AGV调度系统的设计与实现

摘要

在现代化的工厂和仓库中，常使用 AGV 来运输货物，研究 AGV 的调度和路线规划算法非常的有意义。 本文工作目的不仅是要探究 AGV 调度系统的设计与实现以及达到吉林大学毕业论文的要求，而且更重要的是要让作者可以取得本科文凭和毕业证，这对于提高求职者的竞争力是相当的重要的。 研究内容就是做一个 AGV 调度器的模拟仿真程序，调度器的输入为货物运输任务的列表，输出为 AGV 每个时刻的位置和移动情况，根据笔者的时间精力和技术水平可以做一定的简化和抽象。 研究方法是编码实现与上机实验相结合，以编码实现为主、阅读文献为辅。 编码实现中，笔者使用的是 TypeScript 程序设计语言，这是 JavaScript 程序设计语言的一种带有类型表示的超集，这两种程序设计语言都被广泛应用在现代 web 应用程序的开发中，采用这种程序设计语言是因为笔者比较熟悉，使用起来比较方便，工具链比较完善，这个语言生态系统中有主流的代码格式自动整理器、代码静态检查工具、软件包管理工具、单元测试框架等。 具体而言，研究方法就是编写代码、编写单元测试、运行单元测试，按照单元测试中失败的用例调整代码或者反复核对单元测试编写没有纰漏，如此往复，直到单元测试都通过且代码实现了需要的功能。 研究成果是设计了一个 AGV 调度和路线规划的模拟仿真程序，可以自动的生成货物运输任务，然后把这些任务指派给 AGV ，然后再逐一对每个 AGV 指挥其走行，经过在不同规模地图的实验，本系统可以保证 AGV 不相撞，并能高效的完成货物运输任务。 具体而言是编写了将近1000行的 ts 代码，这些包括支撑本文实验的代码，以及代码的单元测试，单元测试使用 vitest 自动运行，这些测试具有典型性，可以保证程序的正确性。 此外，作者也在这个过程中增加了编码经验提高了编码工具使用熟练度。

* 1. 关键词：

AGV，路线规划，最短路径算法

Design and implementation of an AGV scheduling system

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Abstract

In modern factories and warehouses, AGVs are commonly used to transport materials and products. It is of great importantance to study the scheduling and path planning algorithms of AGVs. The purpose of this paper is not only to explore the design and implementation of the AGV scheduling system and meet the requirements of the graduation thesis of Jilin University, but more importantly, to enable the author to obtain a bachelor's degree, which is very important for improving his competitiveness the job market. The research content is to make a simulation program of an AGV scheduling system. The input of the scheduler is a list of cargo transportation tasks, and the output is the position and movement of the AGV at each simulation iteration. Due to limited time and energy of author as well as his technical capability, simplification and abstraction are employed. The research method is a combination of coding implementation and computer experiments, with coding implementation as the main method and reading literature as the supplement. In the coding implementation, the author uses the TypeScript programming language, which is a superset of the JavaScript programming language with syntax for types. Both programming languages are widely used in the development of modern web applications. TypeScript is used because the author is familiar with it, it is convenient to use, and the tool chain is relatively complete. More specificly this language ecosystem has mainstream source code linter, code static inspection tools, package manager, unit testing frameworks, etc.

* 1. Keywords:

AGV, Path Planning, Shortest Path Algorithm