u-City를 위한 친환경 및 특별상황 교통관리체계 개발

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◈ 목 차 ◈

1. Introduction

Afterward when a traffic signal control systems was introduced in of urban transportation management level to be first to Seoul city in 1978, currently the real-time control system which leads the traffic index of traffic volume and the traffic occupancy is constructed. This is the signal operation control systems where the environmental factor and special situation are excluded with the fact that for the congestion of the vehicle. Currently, the signal systems can not follow traffic condition becoming more and more complex. Because of air pollution, habitual incident, and demonstration, traffic condition is more difficult.

This research has been progressed dividing into greatly two parts. The first part is to develop the environment-friendly traffic management system reducing vehicles emissions and improving air quality to a certain place. In this part, we did research to use traffic safety facilities (for example, traffic signals and traffic information provision systems) to realize a traffic society that is safe, comfortable, and easy on the environment. The second part is to develop the algorithm for traffic management strategy and planned special events, in which traffic control is a key-point upon planned special events' occurrence. Main objectives of these projects are supposed to be the smoothing of traffic flows, the provision of travel convenience and the enhancement of traffic safety.

In this paper, we represents that fundamental data investigation to develop algorithms, system architecture for a hardware development and definitions of system constructs and functions which are first-year study results for environment-friendly traffic management system and planned special events traffic management system.

2. Environment-Friendly Traffic Management System

Environmental pollution has become much more of a problem in recent years than it has been in the past. Environmental pollution in industrial zones and pollution caused by traffic congestion have attracted a great deal of attention. The objective of the study is to develop the environment-friendly traffic management system reducing vehicles emissions and improving air quality to a certain

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place. There is few studies on air pollution by car's emission in spite of its importance. Traffic signal timing improvement is one of the most common practices for congestion management. Although the benefits of improvement signal timing for reduced fuel consumption are well documented [1][2][3].

This indicates that it will be possible to reduce traffic pollution by measuring automobile emission at roadside and, when they exceed a present threshold value, using signals to maintain the speeds of vehicle on the road within certain range or providing information that encourages drives to utilize alternate routes [4][5]. Signal timing improvements can be simple changes in timing plans or complex, computer-controlled signal coordination along an entire corridor. When effective, signal improvement can reduce congestion, increase safety, and improve response times for emergency vehicles [6].

It is needed for one to design the better models estimating emission and then with the real time data, make the monitoring system simulating emission rate because of having built the basement of accepting real-time traffic information in ITS projects [7]. Through this, we find confirm the utility of signal coordination and congestion management as effectiveness tools for controlling emissions.

To perform this part, it is necessary to make an overview considering the microscopic emission model to overcome difficulty on the macroscopic emission model. Another part is about developing micro simulator. It's an important work in fields of transportation, environment and human settlement to develop a more realistic model of estimating emission and a model able to monitor emission combined traffic situation. Through this, the objective of these efforts is to use traffic safety facilities (for example, traffic signals and traffic information provision systems) to realize a traffic society that is safe, comfortable, and easy on the environment.

3. Planned Special Events Traffic Management System

Planned special events occurred in the urban areas show a tendency that traffic demand is concentrated at a specific time and a location. If this traffic demand is not managed systemically, the spatial-temporal effects of it will be spread out. However, even the recognition about planned special events are not enough and the survey related to these events has not been conducted actively. This study, accordingly, tries to develop the algorithm for traffic management strategy and planned special events, in which traffic control is a key-point upon planned special events' occurrence. In order to develop the algorithm, this study investigates definition of planned special events, effect range caused by planned special events, and special planned event management strategy.

Before deciding management strategy for planned special events, its definition should be identified. FHWA(Federal Highway Administration) defines the planned special events as the events that information about onset time and place can be collected beforehand. Planned special events are divided into 'street' and 'non-street'. 'Street' is an event that occupies a specific road section for a certain period of time, on the other hand, 'non-street' is an event that occurs at a specific place outside the road section at a specific time. For effective management for planned special events, the effect of planned special events' occurrence should be examined and the intersection for critical management should be determined. However, because antecedent studies are not sufficient, this study researched the range affected by occupancy of road construction, which has similar characteristics with planned special events mentioned above.

Son Bong-Soo et. al (2000) set up the range affected by an occupancy of road construction and showed the effect on the intersection connected directly with this construction area and each direction crossroad linked with the direct connected intersection as well. Lee Soo-Beom et. al(2002) proposed the criteria for target crossroads of traffic effect analysis according to the

blocking type of roads. A precedent studies have already implemented traffic management strategy, focus on comprehensive traffic management - demand side management.

EPA suggests management strategy for overall traffic system that includes not only planned special events participants but also drivers who use traffic system for other purposes under the effect of roads and traffic in planned special events. LADOT(Los Angeles Department of Transportation) in U.S.A manages the planned special events for the safety of road users and participants because of the occurrence of planned special events.

Antecedent studies have researched only establishment of effect zone, demand side management and so on, traffic control plans on which this study put emphasis are not enough in these studies. Accordingly, in the next year study, the effect of planned special events is predicted from traffic condition history D/B to determine countermeasures, and control groups are combined for real-time traffic controls.

4. System Architecture

The research and development system base on traffic signal control system existing system and to be
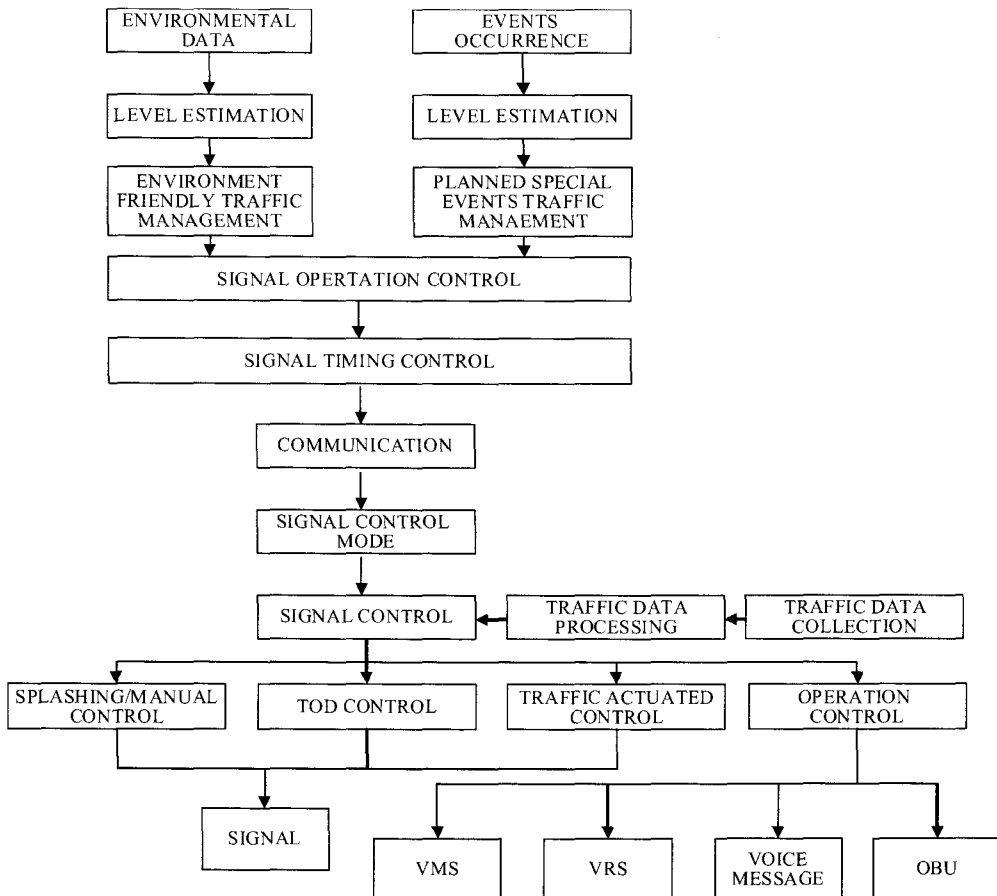
(Figure 1) The architecture of environment-friendly traffic management system and planned special events traffic management system

interchanged in base and the relation system and interface and integration to do.

4.1 Environment-Friendly Traffic Management System

The environment-friendly traffic management system is one of these subsystem, Its function is to reduce the nitrogen oxides(NO_X) and carbon dioxide(CO_2) emitted by automobiles, thereby protecting the environment along the roadway. It does this by utilizing data on air pollution and road side vibrations to provide appropriate traffic information and signal controls.

4.2 Planned Special Events Traffic Management System

The planned special events traffic management system is one of these subsystem, Its function is to reduce congestion by planned special events, thereby protecting the vehicle and pedestrian along the roadway. It does this by utilizing data on road side detector to provide

appropriate traffic information and signal controls.

5. The definition of system constructs and functions

5.1 Center systems

Through a collection of information and processing of the line unit where becomes the ground of judgment, completed MACRO traffic signal control strategy.

5.2 Local systems

Through a collection of information and processing of the spot unit where becomes the ground of judgment, completed Micro traffic signal control. In order to the indicated traffic management strategy from center being accurate and quickly, three fields a local information collection, signal control, information provision- organize.

The function of system was defined with lower part (Table 1) together all.
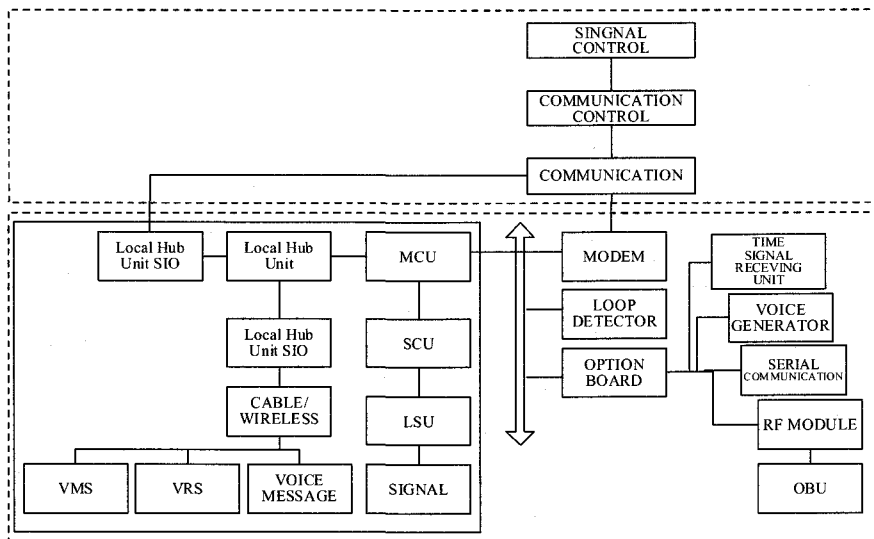
(Figure 2)   The stream of system constructs of environment-friendly traffic management system and planned special events traffic management system

(Table 1) The functions of systems

System	Construction	Communication	Function
Center Systems	Environment-Friendly Traffic management	TCP/IP	Signal control
	Planned Special Events Traffic management	TCP/IP	Signal control
Local Systems	MCU	VME Bus	Main control unit for signal control
	Loop Detector	VME Bus	Traffic data collection
	Option Board	VME Bus	Communication from RF module
	Center Modem	VME Bus	Communication to center
	SCU	Serial	Signal operation
	LSU, FL CONT	User Bus	Signal operation and supervision
	Local Hub Unit	TCP/IP	Signal control and back-up of MCU
	LHU SIO	User Bus	Communication with VMS, VRS and VOIP
	LHU Modem	User Bus	Communication to center
	VMS	Cable/Wireless	Provide information
	VRS	Cable/Wireless	Provide information
	VOIP	Cable/Wireless	Provide information

6. Conclusion

The real-time signal control systems based on traffic volume can not follow traffic condition becoming more and more complex. Because of air pollution, habitual incident, and demonstration, traffic condition is more difficult. Accordingly, importance of environment-friendly traffic management system and planned special events traffic management system comes to be high in the future. Currently, systems which connect circumstance of ubiquitous city and planned special events in limited area of metropolitan certain place.

The elements to develop the algorithm for environment-friendly traffic management system and planned special events management system are obtained by this study. Also, system architecture, constructs and functions are defined. The two systems described in the paper are highly desirable for Ubiquitous-City. They have been developed steadily and the maturity of the algorithms has been made higher over the years. When these algorithms are applied real urban area, it is expected that not only atmosphere environment and safety improvement but also reduction of bad influence of traffic caused by the occurrence of planned special events.

Acknowledgement

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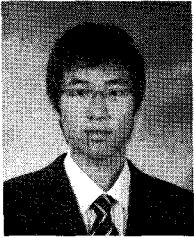
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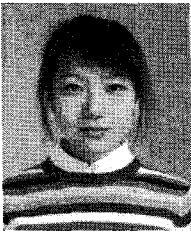
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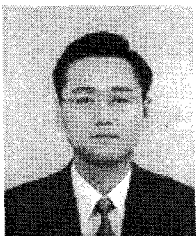
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