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TECHNOLOGICAL AUTOMATION PROGRAM OF THE MOBILE PLANNING SYSTEM FOR ROBOTS

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Abstract:
It is useful to provide robots with automation system capabilities in technological system processes. These robots allow technological processes to be carried out correctly and avoiding the intervention of human operators, which can be economically beneficial and security conditions are discussed in the article. In automation, most cases require the use of path planners that run the robot and one can think about how to move from one place to another at the same time. From their search parameters can be the most appropriate path planning algorithm according to the requirements set by the users and given the large number of approaches available in the literature, a difficult situation can arise. Besides, the past reviews analyzed here cover only some of these approaches, missing important ones. Therefore, our article aims to serve as a starting point for a clear and comprehensive review the research carried out to date is reflected. It presents a global classification of path planning algorithms with a focus on and on these approaches, which are used alongside autonomous ground vehicles, but can be extended to others we will be able to use the system scheme of robots that move on surfaces like autonomous boats. Also, the models used to illustrate along with the mobility and dynamics of the robot, the environment is also considered in perspective need to switch to road planning technology software. Each of the road planning categories specified in the classification shall be disclosed and is analyzed. At the end of technological processes, discussions about their application are given.

Keywords: Technological optimization, location domain management, monitoring the contour system, artificial potential field boundary, differential evolution, universal manipulator robot system

Introduction

An automated robot based on a manipulator system is the most useful and popular type of robot, which is why it is purchased and in recent years, it has gained importance. The manipulator robot is being used more and more and others, especially in industrial and manufacturing applications such as packaging, welding, it is also related to all areas of life, especially personal assistance where it works is being used instead of the human hand. The manipulator must be safe and have high accuracy. There are many ways and many keys to solve the problem of creating a trajectory the methods of cell division mathematical program border tracking were studied. To design the implementation of planning, several planning approaches such as the APF decomposition method in plane mode should be used. Since the introduction of the proportional integral derivative used many algorithms such as controllers, trial and error pole placement and system software methods. All these algorithms are adopted for tuning. It is necessary to reflect in the controllers of technological processes in elastic joints. In addition, all these algorithms have been used shown in the frequency response of linear time invariant systems. These algorithms require perfection. Technological knowledge of the system and hence many meta-heuristic optimization approaches were used to obtain tuned controllers for linear and non-linear robot manipulators systems used. Autonomous navigation in technological processes is a valuable asset for mobile robots. It helps to relieve them and reduces dependence on human intervention. However, it also requires many tasks or problems, solution, for example, a path planning system program should be established. The task was to find the best course of action to create a robot is the best way to get from the current state to the desired state. This direction of movement also comes in the form of a road and in many other works it was named route. The path serves to bring the robot to the desired position and is technological under question works in command acceptance system. However, given the space, there can be many possible paths and it is necessary to create conditions for the robot to move. Path planning algorithms usually try to obtain the best path and moves to it at least in permissible proximity. Here the best path refers to the optimal and the resulting path results from the minimization of one or more objective optimizations, functions are accepted. For example, this path may be the path that takes the least time. This critical in missions such as search and rescue: disaster victims can call for help in life or death situations. Another optimization function to consider could be the robot's energy. This is very important in planetary research because Rovers have limited energy resources. At the same time, the road is formed any restrictions set by the planner must be adhered to. This may be due to limitations from the origin of several problems in the adaptation of the robot to certain terrains. The movement of the robot and the characteristics of the available terrain limit the type of maneuvers that can be performed. Thus reducing the number of paths that the path planner can create. There are many approaches to path planning in the literature, and this number continued to grow over the years. Therefore, it can be a difficult task to choose the most appropriate approach given the specific requirements.

Robot path planning algorithms based on reactive computing of technological processes

This category includes path planning algorithms where the environment, typically a the map that separates the fenced and unfenced areas only shows the location and the shape of existing barriers. Reactive computing algorithms are commonly used local path planners (spanning the robot's surroundings and with dynamic replanning) due to the ability to quickly manage new data (for example, in the form of newly discovered obstacles) often arising from limited on-board sensors. As local planners, this algorithms typically plan the next immediate path or maneuver to avoid nearby obstacles following a global plan drawn up by another algorithm. However, these algorithms are possible calculate local minimum paths or even cause the robot to get stuck, so special attention should be paid to received. There are two subcategories of

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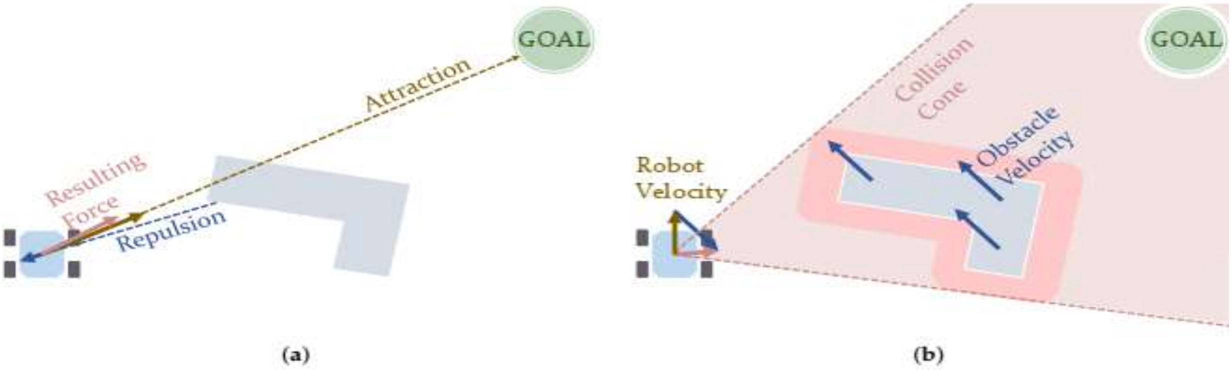
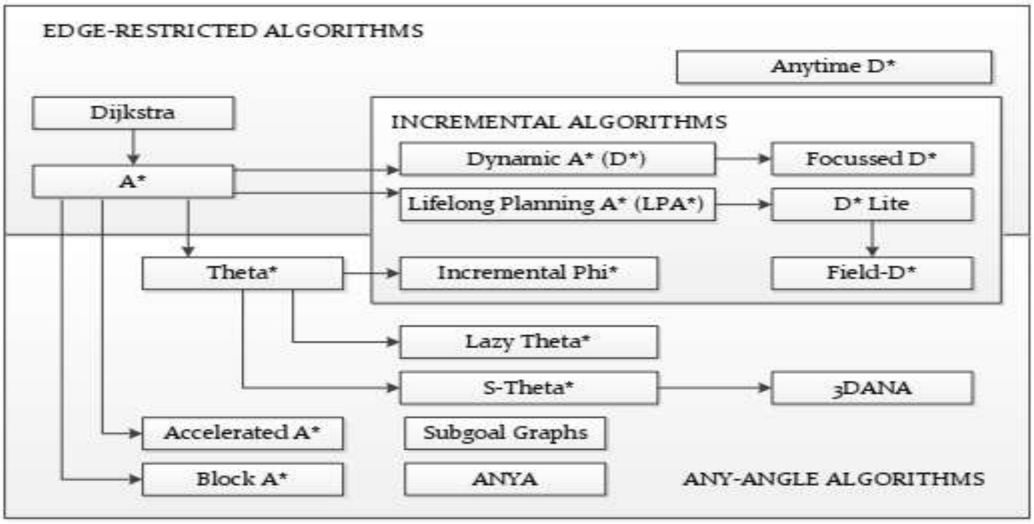
reactive computing algorithms: Reactive Maneuvering methods, where the presence of obstacles immediately determines the next maneuver robot and Local optimization methods are modified according to the path available here indicates and warns of the presence of obstacles.



Picture 1. Graphical representations of the concepts used in the Robot Path Artificial Potential Field Boundary (a) and Velocity Barrier (b) algorithms. (a) Boundary and path of potential fields acting on the robot. (b) Collision cone warning mode program considering robots moving obstacle.

The algorithms presented here rely on determining how the robot reacts at each moment to the presence of obstacles. This reaction can be determined according to the formula refers to the location of existing barriers. A common feature of the various formulation approaches is the low computational requirements required to produce the reaction, usually in the form of a steering or speed command. Because this formula is not global information, these methods are usually used as Local schedulers. Formulation the question may be based on the use of fields to determine the location of obstacles generating a speed command after the limits of obstacles to avoid them estimating available space or speed of moving obstacles.



Picture 2. Constructing a diagram of the structure of the robot path steps. The technological system is attached to the algorithm program.

Algorithms based on reactive computing seem suitable for local obstacle avoidance planning because they are easy and cheap to implement. Also, reactive maneuver methods are a good choice for scenarios with high uncertainty or when using a robot very limited sensing capabilities. Local optimization even allows you to take into account the kinematics the limitations associated with TEB, although they do not guarantee completeness. Special attention should be paid given to both subcategories to avoid local minima. Soft computing algorithms produce a path using several adjustable operators that can be inspired may be inherently or based on fuzzy rules and/or neural networks. Suitable for them problems with a large number of variables or problems that are difficult to model; in a highly dynamic environment such as With scenarios that include moving elements, in long-term (global path planning) scenarios, it is sufficient to use Evolutionary methods.

Conclusions

As an alternative to the reactive maneuvering methods of technological process management, planning consists in creating a system control scheme. Creates C-Space Search algorithms and it is essential to use samples to represent different configurations of the robot. These samples are possible they can be pre-rendered graphically or they can be generated dynamically. Graph Search algorithms are suitable for global path planning considering advanced graphs and as view graphs or space grid graphs, at the expense of construction time it will be necessary to transfer to the algorithm. Still, it scales poorly with high-dimensional problems, this justifies the use of Sample-based algorithms, and instead, it reflects the parameters of the technological system management. Algorithms based on sampling have also proven useful for these types of maneuvers and fixed many size issues. Optimal control algorithms are great in order to achieve global optimal results, the algorithm of technological automation processes must have a perfect circuit system. Algorithms based on robot path solving are highly dependent based on isotropic or anisotropic cost functions and possible shaped system it is necessary to work with a map model in the form of a grid. Global optimization algorithms should be started and adapt it to the robot's motion constraints in an already defined way. Automation system solution algorithms are suitable for offline calculation of given long distances. In it less uncertain static scenarios because they provide optimal paths without relying on rescheduling. Finally, it should be noted that all of these planners rely on available data. The representation of the environment and the robot is attached to the automatic system memory. These data must be clearly modeled and helps to improve the output of the path planner as much as possible. Otelbayev Azizbek, a student of the Nukus Mining Institute under the Navoi State University of Mining and Technologies, is conducting research on the automation of processes in mining enterprises. We can also use automation of technological processes in mining enterprises. For example, we can monitor the mining system using GPS technology, this system works with high accuracy. In mining enterprises, this system ensures the quality and safety of processes. Many of Azizbek's articles on technological processes in mining

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enterprises have been published in magazines. There is a high level of interest in processes in mining enterprises, metallurgy, chemical processes, the structure of metal melting furnaces, processes such as metal flotation enrichment.

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