

OMPARISON OF THE LAWS OF ROBOTICS BY ISAAC ASIMOV AND BEAM ROBOTICS

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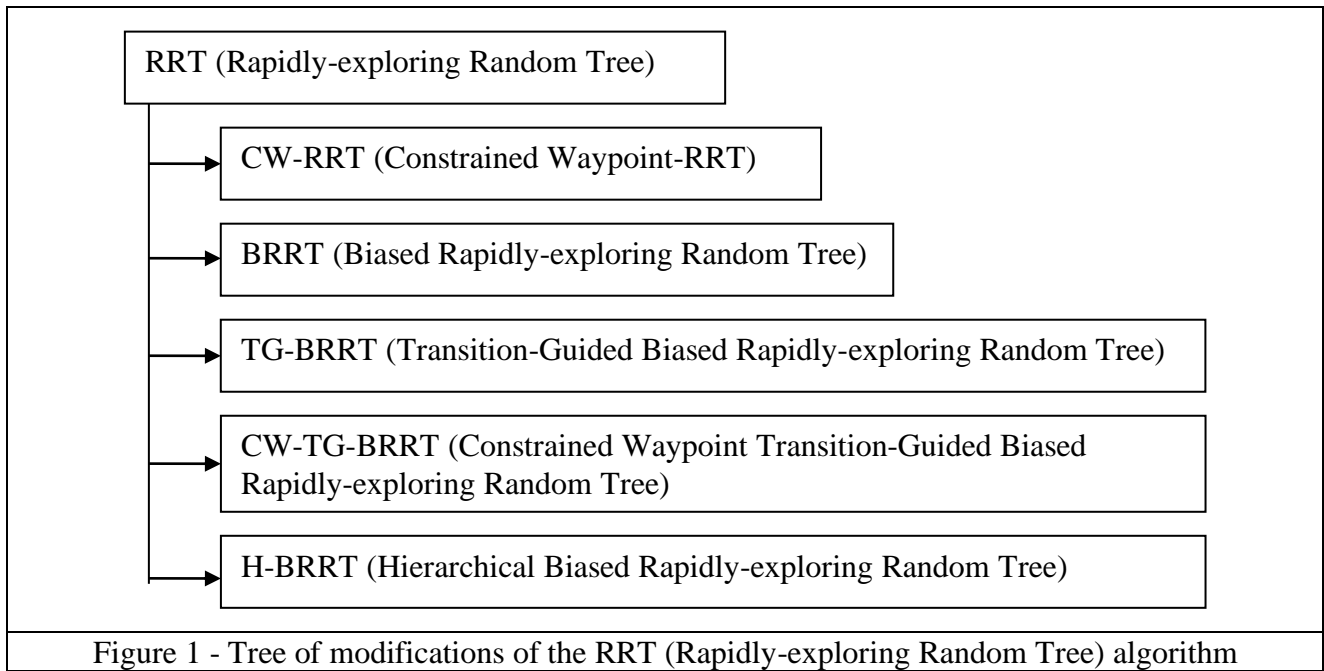
Annotation: In this paper, a comparative analysis of modifications of the RRT algorithm for route planning of a mobile robot has been carried out. The advantages and disadvantages of such modifications as CW-RRT, BRRT, TG-BRRT, CW-TG-BRRT and H-BRRT in terms of efficiency and complexity of implementation were investigated and compared. The analysis results identify the most appropriate modifications of the RRT algorithm for different mobile robot route planning scenarios, which can be useful for researchers and developers in the field of robotics.

Key words: Industry 4.0, robotics, comparative analysis, modifications, RRT algorithm, route planning, mobile robot.

With the development of robotics and the widespread introduction of robots in various fields in the modern world of industry and technology, embraced by the Industry 4.0 phenomenon, the use of mobile robots is becoming increasingly widespread [1-7]. These robots are widely used in various fields such as manufacturing, warehousing, medical diagnostics and many more [8-12]. One of the key aspects of their work is the ability to effectively plan routes to achieve given goals. Path planning algorithms such as RRT (Rapidly-exploring Random Tree) provide efficient methods to solve the path planning problem of a mobile robot. However, given the varied requirements and conditions in different applications, there is a need to modify these algorithms to achieve optimal results. A comparative analysis of modifications of RRT algorithms for planning the route of a mobile robot becomes relevant in the context of the development of Industry 4.0. It is required to identify the most effective modifications of RRT algorithms that will improve the quality and speed of route planning, which will ultimately lead to increased productivity and efficiency of mobile robots in various fields of application [13-16].

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RRT (Rapidly-exploring Random Tree) is a state-space path-finding algorithm that is used in robotics to plan the trajectory of mobile robots. It is based on the idea of quickly exploring random directions to build a state tree that represents a set of possible trajectories. RRT builds the tree gradually, expanding it in the direction of randomly selected points, which allows you to quickly find a path to the target point. The tree of modifications of the RRT algorithm is presented in Figure 1.



Based on the research conducted, a table comparing the advantages and disadvantages of modifications of the RRT algorithm was developed; the comparison results are presented in Table 1.

Table 1 - Comparison of advantages and disadvantages of modifications of the RRT algorithm

Algorithm	Advantages	Flaws
CW-RRT	Considers path constraints, allowing path planning in complex environments	Additional complexity due to the need to define and manage waypoints

CONCLUSIONS. A comparative analysis of modifications of the RRT algorithm for planning the route of a mobile robot revealed several key conclusions. The basic RRT algorithm is easy to implement, but can require a large number of iterations to find a path in complex environments due to the random selection of points to explore.

References:

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