

## Study on Optimal Control of Mixed Traffic in Area

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**Abstract:** With the rapid development of Windows graphical user interface and the wide application of multimedia technology, the system is required to have high-speed graphics processing and I/O throughput, which makes the original ISA, EISA bus far unable to adapt and become the main bottleneck of the whole system. To this end, in the second half of 1991, Intel first proposed PCI concept, and in conjunction with IBM, Compaq, AST, HP Apple, NCR, DEC and other more than 100 companies colluded with the development of computer bus, established PCI Group. This paper mainly analyzes the control optimization of mixed traffic in CPCI area, introduces the characteristics of PCI bus and bus signal, and puts forward the specific control countermeasures and optimization methods of mixed traffic, hoping to play some reference role for relevant staff..

### 1. Introduction

Mixed traffic refers to the combination of motorized and non-motor vehicles and pedestrians on the same road. Due to the low standards of the road, narrow road surface, there is no separation zone, no carriageway and sidewalk, express and slow train. In this kind of mixed traffic mode, it is very easy to have traffic accidents between people and vehicles, people and animals, and it also directly affects the speed and efficiency of all aspects. PCI refers to the peripheral interconnection bus, is a local bus, has become a new standard of local bus, widely used in the current high-grade microcomputer, workstation, and portable microcomputer. Mainly used to connect display card, network card, sound card. the pci bus is a 32-bit synchronous multiplexing bus. The address and data line pins are AD31 to AD0 and PCI operates at 33 MHz[1].

### 2. PCI Bus Characteristics

#### 2.1. PCI Bus Features

The transmission rate is high and the maximum data transmission rate is 132 MB/s. When the data width is upgraded to 64 bits, the data transmission rate can reach 264 MB/s. This is unmatched by other buses. It greatly alleviates the data I/O bottle neck and makes the function of high performance CPU fully play to meet the needs of high-speed equipment data transmission.

The use of PCI bus allows multiple buses to coexist in a single system, accommodating devices of different speeds. the cpu bus and pci bus are bridged by the host-pci bridged component chip; the pci bus and the isa/eisa bus are bridged by the pci-isa/eisa bridged component chip to form a hierarchical multibus system. The high-speed device is removed from the ISA/EISA bus and moved to the PCI bus. The low-speed device can still be hung on the ISA/EISA bus, which inherits the original resources and expands the compatibility of the system[2].

The CPU PCI bus is not dependent on a specific processor, that is, the PCI bus supports multiple processors and new processors for future development.

It is convenient to automatically identify and configure peripheral users.

Parallel operation capability.

## 2.2. Main Performance of PCI Bus

Bus clock frequency 33.3 MHz /66.6 MHz.

Bus width 32 bits /64 bits.

Maximum data transmission rate of 132 MB/s (264 MB/s).

Support for 64-bit addressing.

Adapt to 5V and 3.3V power supply environment[3].

## 3. PCI Bus Signal

The signal lines defined by the PCI bus standard are usually divided into two broad categories, required and optional. The total number of its signal lines is 120(including power supply, ground, reserved pins, etc.). Among them, the required signal lines: the main control equipment 49, the target equipment 47. optional signal line :51(mainly for 64-bit extensions, interrupt requests, cache support, etc.).

A master device is a device that has acquired control over a bus, and a device in the master alternative for data exchange is called a slave or target device. As main equipment need 49 signal lines, if as target equipment, need 47 signal lines, optional signal lines have 51. These signal lines can be used to transmit data, address, interface control, arbitration and system functions. The PCI local bus signal is shown in the following figure. The following are described by functional groups[4].



Figure 1 Mixed traffic

## 4. Characteristics of Mixed Traffic

### 4.1. Characteristics

Traffic control has always been one of the key issues of urban traffic, and plays a very important role in urban traffic organization. The domestic and foreign research on traffic control has made some progress in the long-term development, and the relatively successful control system mainly includes the function of fixed timing and the related performance of automatic or semi-automatic adaptation, which play a very important role in the traffic control of the city, and has a very significant effect on reducing the delay and the economic loss caused by the accident. The traffic characteristics of our country are not the same as that of foreign countries, and the mixed traffic can be said to be a major feature of our transportation. Whether domestic or foreign, the traffic control theory or model mainly stays on the research of motor vehicles, but the impact on non-motor vehicles is rarely considered. The phenomenon of many bicycles and pedestrians crossing the road in our country is very serious, so we can not completely copy the relevant experience of foreign countries when carrying out the mixed traffic control, but we should design a theoretical model according to the actual situation that accords with the characteristics of mixed traffic in our country. With the continuous development of science and technology, today, the requirement of traffic control is not only to be orderly, but also to highlight the characteristics of information and intelligence. Therefore, some theories and techniques of artificial intelligence should be applied to traffic control, such as intelligent body, knowledge engineering and so on, which can make traffic

control more flexible and intelligent, thus improving the quality of control. However, the characteristics of mixed traffic are mainly due to the relatively slow driving speed of non-motor vehicles, and the changeable track, which can easily affect the driving of motor vehicles, and then lead to the chaotic phenomenon of road traffic order, which reduces the capacity of roads and may even lead to traffic congestion or traffic accidents, which makes it difficult for traffic management and control.[5].

#### **4.2. The Impact of Mixed Traffic Characteristics on Traffic Operation**

The impact of the characteristics of mixed traffic on traffic is manifested in the following two aspects. The first is the impact of mixed traffic on the road section, followed by the impact at the intersection location. Since there are no non-separation zones on the road, non-motor vehicle rush hour, the bicycle may also drive into the driveway, thus causing interference to the driving of the vehicle. However, the traffic control signal of the intersection used in our country is mainly aimed at the setting of the traffic flow of the motor vehicle, but the signal of the non-motor vehicle is less, so when the non-motor vehicle is crossing the street, the traffic of the non-motor vehicle is similar to the unregulated disorder, which will lead to the crossing of the traffic flow such as the bicycle pedestrian, which will not only cause serious safety hidden danger, but also hinder the normal operation of the motor vehicle.

In order to solve the problem effectively, the demand of non-motor vehicle should be considered, not only the motor vehicle but also the bicycle and pedestrian should be considered when setting the signal, and the special signal of non-motor vehicle should be set up. The peak time of bicycle traffic flow is not consistent with that of motor vehicle. In general, it is earlier than that of motor vehicle, and the flow of motor vehicle is relatively low in this period, so it can be dealt with simply. During the peak of bicycle, the traffic model can be established according to the characteristics of bicycle, and the influence of bicycle should be considered in the process of establishing the traffic model during the peak of motor vehicle.



Figure 2 Mixed traffic

### **5. Regional Traffic Control Strategies and Optimization Methods**

#### **5.1. Urban Traffic Control Model Based on Multi-Agent**

Multi-intelligence system is one of the important subjects of artificial intelligence at present, and it is also a main branch of distributed artificial intelligence research. Its goal is to build a large complex system into a small, interconnected, coordinated and convenient management system. The research of multi-agent needs to use the relevant knowledge goals and skills of the intelligent body to solve the problem of the action of the intelligent system effectively. A multi-agent system can be combined by multiple computed agents, each of which can act as a physical or abstract entity in its own environment and communicate effectively with other agents.

Because of the distributed characteristics of hybrid transportation, it is very suitable to apply multi-agent technology, especially when the traffic situation with drastic changes, the distributed processing and coordination technology of multi-agent can be effectively analyzed and processed,

so that the control model can be established in time to facilitate the solution of related accidents. The aorta of urban traffic is urban road, so it is necessary to establish a corresponding system to monitor the changes of urban road traffic in real time, so as to be able to respond quickly and adopt effective control strategies to reduce the occurrence of related traffic accidents and ensure the smooth and orderly traffic flow[6].



Figure 3 Regional traffic control

## 5.2. Establishment of Knowledge Models

The knowledge model is also one of the branches of artificial intelligence, which needs to involve the research of knowledge acquisition, knowledge base and reasoning mechanism, which has the relevant knowledge and experience of experts in a particular field, and can use relevant knowledge to reason and make corresponding intelligent decisions like experts. By establishing the knowledge model, we can simulate the human expert to make the corresponding decision, and solve the complex problem effectively, and have strong adaptability, reliability and stability, can respond quickly, and have the related explanation function. The urban traffic control mode includes the timing control and adaptive control of a single entrance, as well as the timing overall control and adaptive overall optimal control. By introducing the knowledge model, we can use its powerful knowledge base and reasoning ability to combine the mathematical model and the network model to carry on the intelligent control effectively.

## 6. Conclusion

To sum up, with the continuous development of science and technology, the control of mixed traffic can also adopt artificial intelligent technology to further improve the process of traffic control, so as to effectively reduce related traffic accidents, ensure the smooth operation of urban traffic, protect people's travel safety, and improve people's quality of life.

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