Car Management System with In-Vehicle Networks

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Abstract. Vehicle black boxes that have similar functions as airplane black boxes are currently being used due to the loss of many lives and properties arising from vehicle accidents. Both black-box products and Event Data Recorder(EDR) systems are currently available in the market. Most of the existing in-vehicle black boxes, however, record only external videos and images and cannot show the vehicle's driving status, whereas EDR products record only the driving status and not external videos. To address the problem of black boxes that can record only videos and images and that of EDR systems that can record only driving data, Car Management System(CMS) that uses MOST(Media-oriented System Transport), a new vehicle multimedia network, and OBD-II(Onboard Diagnostics II), a current standard of electronic-control network, was realized in this study to collect data from the electronic-control devices. The system uses external sensors such as CAM (camera) and GPS (global positioning system) to collect video, time, and location data that will be needed to make a judgment on the vehicle's current status.

Keywords: blackbox , in-vehicle network, OBD-II, MOST, CAN, vehicle blackbox, EDR

1 Introduction

Blackboxes were first used in a aircrafts to store the flight records and use them to determine the causes of accidents. This technology was recently applied to vehicles, and is being used to identify the causes of vehicle accidents the purpose of the car blackbox is to store the driving video, vehicle location, and time information related to an accident as objective data, and to identify their causal relationships with the accident. The car blackbox can also record hit-and-run cases during driving or parking accidents to protect the driver's propery. With the increase in the importance of the car blackbox. It has been made obligatory for all vehicles in Europe in 2010, and for all 4.5-ton-or-less vehicles in the U.S in 2011. Between 2010 and 2013 in korea (12/29/2009 ministry of land, transport and maritime affairs), business vehicles started to be required to be equipped with a digital driving recorder. In November 207 the Korean agency for technology and standards established the national standard (KS) for the car accident recorder(KSR5076) to provide regulatory support for its

technical development and for its use in relevant industries. According to the KS blackbox standards, video data are important, but the driving data (vehicle speed, brake, condition, seatbelt fastening status, GPS, ABS tire pressure, air bag condition, ETC.) are also necessary in actual car accidents. Most car blackboxes in the market. However, meet the KS video data standards, but do not comply with the requirement for the vehicle condition data. In actual car accidents, video data are not enough to accurately identify the accident cause[1][5].

In this paper, video data were stored; the vehicle conditions, including the RPM and speed, were stored using the OBD-II protocol, which is widely used for in-vehicle networks; and the vehicle multimedia information were stored using the media oriented systems transport(MOST) protocol, which is widely used for vehicle multimedia networks, to realize CMS what provides accurate information for actual accident analysis.

2 Paper Preparation

The system development environment was Windows XP on a desktop computer, and a USB was used as the external memory device.

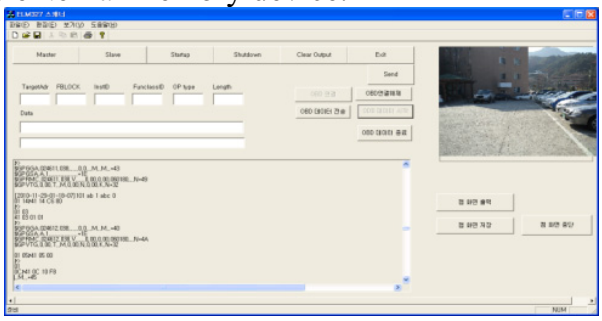

Fig. 1. CMS implementation screen

The main window of the CMS program has three areas: the OBD-II, MOST, and GPS data reception area; the CMS control area; and the CAM image display area (Fig. 5).

Fig. 2. GPS, MOST, and OBD-Ⅱ data outputted

Fig. 3 shows the window wherein the OBD-II, MOST, and GPS data are outputted according to each event.

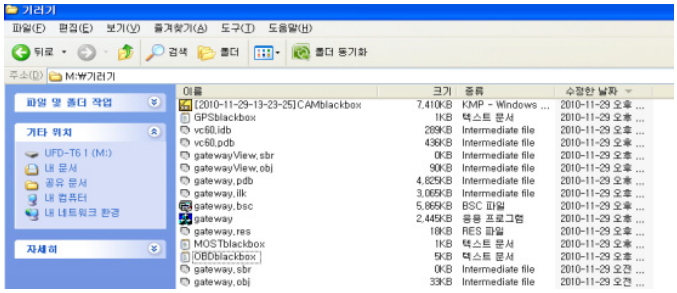

Fig. 4. GPS, MOST, OBD-Ⅱ, and CAM data stored in the external memory

Fig. 4 shows the window wherein the OBD-II, MOST, and CAM data are stored in the external memory. When the CMS starts its operation, the external images are outputted and stored in five-minute sections. When the external memory is full, the oldest image data are removed. If an accident happens or the Store button is pressed, the external images (CAM) are stored in a separate space (USB memory), and the time information is used as the image data name.

The stored data are analyzed via simulation so that users can easily understand them (Fig. 5).

Fig. 5. Simulation window

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