

Building of Intelligent City Traffic Signal System

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Abstract. One of the tasks of smart city construction is intelligent traffic management. The building of intelligent traffic signal system is the infrastructure project. It has the functions of the real-time perception of traffic flow in the urban road, and taking the traffic signals connect to the Internet for the service of the real-time road condition information to user. The building is consisted of the sensor module, the control center and the controller module. Through the data from the sensor module detected on the road traffic situation, the control center can determine the most suitable scheme to dynamically regulation and send instructions to the traffic lights to automate the process. So it can achieve the intelligence shunt and ease the congestion in the road.

Introduction

With the development of society, the amount of automobiles increases continuously. For the traffic flow inevitably increases, the congestion in the road becomes a major problem of urban traffic.

One of the tasks of smart city construction is intelligent traffic management. The intelligent and networked public service vehicles such as 80% buses and rental vehicles form a linkage network of vehicles and intelligent transportation systems. The users need the intelligent traffic signal system to realize the real-time perception of traffic flow in urban road. So we carry out the anticipation and diversion of intelligence, all urban signalized intersection traffic signal network, centralized coordination, covering the construction of urban road traffic illegal monitoring and analysis system. The construction of real-time and accurate travel information service system provides travelers with real-time traffic information such as road traffic video, route guidance and traffic control. The intersection lights are common by the analog signal timing control with the traffic flow. The traffic congestion problem is serious and the busy traffic intersection vehicle is required to reduce the waiting time at the intersection. The intelligent instruction form of control signal is one of the effective ways to solve the question.

This paper presents the design of intelligent traffic signal system which is based on the information technology, sensor technology and control technology. It is applied to a system of intelligent traffic management system. At the same time, it is also a comprehensive and large scale integrated traffic management system. Through the traffic lights as a guide, a variety of sensors characterize the road information. With data to a certain extent, the purpose of traffic intelligence is achieved. The design of intelligent traffic lights can improve the status of congestion and greatly enhance the transport capacity so that the transportation process is more rapid and safe.

System Design Idea

The intelligent traffic lights system designed is based on communication technology and control technology to achieve the traffic lights work mode changes with the road traffic flow. So the system can change working mode and the appropriate emergency.

With the application of communication technology, the feedback of traffic on the road traffic monitoring is back to the center. The control center is focus on analysis of the collected information and set the most suitable scheme to dynamically the judgment unit and then determine which kinds of working mode. After the control instruction is sent to the instruction action, the system achieves

the process of dynamically regulation of intelligent city traffic signal.

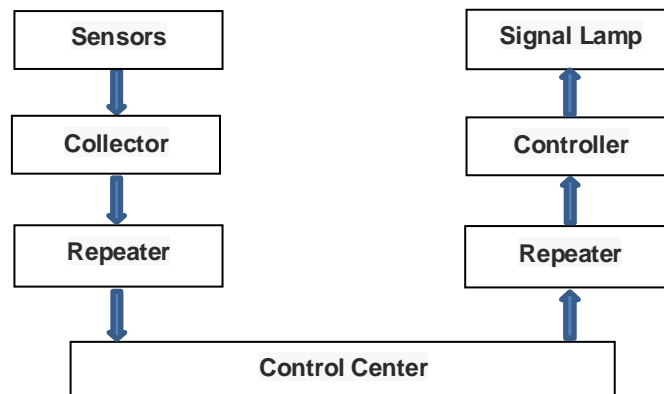


Fig.1 Schematic of System Structure

The process of system is as Figure 1.

- a. when the vehicle passes through the road and is detected by the sensor, the sensor transforms the physical signals it induced into electrical signals and sends them to the data collector;
- b. the data collector sends the collected data to the repeater after simple processing (comparison, addition, etc.), and the relay transmits the data to the control center by means of a certain communication medium;
- c. after receiving the road information data, the control center gives the instructions of the signal lamp according to the preset scheme (same as before but also changed);
- d. the action instructions are transmitted to the field controller by the relay, and the controller reflects the instructions on the signal lamp to complete the control.

Control Center Design

The integrated control module is based on one or more control units to achieve certain control objectives. It is as Figure 2. Through the data receiving and processing, connecting sensors and work modules, the system can achieve data processing, control operations and other functions. The control center consists of two parts of the internal system and the external system. They are based on the hardware platform of control center and have each subsystem to support its work. According to the number of subsystems in the management, the system can achieved control fuction with the different degrees of complexity but also it can satisfy the needs of different needs. The same road or even the signal lights on the same area can be connected into a network, and the traffic signals of the whole area can be controlled. So the unified dispatching can be realized.

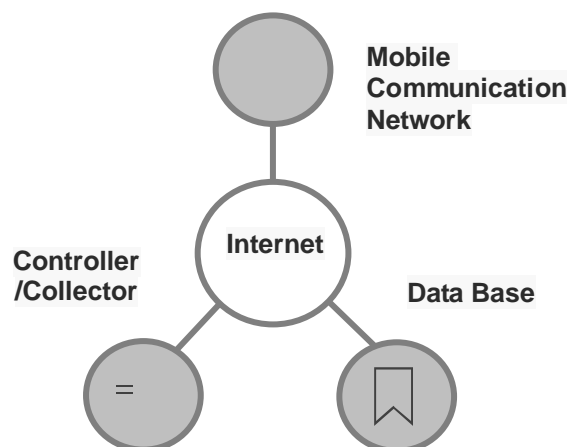


Fig.2 Diagram of Organization of Control Center

Function

The system can achieve the functions as Table 1. The two signals can work independently.

Vehicle flow detection function: under normal condition, SB4 can check the traffic flow detected on the last inspection cycle.

Automatically change the mode of the signal light: according to the preset automatic control condition, with the amount of input detected, automatically change the mode of the signal lamp.

Special situation control: SB2 can select several emergency scenarios manually.

Button modify the signal mode: SB1 into the modified mode, SB3 and SB4 can modify the conventional function of the signal mode.

Tab.1 Parameter of system Function

Button Input	Fuction
SB1/1	Mode:modify the regular work time, east-west direction
SB1/2	Mode:change the regular work time, north-south direction
SB2/1	Status: no thoroughfare crossing
SB2/2	Status:can travel in the East-West direction, South and north directions are prohibited
SB2/3	Status:can travel in the North and South directions, East-West forbidden line
SB2/4	Status:Special traffic
SB3	On Mode SB1/1/2, Reduces the regular work time
SB4	On Mode SB1/1/2, Increase the regular work time

Conclusions

The construction of intelligent traffic signal light system suitable for use is based on the real-time perception of traffic flow in the main urban road. To predict and split the traffic flow intelligently, the system can realize the dynamic adjustment of traffic signals. The design of intelligent traffic lights to alleviate the current situation of road congestion, and gradually realize the safety and fast intelligent transportation system. And the system can provide travelers with the road traffic video, travel route guidance, traffic control and real-time traffic information services.

Acknowledgements

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