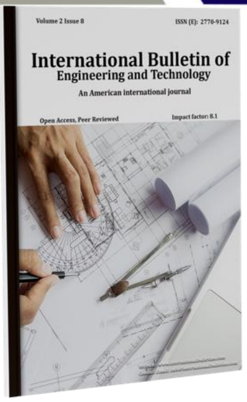

ADVANTAGES OF SOFTWARE DESIGN FOR TECHNOLOGICAL AUTOMATION OF A MOBILE PLANNING SYSTEM FOR ROBOTS

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Abstract: It is mainly useful to provide system capabilities for automating robots in technological system processes. These robots make it possible to correctly perform automation in technological processes and avoid the intervention of human operators, which can be economically beneficial, and the safety conditions are discussed in the article. In most cases, automation requires the use of path planners that control the robot and simultaneously figure out how to get from one place to another. According to their search parameters, the path planning algorithm can be the most suitable according to the requirements set by the users, and considering the many approaches available in the literature, a difficult situation can arise. Furthermore, the past reviews analyzed here cover only some of these approaches, missing important ones. Our paper therefore aims to serve as a starting point for a clear and comprehensive review of the research to date. It provides a global classification of path planning algorithms, focusing on these approaches applied in addition to autonomous ground vehicles, but can be extended to others, we can use the system diagram of robots moving on surfaces such as autonomous boats. . Also, models used to represent the environment along with the mobility and dynamics of robots are a necessity for future path planning technology.

Keywords: Technological optimization, monitoring the contour system, artificial potential field boundary, differential evolution, robot system.

Introduction

An automated robot based on a manipulator system in the control of technological processes is the most useful and popular type of robot, so it has been purchased and gained importance in recent years. The manipulator robot is increasingly used in industrial and manufacturing applications, especially in packaging, welding, it is related to all areas of life, especially where it works, personal assistance is used instead of human hands. The manipulator must be safe and have high accuracy. There are many ways and many keys to solve the problem of creating a trajectory of methods for tracing the boundaries of a mathematical program of cell division. Several scheduling approaches should be used to design the scheduling implementation, such as the flat-mode APF decomposition method. Since the introduction of the proportional integral derivative, many algorithms have been used, such as controllers, trial and error pole placement, and system software techniques. It is adopted for the adjustment of algorithms in the automation and programming of all technological processes. Technological processes in elastic joints should be reflected in controllers. Moreover, all these algorithms are shown in the frequency response of linear time-invariant systems. These algorithms require perfection. Many meta-heuristic optimization approaches have been used to obtain the technological knowledge of the system and therefore the controllers tuned for the linear and non-linear robotic manipulator systems used. Autonomous navigation in technological processes is a valuable asset for mobile robots. This helps to eliminate them and reduces the dependence on human intervention. At the same time, it requires solving many tasks or problems, for example, it is necessary to create a program for a road planning system. The task was to find the best course of action to create a robot that is the best way to get from the current state to the desired state. This movement also comes in the form of a road, and in many other works it is called a route. The path serves to bring the robot to the desired position and is technological and works in the system of receiving commands. However, given the space, there can be many possible paths and the robot must be able to move. Path planning algorithms usually try to get the best path and move at least as close as possible. Here, the best path refers to the optimal, and the resulting path results from the minimization of one or more objective optimizations, functions are assumed. For example, this path may be the path that takes the least time. Another optimization function to consider might be the energy of the robot. This is important in planetary exploration, as rovers have limited energy resources. At the same time, the road is formed, any restrictions set by the planner must be observed. This may be due to limitations in 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. This reduces the number of paths that the path planner can create. There are many approaches to path planning in the literature, and this number has continued to grow over the years. Therefore, it can be a difficult task to choose the most appropriate approach, given the specific requirements. This category includes design stage algorithms based on robot movement path planning and control of technological processes, where the environment, usually a map separating walled and unobstructed areas, shows only the location and shape of existing obstacles. Reactive computing algorithms are widely used in local path planning due to their ability to quickly handle new information (e.g., in the form of newly discovered obstacles) coming from often limited on-board sensors (by covering the robot's surroundings and dynamically replanning). is used. As local planners, these algorithms usually plan the next direct path or maneuver to avoid nearby obstacles after a global plan made by another algorithm. However, these algorithms may calculate local minimum paths or even cause the robot to get stuck, so special attention should be paid to acceptance. There are two subcategories of reactive computing algorithms: Reactive maneuvering methods, where the presence of obstacles immediately determines the next maneuvering robot, and Local optimization methods, where the existing path is changed according to the presence of obstacles and indicates and warns. Algorithms presented in the design of the path of movement of robots through automated assistants in technological processes are based on determining how the robot reacts to the presence of obstacles at each moment. This reaction can be determined by the formula depending on the location of the existing obstacles. A common feature of the various formulation approaches is the low computational requirements required to produce the response, usually in the form of a control or speed command. Since this formula is not global information, these methods are usually used as Local schedulers. The question formulation can be based on the location of the obstacles causing the speed command after the obstacle limit, the space available to avoid them, or the use of fields to determine the speed of the moving obstacles. Algorithms based on reactive computing seem suitable for local obstacle avoidance planning because they are easy and cheap to implement. Additionally, reactive maneuvering methods are a good choice for scenarios with high uncertainty or when using a robot with very limited sensing capabilities.

Local optimization even allows kinematics to take into account the limitations associated with automation processes, although they do not guarantee completeness. Both subcategories should be given special attention to avoid local minima. Soft computing algorithms create a path using multiple adjustable operators that may be fuzzy by themselves or based on fuzzy rules and/or neural networks. They are suitable for problems with a large number of variables or difficult to model; In a highly dynamic environment, for example, in scenarios with moving elements, in long-term (global path planning) scenarios, it is safe to say that the use of Evolutionary methods is sufficient. Path planning is an important research area for improving mobile autonomy robots and has attracted the attention of researchers all over the world in recent decades. Although many path planning algorithms have been proposed and implemented in mobile robots, they have several disadvantages and limitations that need to be further studied.Although various classical algorithms are widely used for the conventional path planning, they have several disadvantages. Their adaptation to a complex environment are not satisfactory and their ability to model and process the environment is limited by a to some extent. This is especially true in complex environments where adaptation is difficult to and process, which makes path planning less efficient and accurate. For example, in practical applications such as human-machine collaboration, multi-robot collaboration and other scenarios, often involving complex environments and different robots, traditional algorithms are not suitable. Some traditional algorithms run into problems like infinite loops and perform repetitive searches along the way to look for This leads to low efficiency of the algorithm and affects its practical application. Traditional algorithms are often based on static environment modeling and pathfinding. This means that they cannot be adapted according to the actual environment and conditions the behavior of the robot, resulting in insufficient robustness and flexibility in path planning.Most of the current algorithms are based on improving their properties and showing good results. However, the results are better when used differently as opposed to individually improving algorithms. There is no single path planning. The algorithm can solve all problems in practical applications, especially path planning complex environments. Also, researching new algorithms is difficult, so it is expected To compensate for this, more combinatorial path planning algorithms will appear in the future each other's shortcomings.

Conclusions

As an alternative to reactive maneuvering methods of controlling automation processes in technological processes, planning consists in creating a system control scheme. An automated robotics system generates algorithms and it is essential to use samples to demonstrate different configurations of the robot. These samples can be pre-generated graphically or dynamically. Graph search algorithms are suitable for global path planning considering advanced graphs and need to switch to an algorithm due to construction time, such as lookup graphs or space lattice graphs. Nevertheless, it scales poorly with high-dimensional problems, justifying the use of sample-based algorithms that instead reflect the control parameters of the process system. Sampling-based algorithms have also proven useful for these types of maneuvers and have solved multi-dimensional problems. To achieve global optimal results, optimal control algorithms are perfect, technological process automation algorithm must have a perfect circuit system. Algorithms based on robot path solving are highly dependent on isotropic or anisotropic cost functions and the possible shaped system, and must work in grid form with the map model. It is necessary to run the global optimization algorithms and adapt it to the motion constraints of the already defined robot. The solution algorithms of the automation system are suitable for offline calculation of given long distances. It has less ambiguous 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 image of the environment and the robot is attached to the memory of the automatic system. And this system helps in the gradual implementation of the automated system.

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