차세대 안전한 신호등 시스템

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Next-generation Safe Traffic Light System

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● 요 약 ●

본 논문에서는 새로운 교통신호 시스템에 적합한 레이더와 Can-bus 통신방식을 이용한 새로운 차세대 신호등 방식을 제시한다. 이 방식은 서로 보이지 않는 신호등을 통과하는 사람과 자동차가 보이지 않는 곳에서 사람과 자동차의 진입 정보를 신호등에 전송해 사고를 예방하는 시스템이다.

키워드: 차세대 교통신호(next-generation traffic light), Can-bus, 교통사고(accident)

I. Introduction

From July 12, 2022, the 2022 Crosswalk Right Turn Act was amended. As the standards for right turn enforcement at crosswalk intersections have changed, interest in the correct way to pass is growing. To simplify the method of turning right at a crosswalk intersection, if there is a person in the crosswalk at the intersection or a pedestrian trying to cross the crosswalk, the car must stop temporarily. In other words, if there are people, stop temporarily, and if there are no pedestrians, go slowly and pass [1].

II. Next-generation Traffic Light System

The schematic structure of this system is detailed in Figure 1. AI multimodal sensor prototype development for pedestrian recognition, FPGA (Field Programmable Gate Array)-based AI (Artificial Intelligence) distributed server performance unit prototype with low power and high-speed object recognition performance, mobile vehicle detection and node-based traffic flow information collection Radar sensor-based convergence detection sensor prototype development, AI traffic safety system control unit H/W and S/W development, and traffic signal and pedestrian image recognition linked display system prototype development.

Fig. 1. Overall System Architecture

First, by developing an AI multimodal sensor prototype for pedestrian recognition, the pedestrian detection sensor is a sensor that combines an RGB (Red Green Blue) camera sensor and a Depth (Thermal or TOF (Time of Flight)) sensor.

The second is the development of a prototype FPGA-based AI distributed server execution unit with low power and high-speed object recognition performance.

The third is the development of a radar sensor-based convergence detection sensor prototype for detecting moving vehicles and collecting traffic flow information by node.

The fourth is the development of AI traffic safety system control unit H/W and S/W.

Lastly, it is the development of a prototype of a display system linked to traffic signal and pedestrian image recognition.

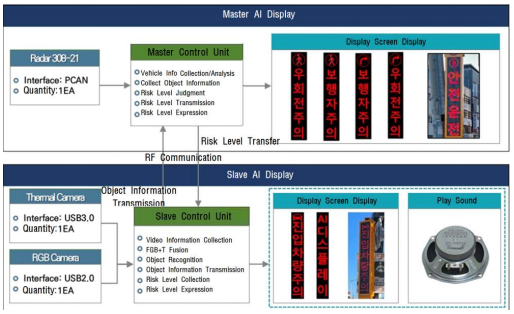

Fig. 4. Safety Service Overview of AI Display-based AI Traffic Safety System

III. Experiment

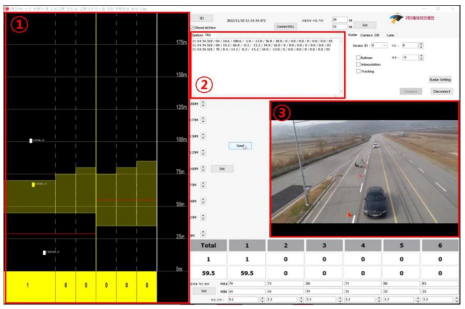

Fig. 2. Sensor-based Fusion Detection Software

Radar sensor-based convergence detection sensor software development is shown in Figure 2. 1 shows radar-based traffic information collection, 2 collects vehicle driving information, and 3 shows an unexpected situation confirmation screen.

AI traffic safety system control unit H/W and S/W development. Fifth, traffic signal and pedestrian image recognition linked display system prototype development, which was developed in conjunction as shown in Figure 3.

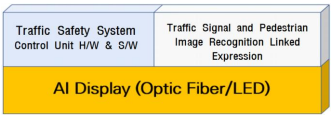

Fig. 3 AI Display System

IV. Conclusions

In this paper, a new next-generation traffic light method using radar and Can-bus communication method suitable for the new traffic signal system is proposed. This method is a system that prevents accidents by transmitting information on the entry of a person and a car to a traffic light from a place where a person and a car passing through an invisible traffic light cannot be seen.

REFERENCES

[1] Law revision in 2022, how to turn right at a crosswalk intersection (+pause enforcement standards). Apricot News [Internet]. Available: https://www.salgoonews.com/news/articleView.html?idxno=20823.