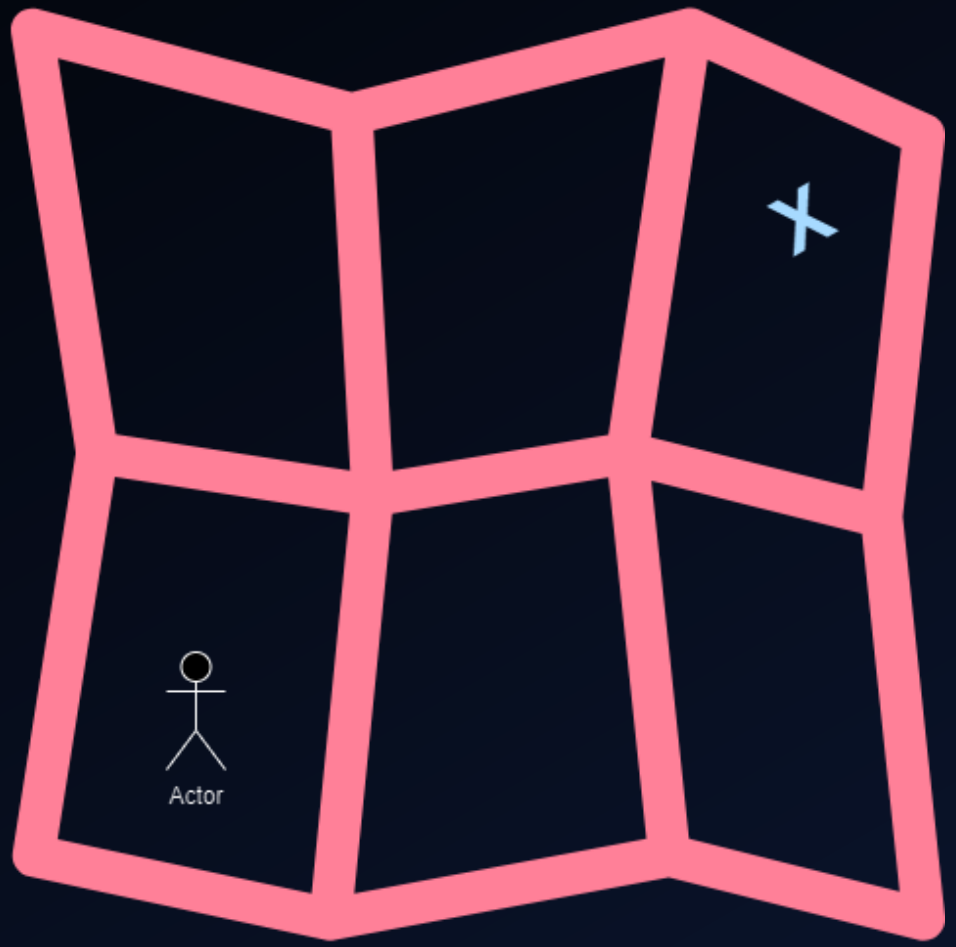
Abstract:

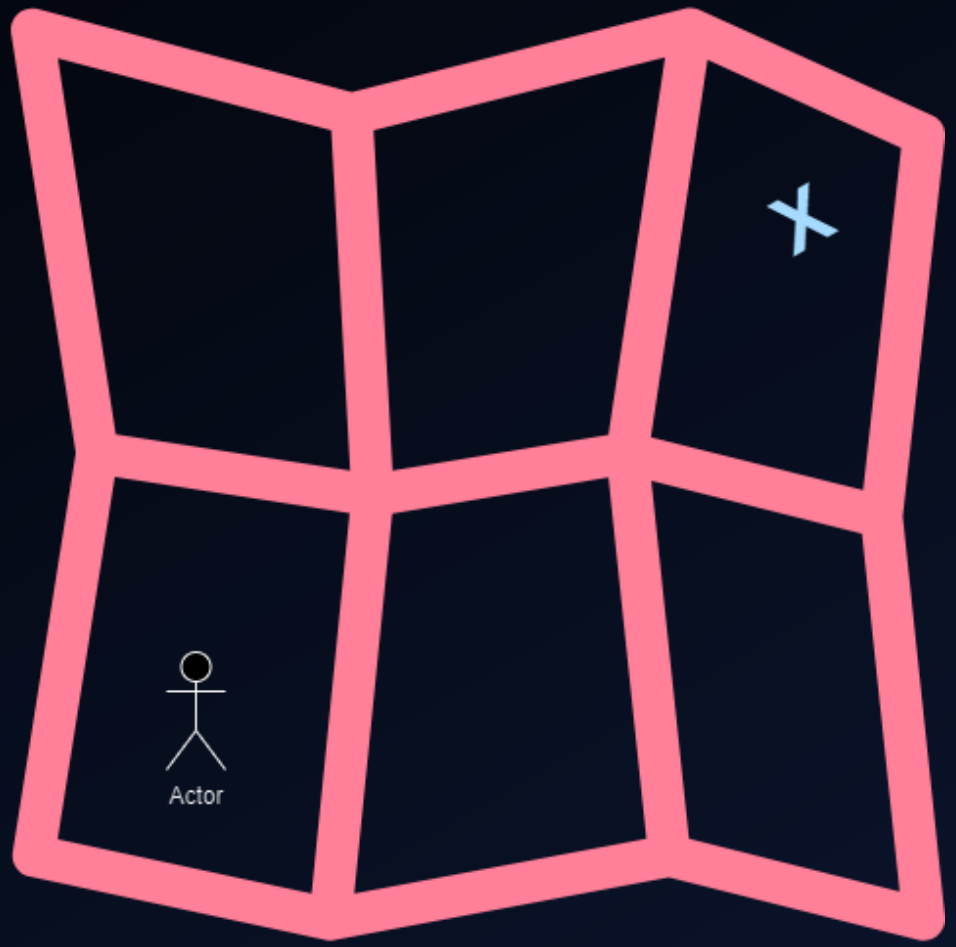
- Introduction
- Methodology
  - Data acquisition
  - Data filtering
  - Mapping
  - Algorithms
- Results
- Discussion to Conclusion
- References

Introduction:



Introduction:

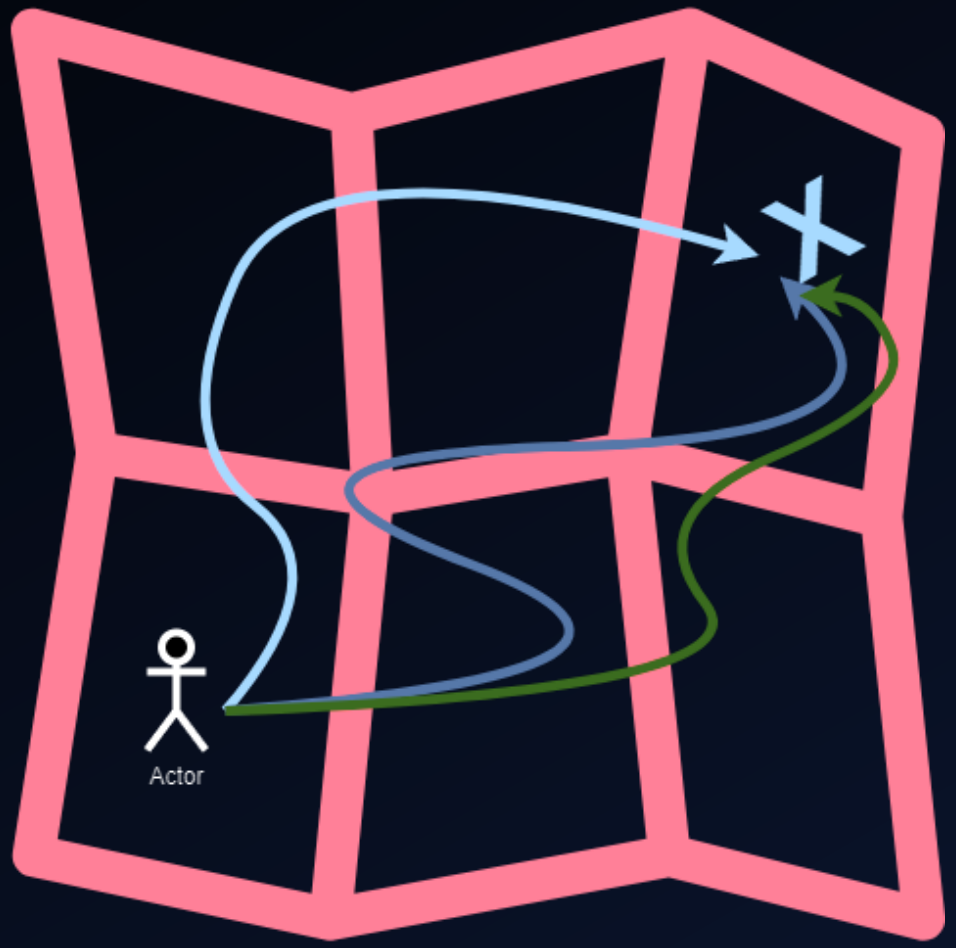
Mapping



Introduction:

Mapping

Path Planning

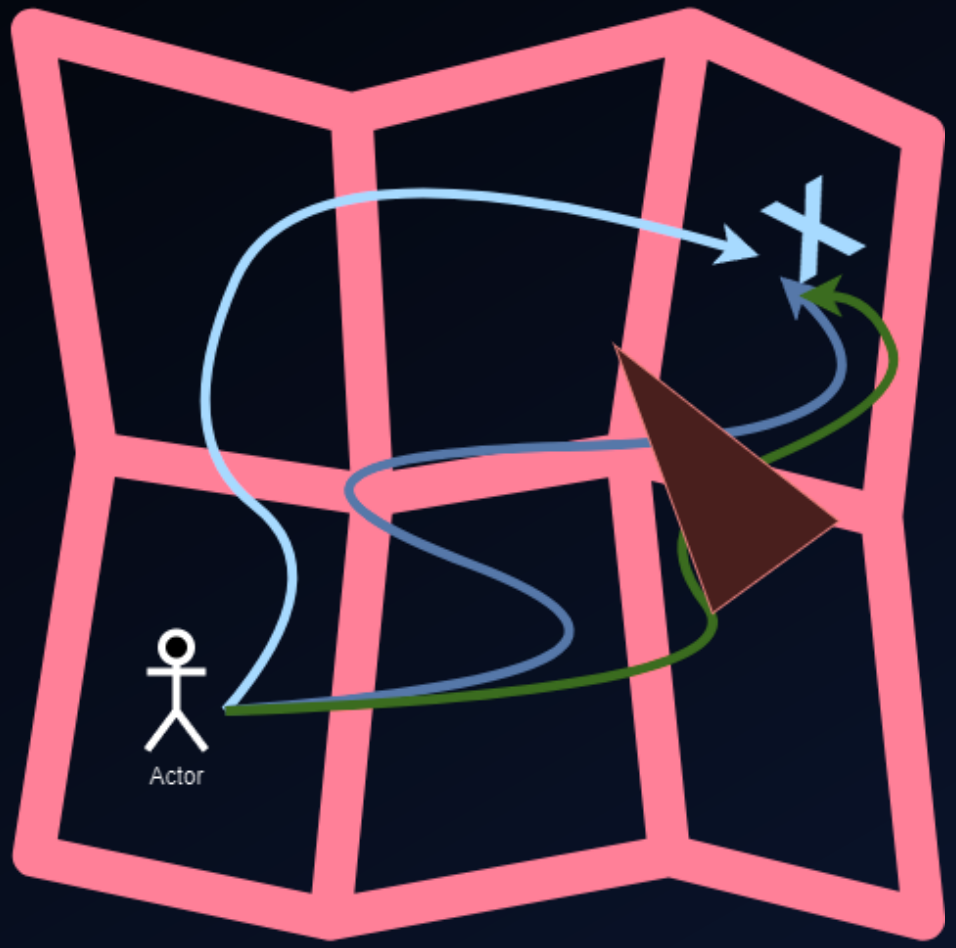


Introduction:

Mapping

Path Planning

Obstacle Avoidence



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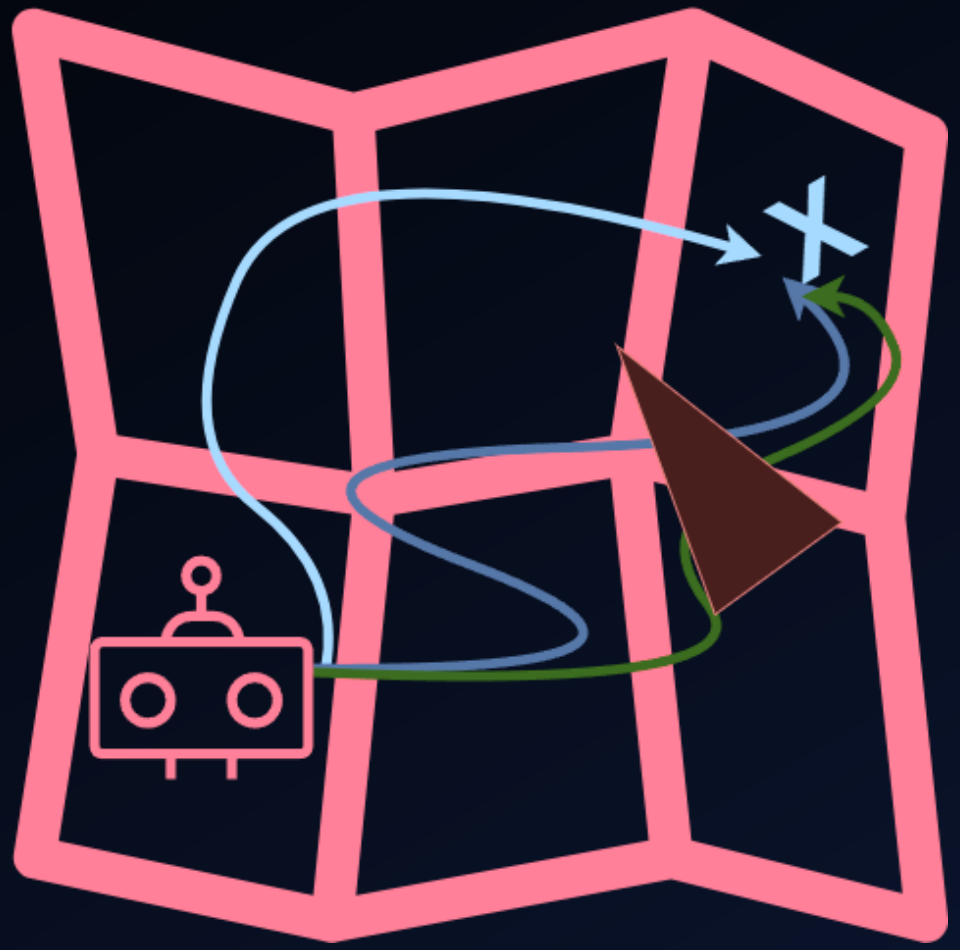

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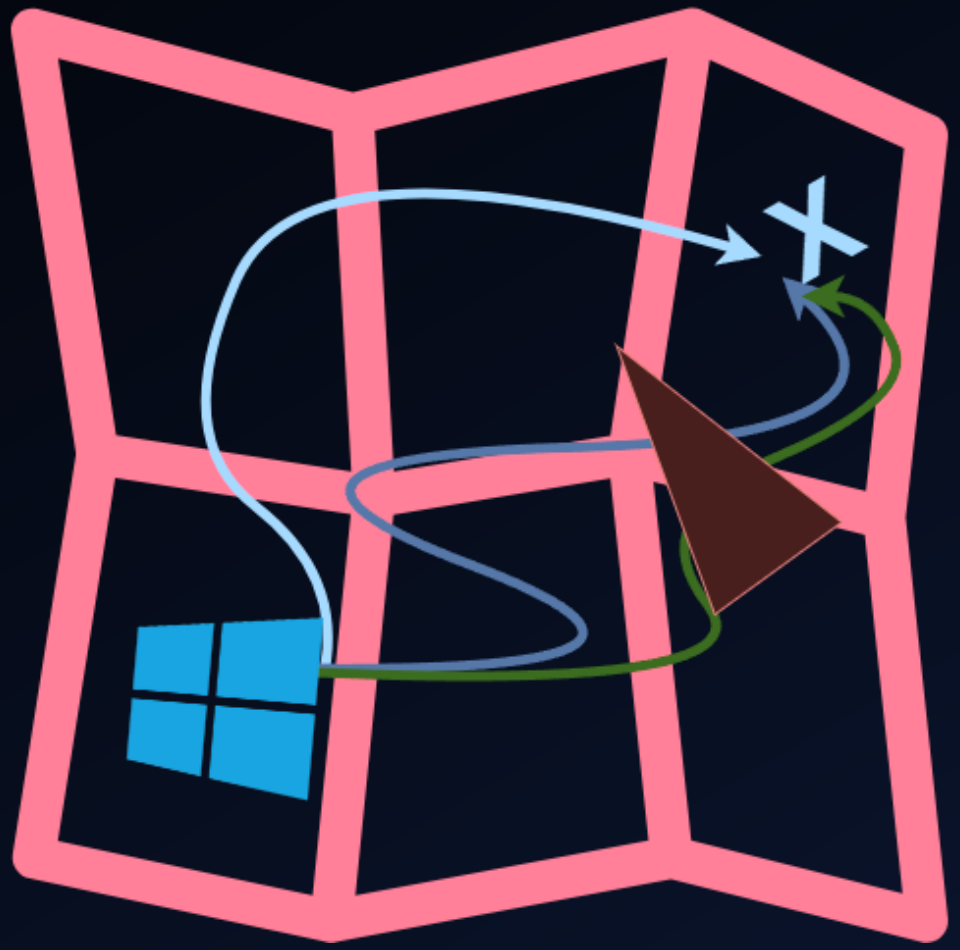
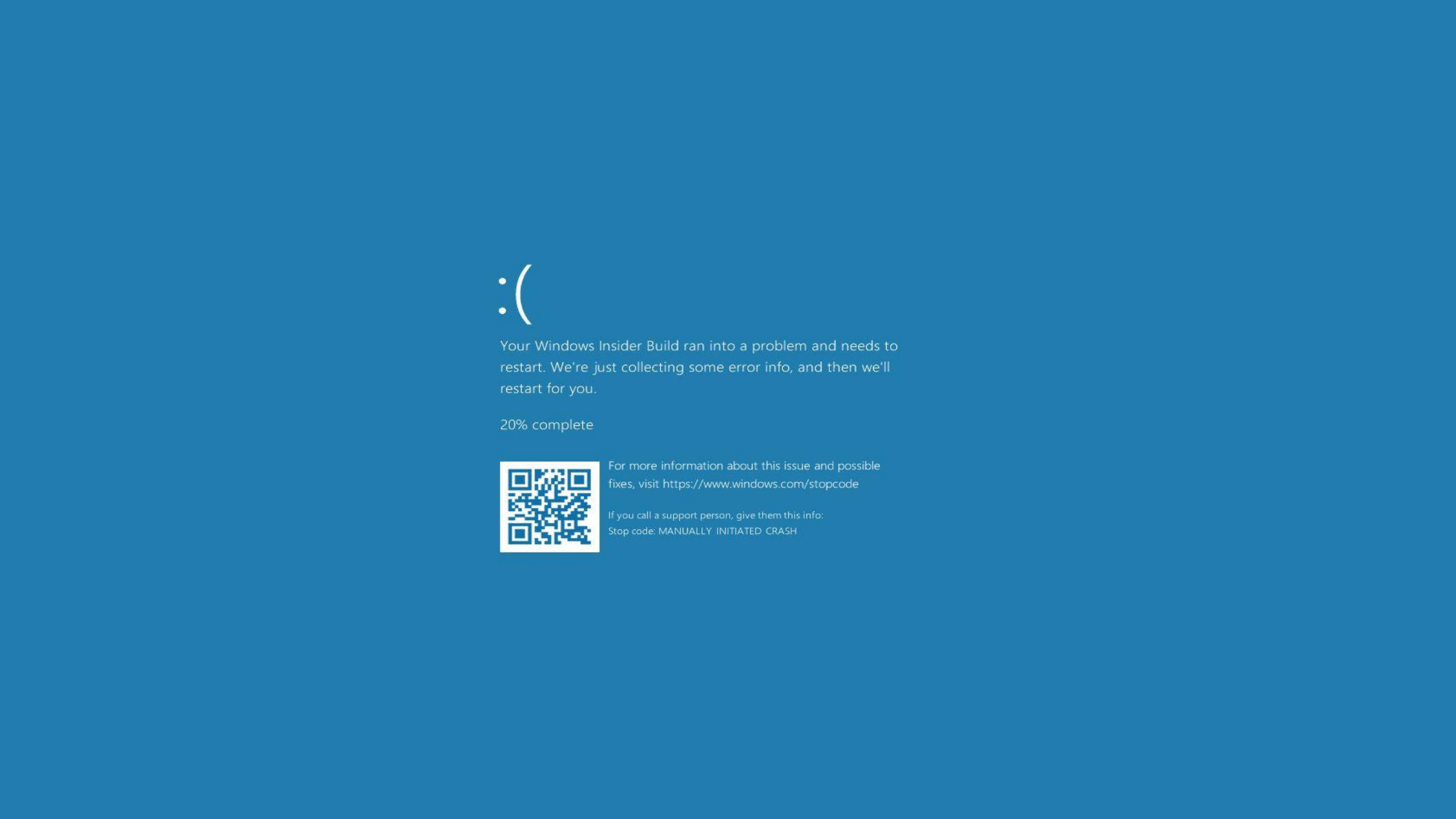



:(
Your Windows Insider Build ran into a problem and needs to restart. We're just collecting some error info, and then we'll restart for you.
20% complete
For more information about this issue and possible fixes, visit https://www.windows.com/stopcode
If you call a support person, give them this info:
Stop code: MANUALLY_INITIATED_CRASH

Methodology:

Lebai S300

Methodology:

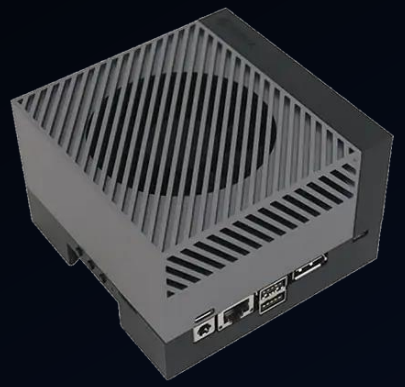
- LiDARs

- STM32

- Distance senors

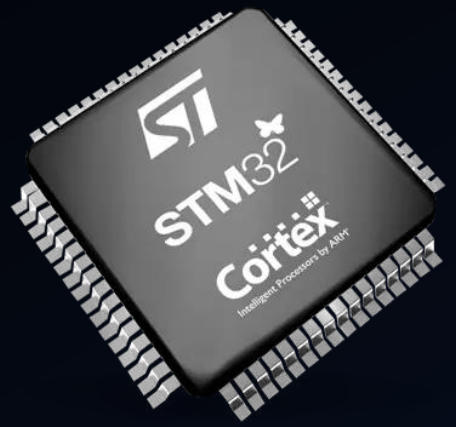
- Nvidia Jetson

Methodology:



- The central processing power
- Linux operating system
- Main application is done in ROS

Methodology:



- The bridge between all of the subsystems
- Command set for controlling the motors

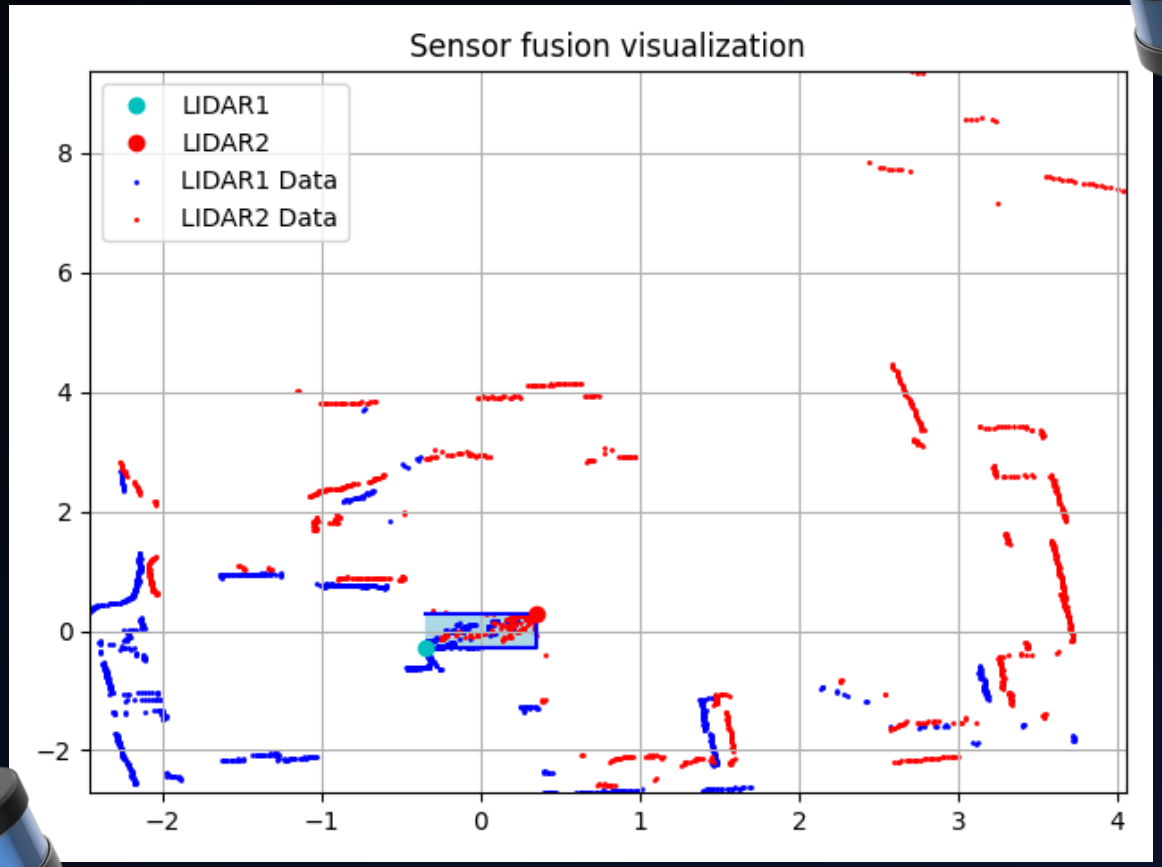
Methodology:

- Used for detection of very close objects in front of the vehicle

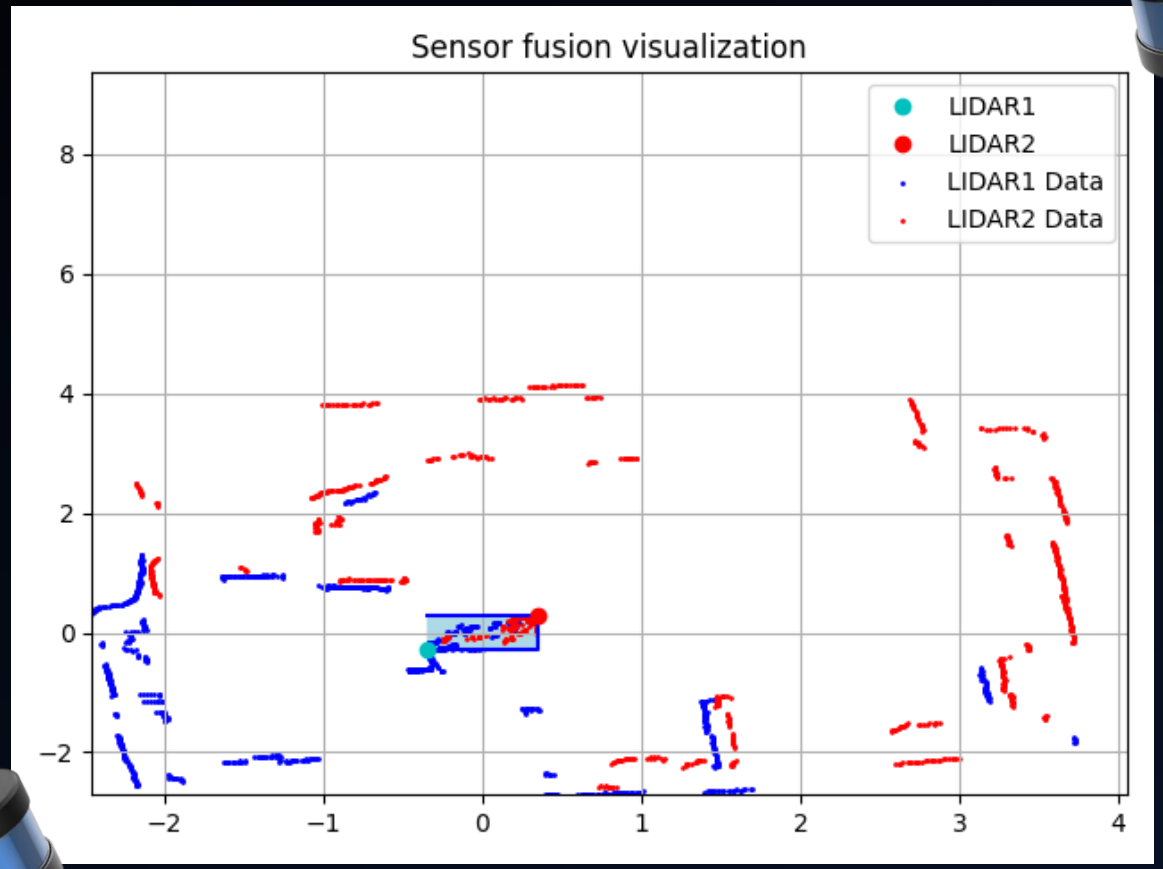
Methodology:

- The main way of the robot to see the environment

Data filtering:



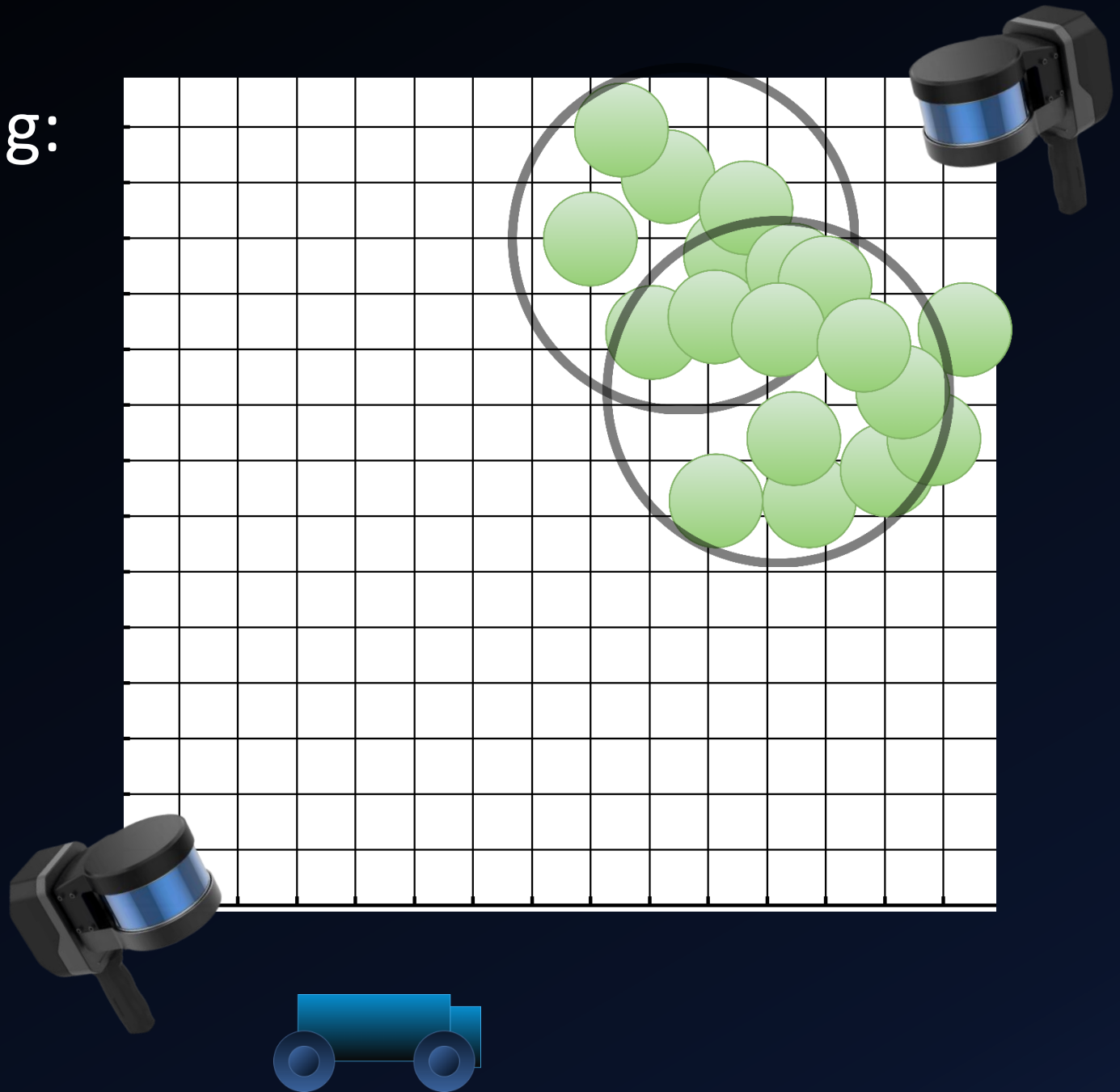
Data filtering:



Filters applied:

- Standard Deviation Filter
- DBSCAN (Density-Based Spatial Clustering of Applications with Noise)

Data filtering:



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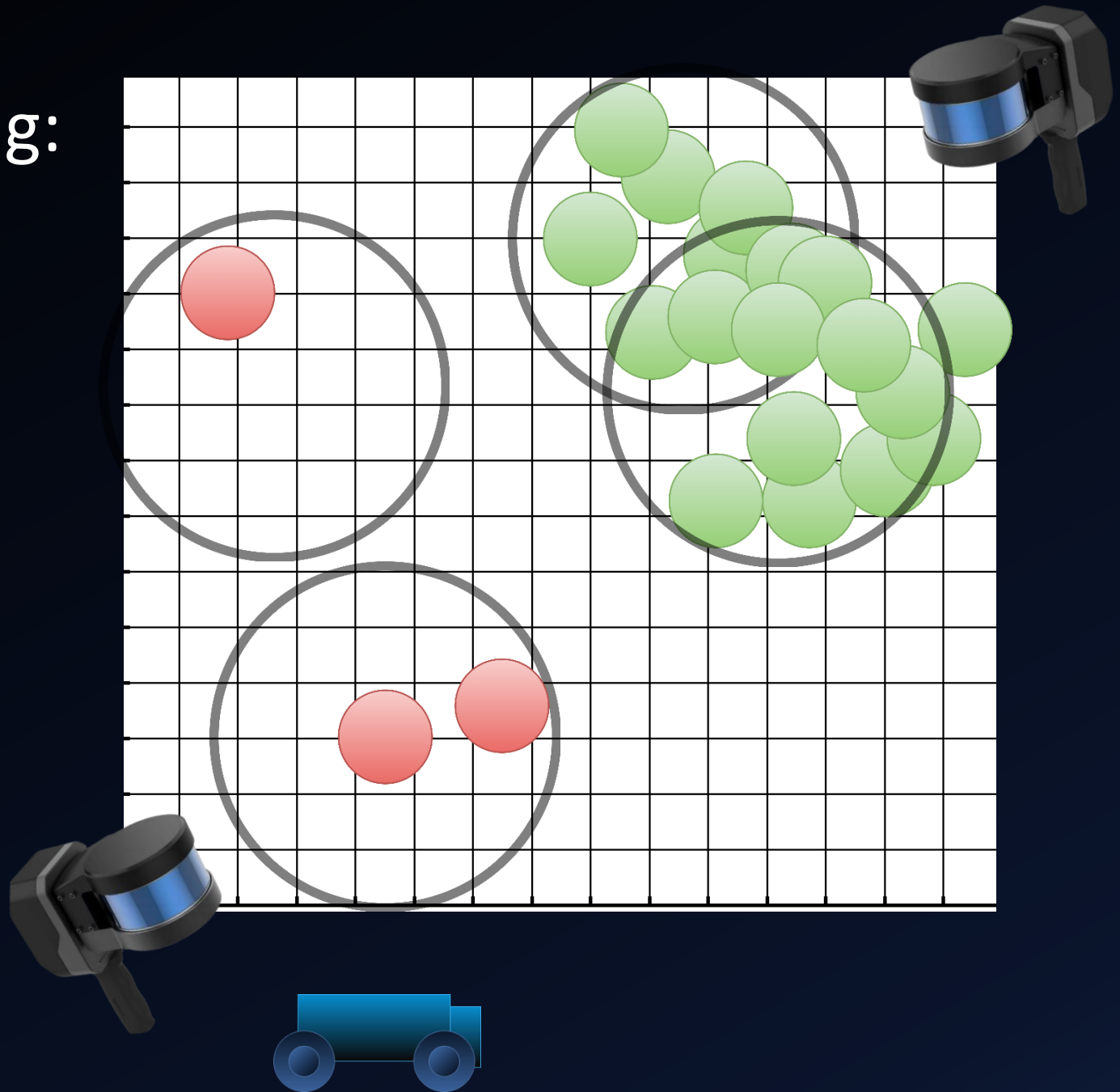

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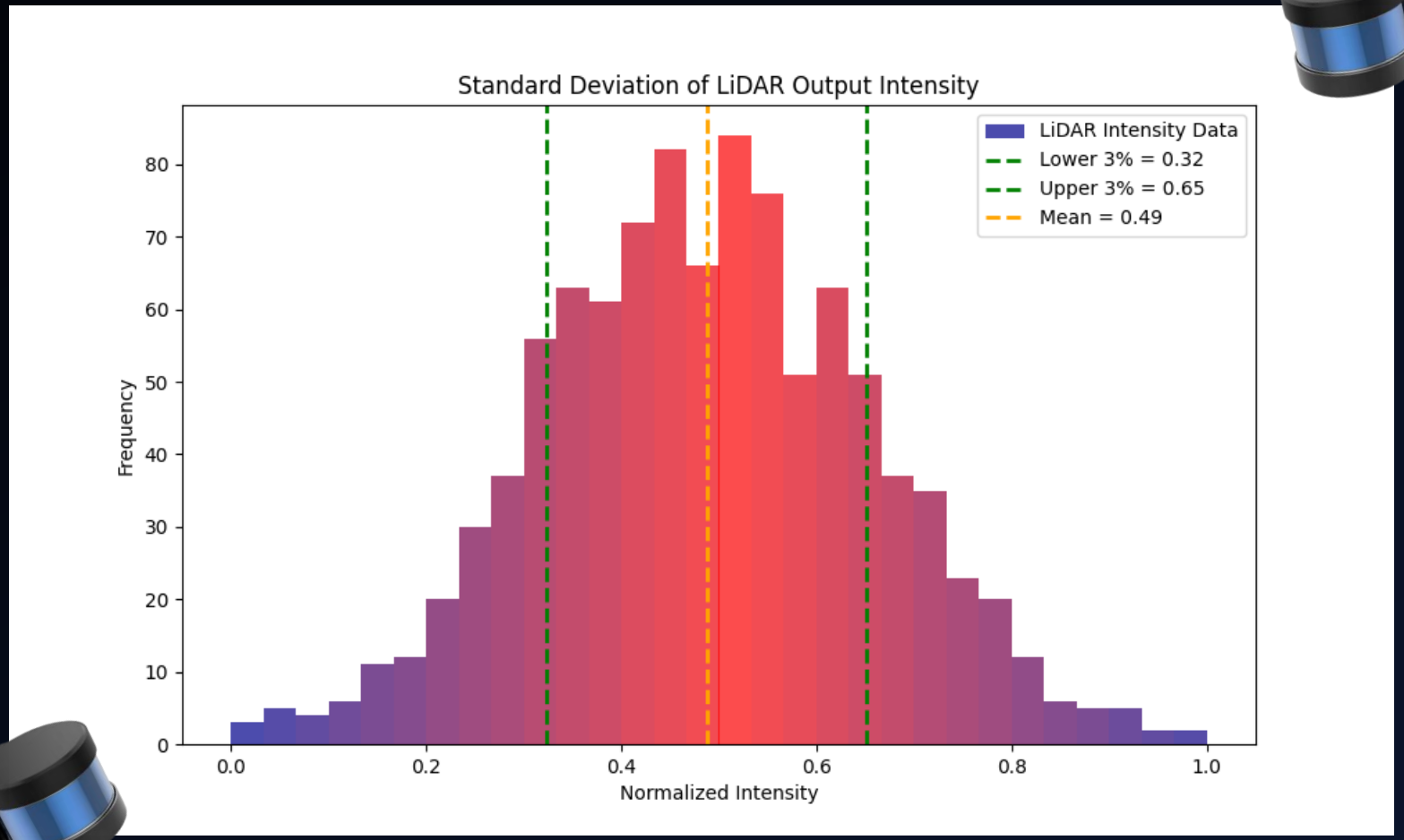
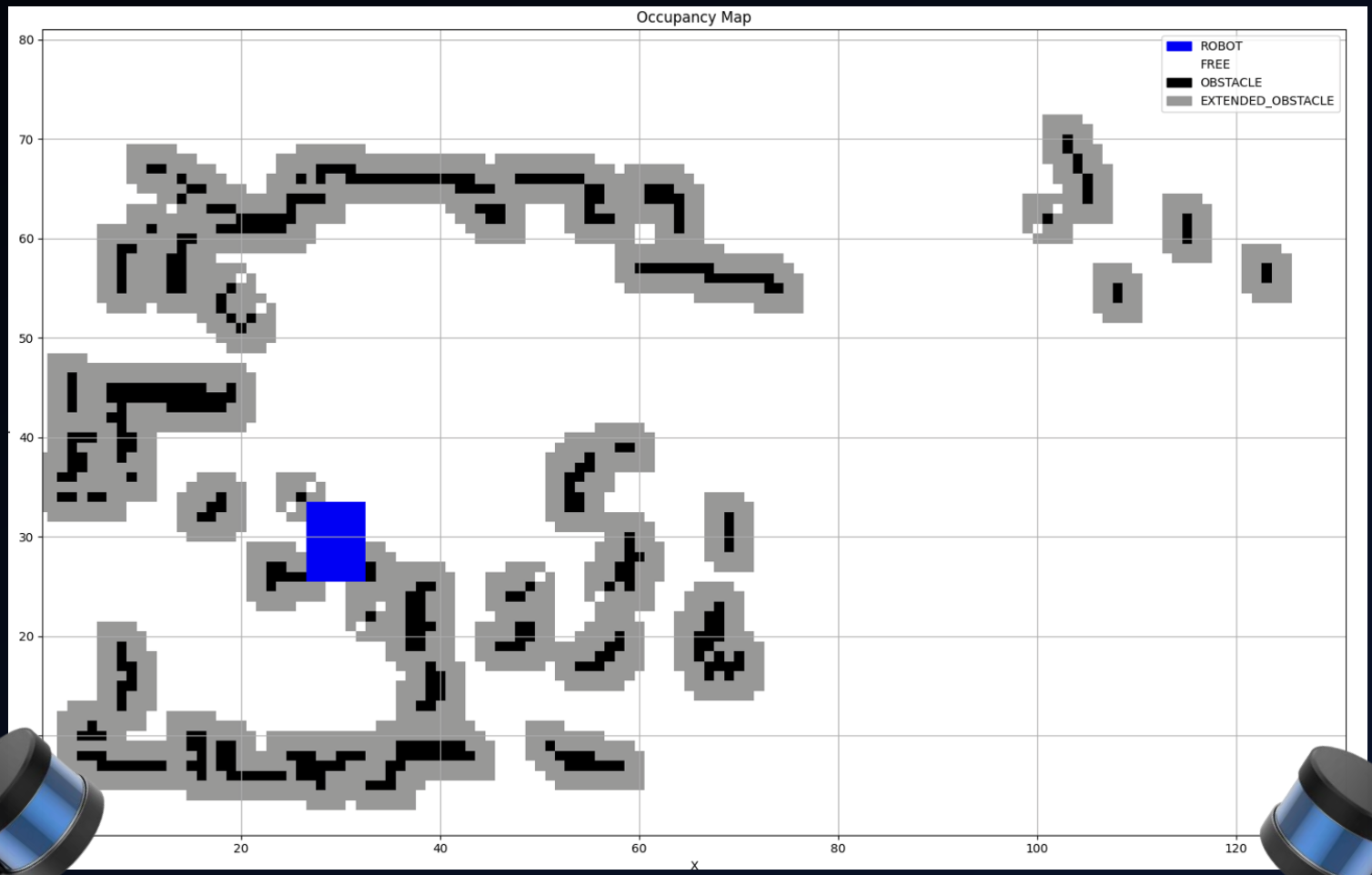
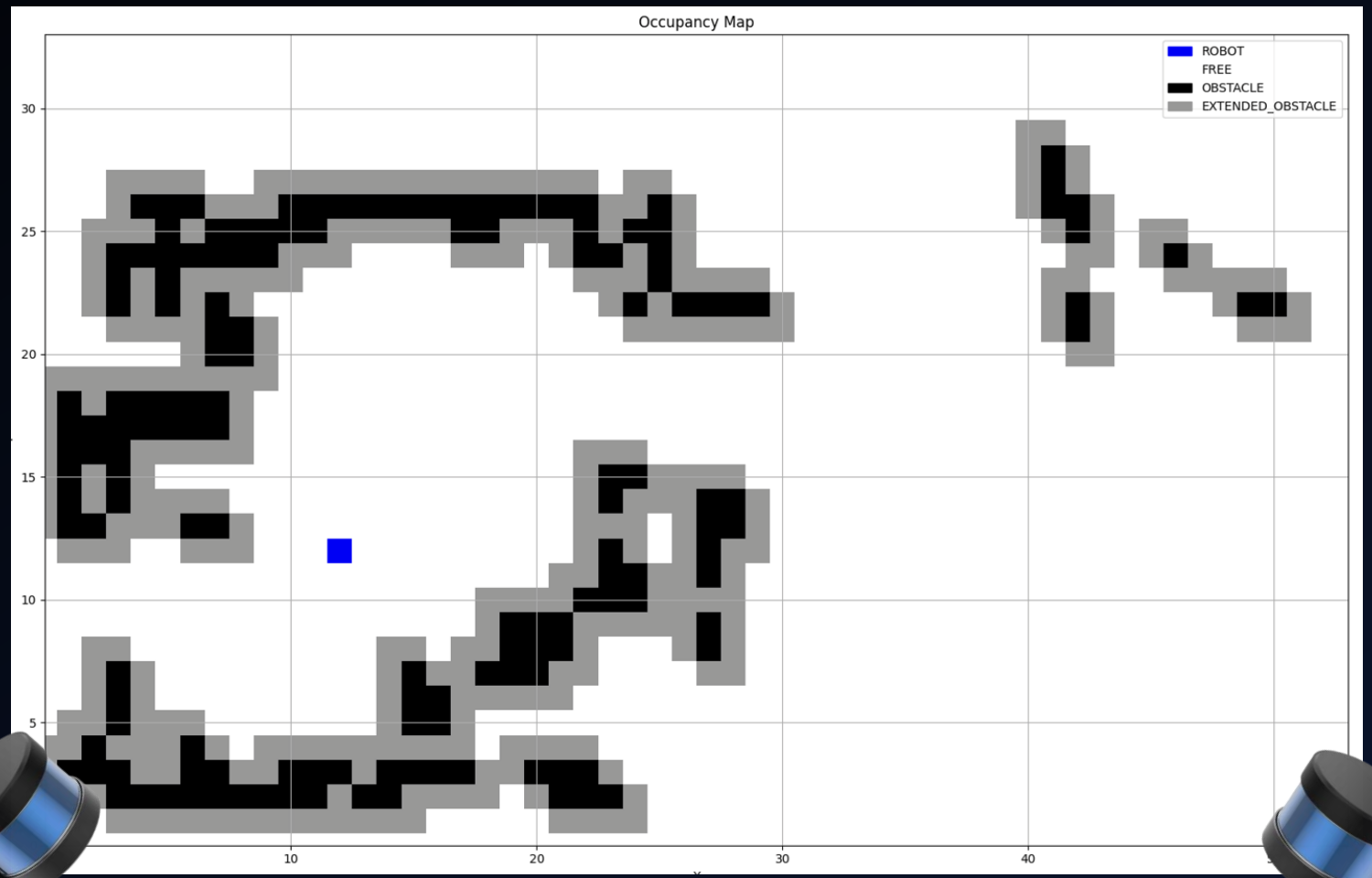


Space quantization:

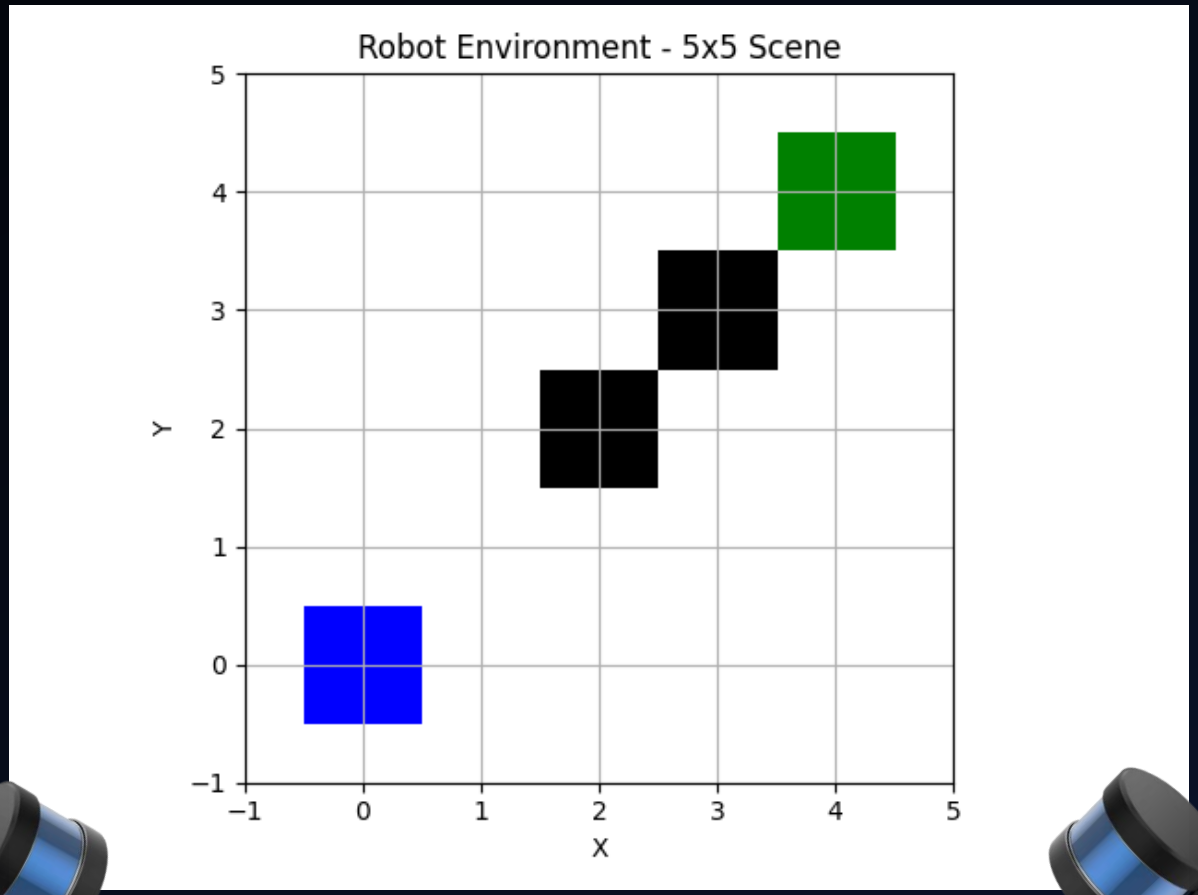
Object extension:



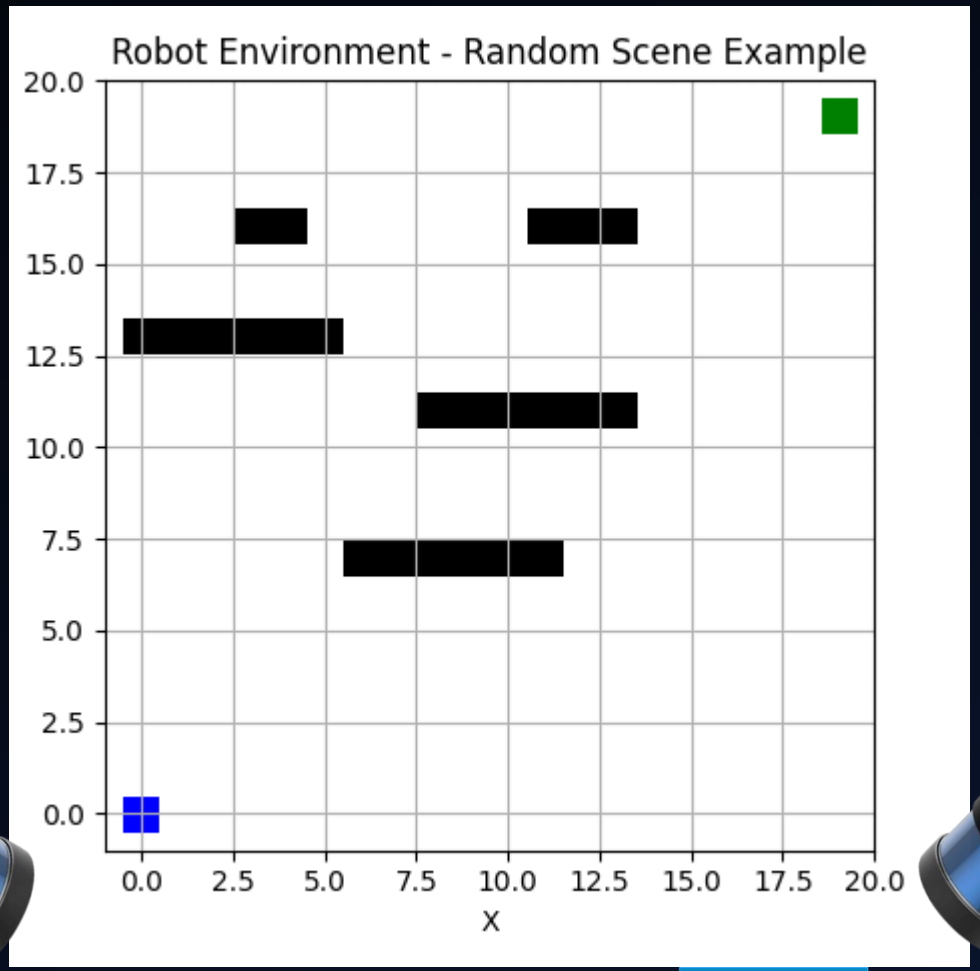
Object reduction to one point (lidar test grid):



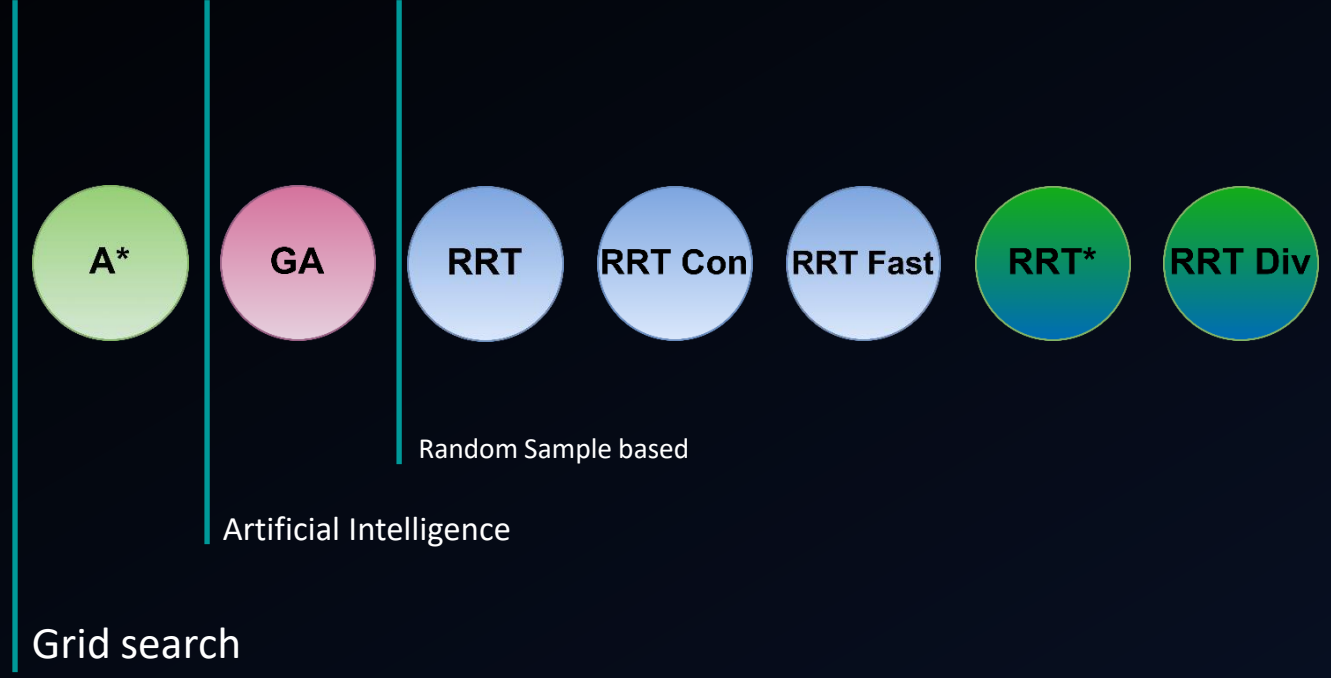
Five by five scene test mapping:



Random scene test mapping:

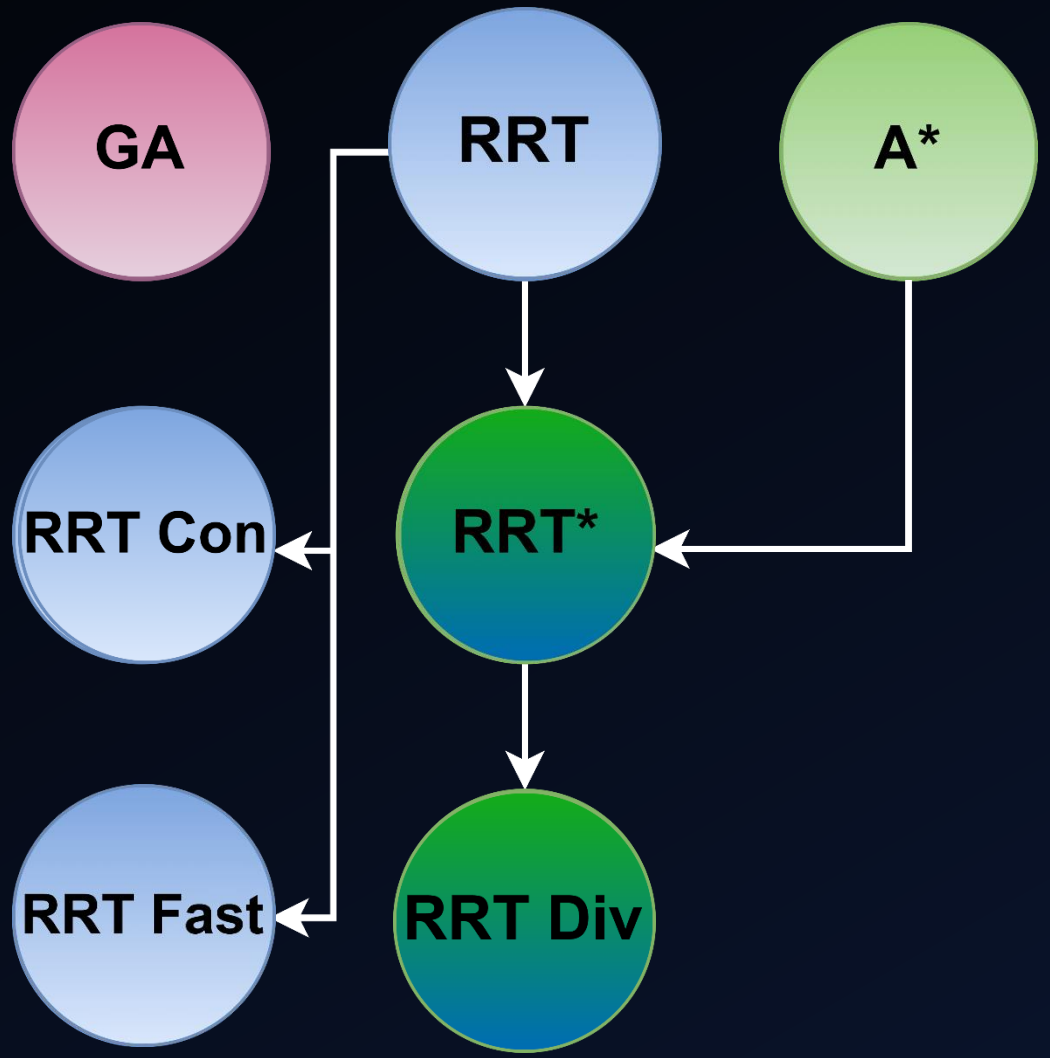


Algorithms:



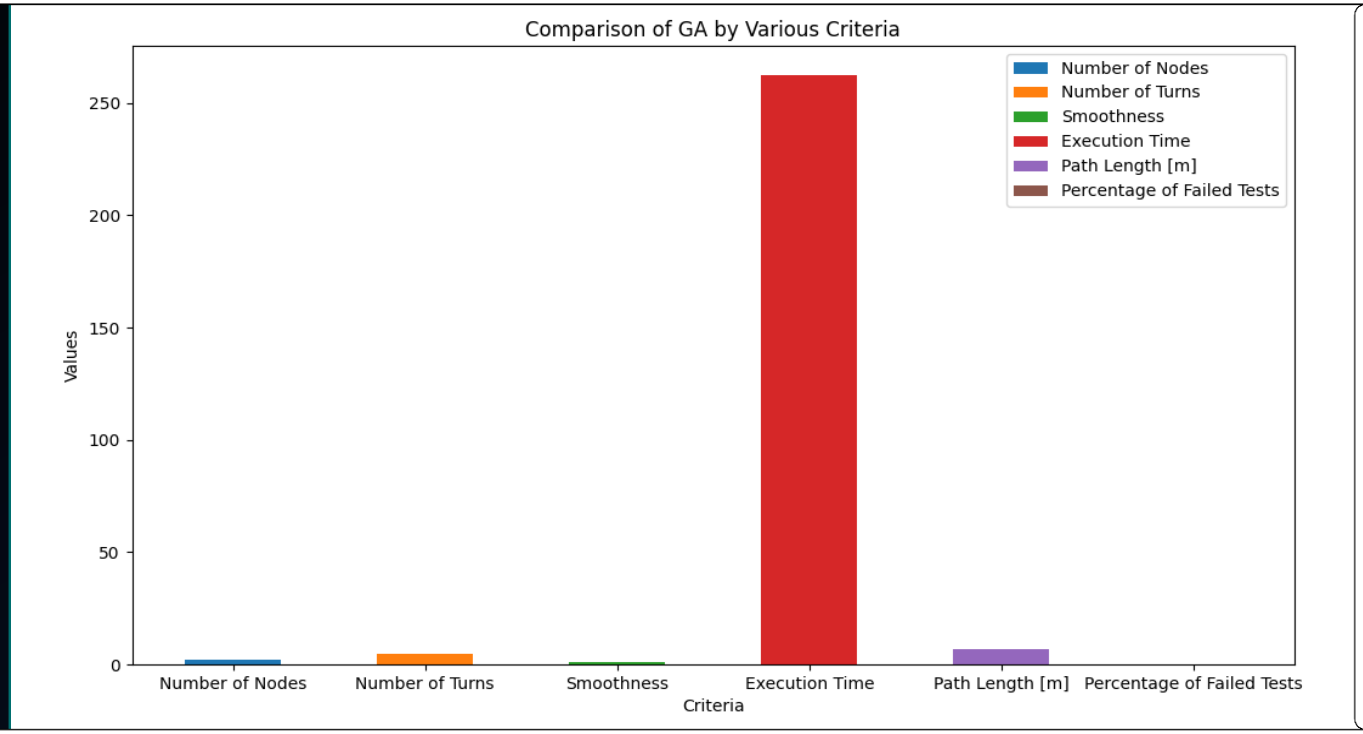
- All of the algorithms were implemented with the platform in mind;
- The data processing and implementation was done in Python;

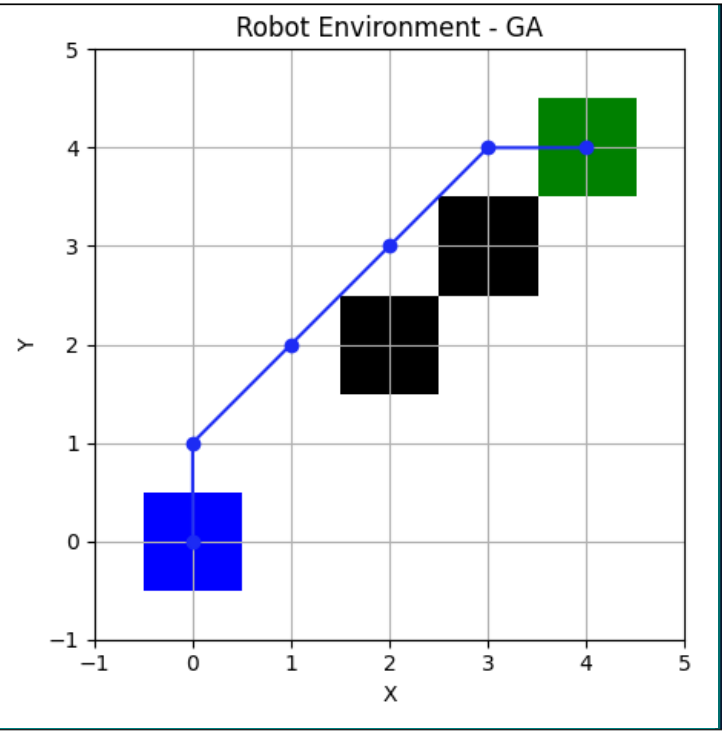
Algorithms:



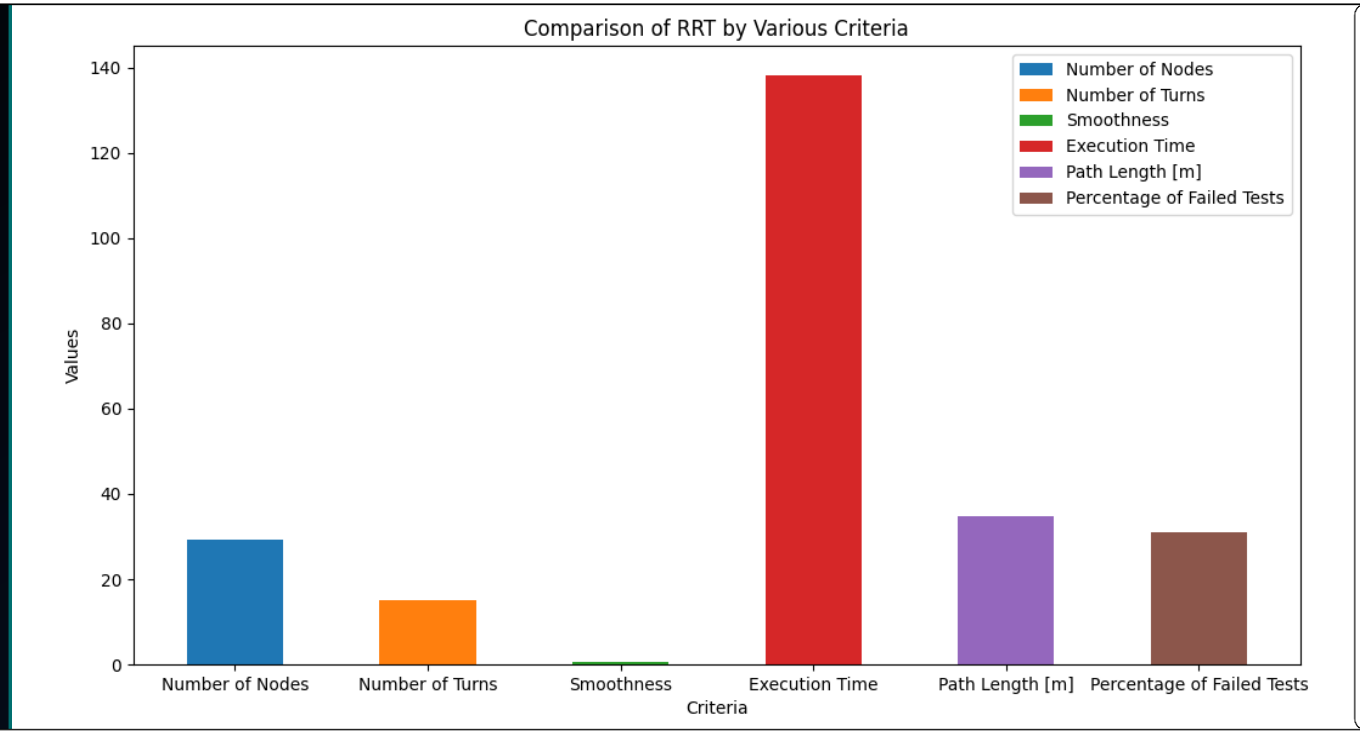
Algorithms:

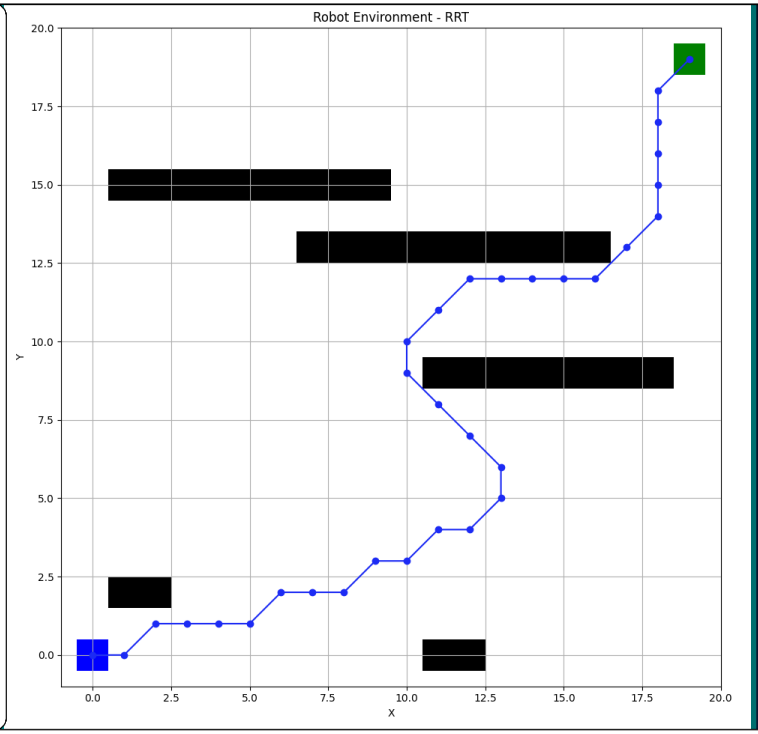
GA | RRT | RRT Con | RRT Fast | RRT* | RRT Div



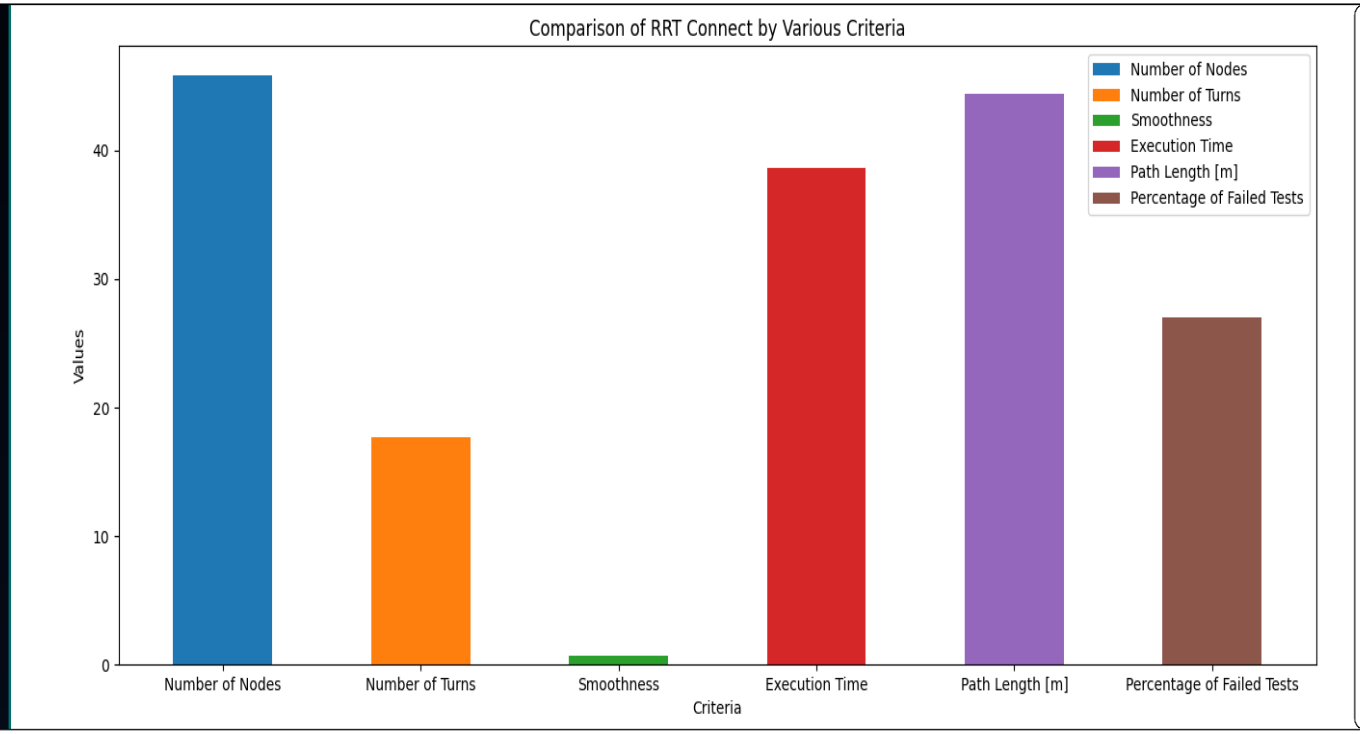


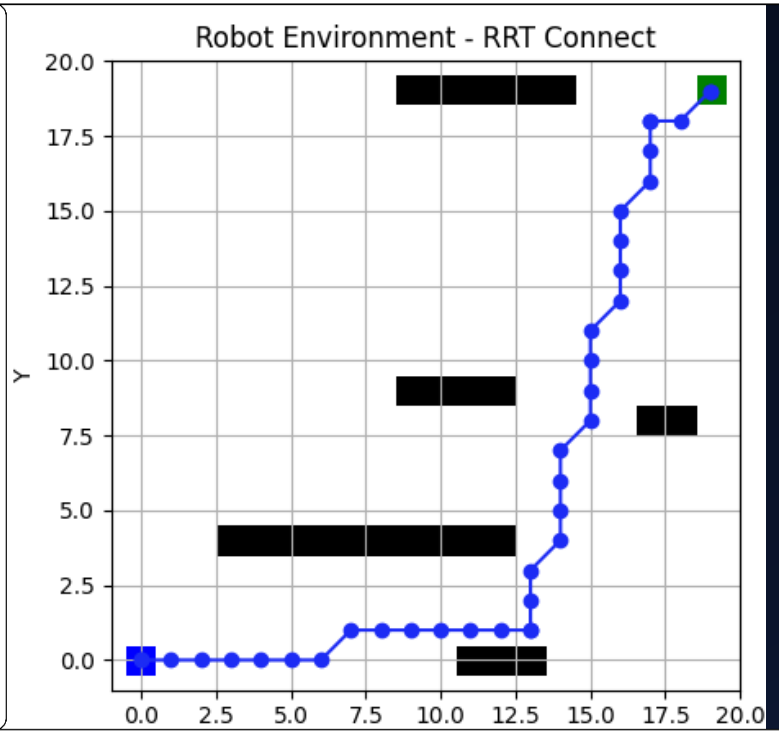
Algorithms: RRT RRT Con RRT Fast RRT* RRT Div



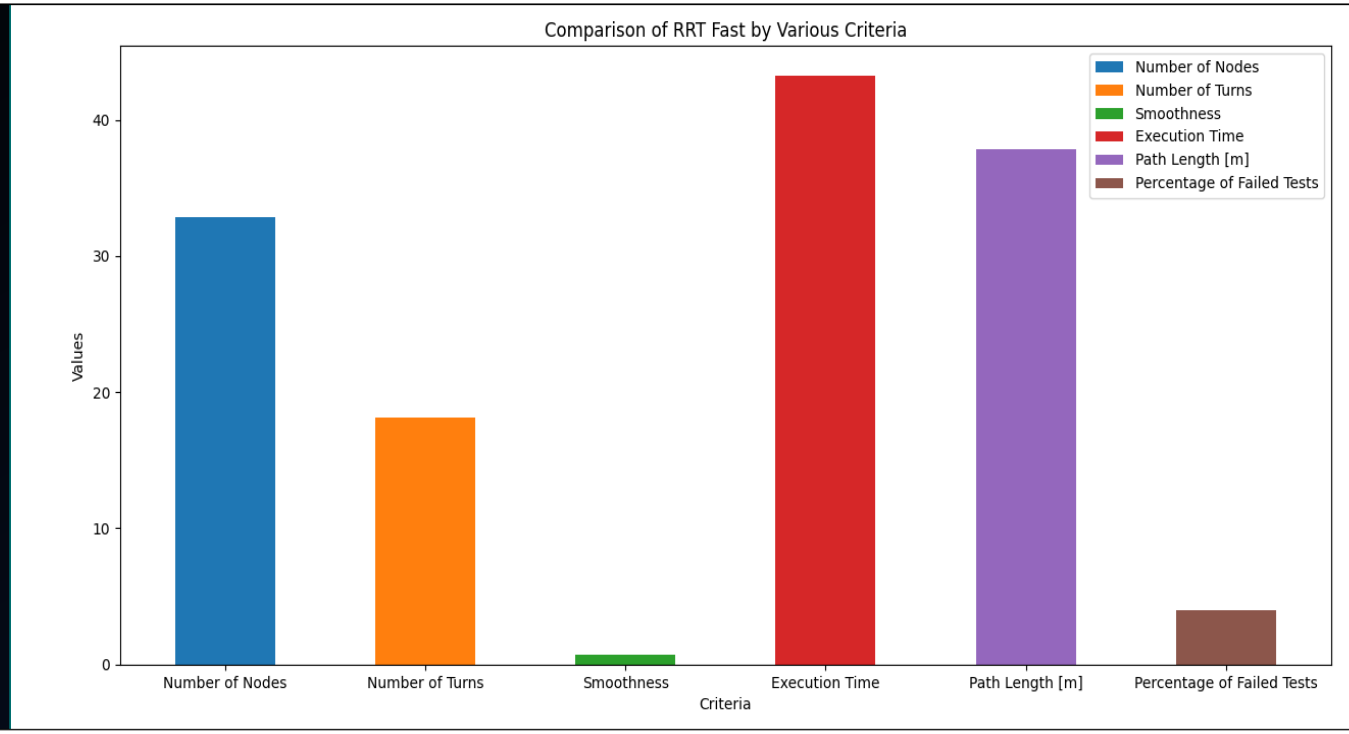


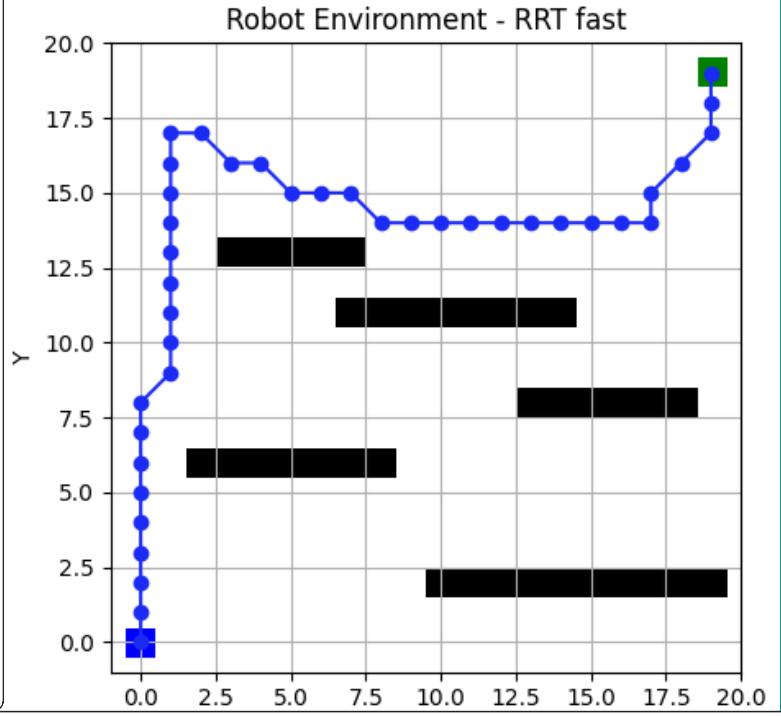
Algorithms: RRT Con RRT Fast RRT* RRT Div



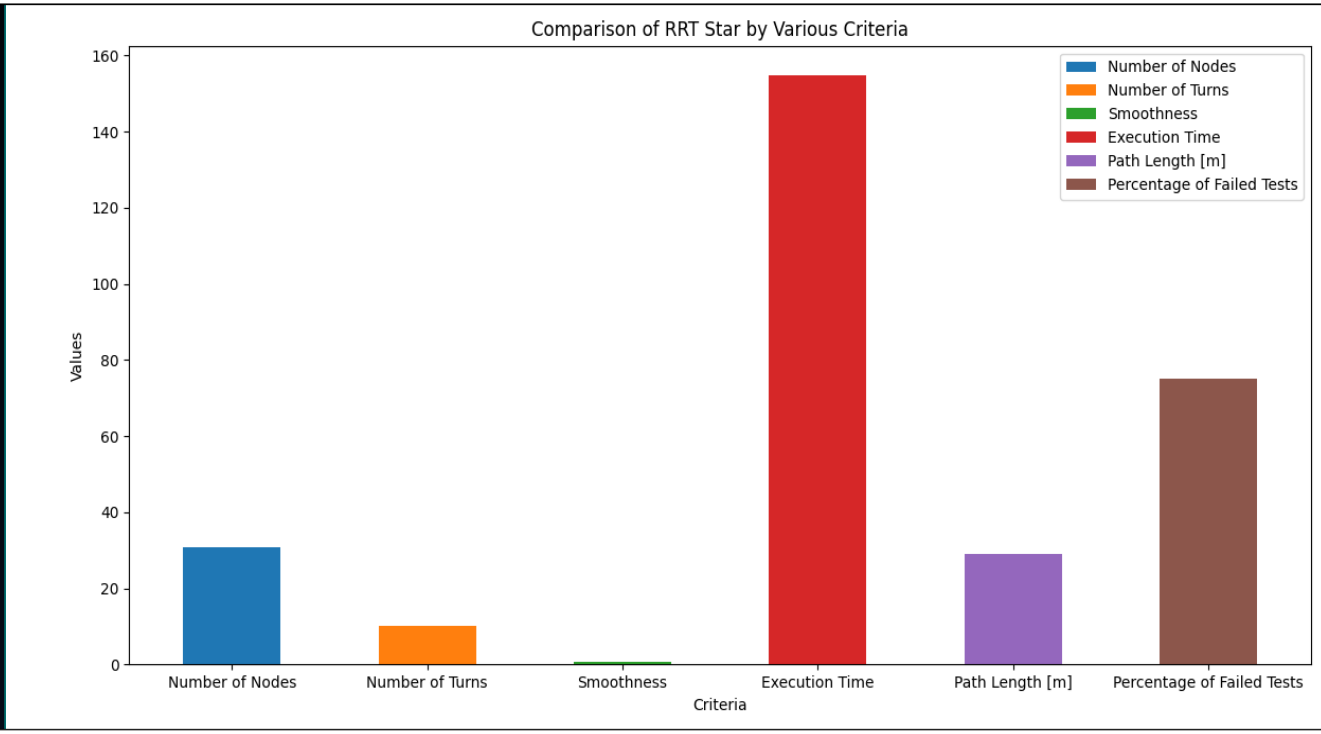


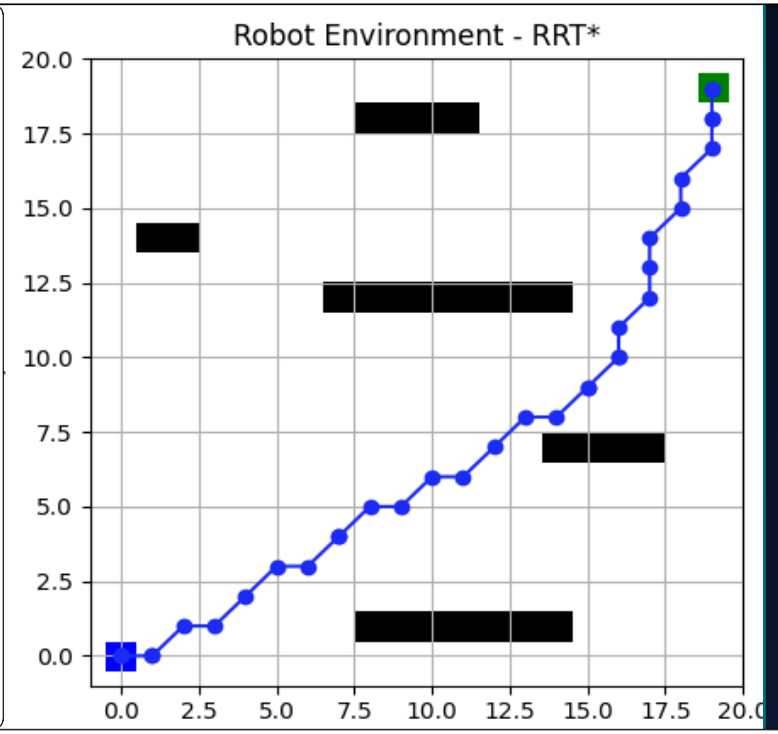
Algorithms: RRT Fast RRT* RRT Div



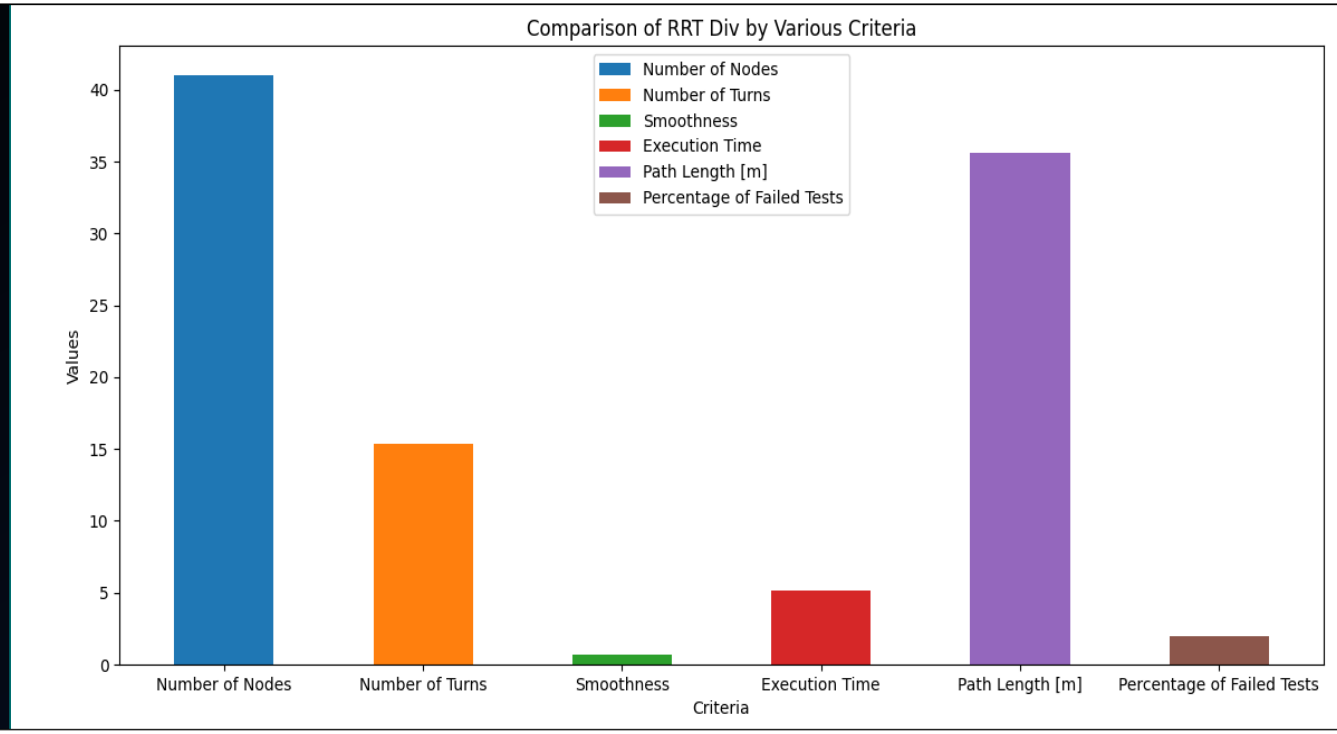


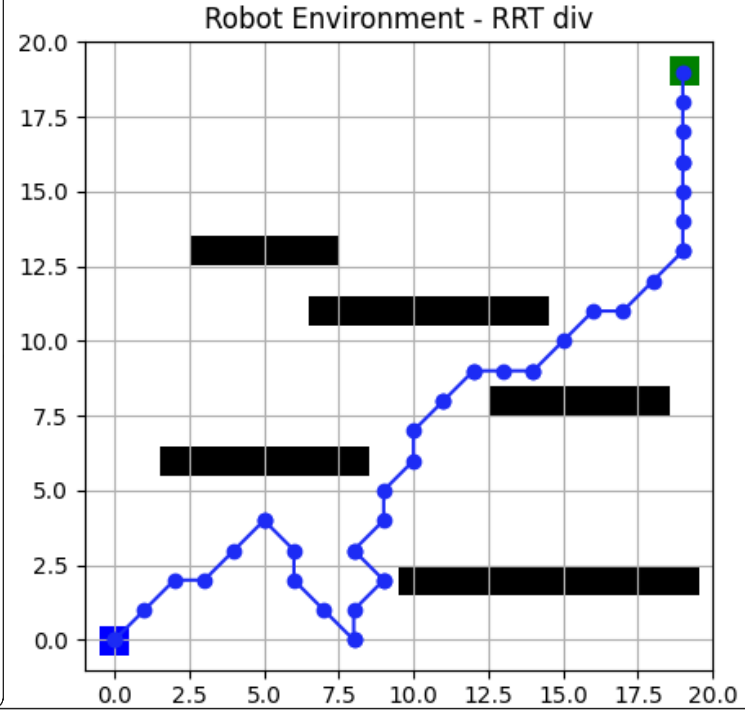
Algorithms: RRT* RRT Div



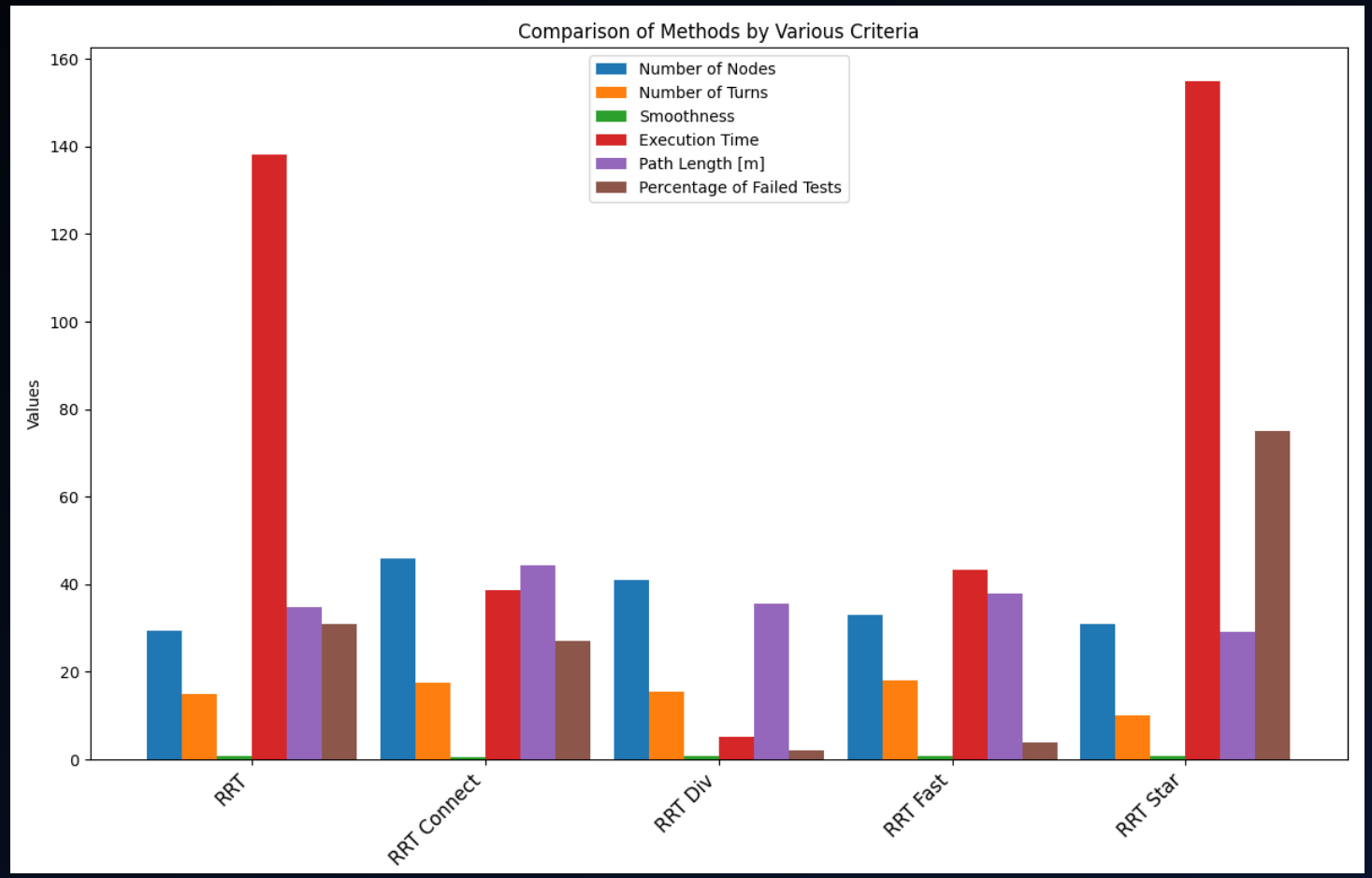


Algorithms: RRT Div





Algorithms general results:



Conclusions:

RRT Div — The best one overall, very big potential for real time systems;

RRT* — Very consistent speed, great posibility of rewiring in case of dinamyc obstacles;

GA — Great potential for future implementations with NN

Each one has an aspect in which it is the most constant one;

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Thank you!