

# Telematics Service for Safe Driving Management

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## 1 Introduction

A traffic accident caused by an employee or a vehicle owned by a company leads not only to a financial impact on the company but also to loss of business opportunities including loss of social confidence. Moreover, as demonstrated in establishment of the ISO39001, an international standard for road traffic safety management system, awareness of safe driving management has been growing recently among a wider range of business operators, in addition to transportation companies using taxis, busses, trucks, etc. Fujitsu Ten has offered drive recorders for business use to those companies in taxi, bus and truck businesses for easier safe driving management since 2005. This paper elaborates a telematics service and the drive recorder G500 Lite equipped with the service for the safe driving management optimized to be widely used for general commercial vehicles.

## 2 Features of System

This system provides simple and reasonable safe driving management to companies that own commercial vehicles and service vehicles without a schedule control manager or a manager having expertise. The system's major features are listed below.

- Total support for the PDCA: "planning (Plan)" for safe driving, automatic "recording (Do)" of driving data, "analyzing (Check)" of data accumulated in a cloud center and optimal "training and learning (Action)" for each driver
- Visualization of near-miss locations having high accident risk by using analysis technology in the cloud center

## 3 System Configuration

The system accumulates driving data and video data in the cloud center, and offers service for the safe driving management based on results analyzed in the center.

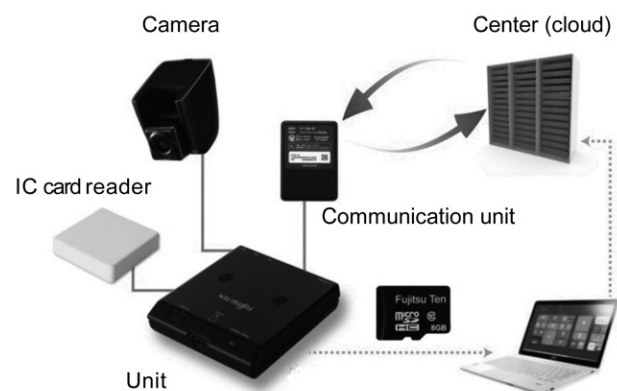


Fig. 1 System Configuration

## 4 Drive Recorder Specifications

As compared to the conventional model for taxis, buses and trucks, the G500 Lite is considerably downsized, and is equipped with a personal authentication system employing an IC card reader that reads driver's license. Thus, with easy installation and improved convenience, the new model is optimized to be installed in general commercial vehicles.

## 5 Service Specifications

### 5.1 Total Support of "Planning," "Recording," "Analyzing" and "Training and Learning"

By periodical management of "planning," "recording," "analyzing" and "training and learning," the system can evaluate each driver.

The connected drive recorder analyzes the

Table 1 Specifications of Connected Drive Recorder G500 Series

Product		G500	G500 Lite
Target		Vehicles with green license plate (Taxis, buses, trucks, etc.)	Vehicles with white license plate (Commercial vehicles, service vehicles, etc.)
Unit size		150×125×25	99×113×24
Video record		Double recording (event / continuous mode)	Double recording (event/ continuous mode )
Recording medium		Original SDHC/SDXC card Sold separately: 8GB, 16GB, 32GB, 64GB, 128GB	Original Micro SDHC card Included accessory: 8GB
Connectable cameras		Up to 5 cameras	Up to 2 cameras
Camera	[Standard]	Pixels: 1 million pixels View angle: 110 ° horizontally, 70 ° vertically	Pixels: 1 million pixels View angle: 110 ° horizontally, 70 ° vertically
	[OP]	Pixels: 0.31 million pixels View angle: 135° horizontally, 105 ° vertically	Pixels: 0.31 million pixels View angle: 135° horizontally, 105 ° vertically
Audio record		Available	Available
Card slot		1	1
Image frames		Up to 28 frames/sec.	Up to 28 frames/sec.
Video recording time		Up to 150 hours ※ 1 camera, 128 GB, 14 frames/sec. Long-time recording mode	Up to 300 hours ※ 1 camera, 8 GB, 14 frames/sec. Long-time recording mode
GPS receiver		Included	Included
Wireless LAN		Included	Not included
VD/LDW		Included	Included
Recorded data		Time, location, G value, engine rotations, vehicle speed, distance to lane, inter-vehicular distance	Time, location, G value, vehicle speed, distance to lane, inter-vehicular distance
Personal authentication		SD card	IC card reader

driving of the driver based on collected driving characteristic data on erratic driving, inter-vehicular distance to a preceding vehicle and abrupt steering, etc. Then, it can automatically prepare a safe driving diagnosis report, and display a safe driving ranking. Moreover, the system analyzes driver's driving in detail per item based on diagnosis results to automatically provide comments to help the driver improve their driving. Training tools are also available for the manager for each item to be enhanced. Thus, each driver can receive training, including e-learning, appropriate to his/her characteristics. Therefore, a manager in an office can comprehensively manage drivers across the country.

## (1) Planning

### ① Safe driving plan

The drive recorder automatically sets items to be improved and their recommended targets based on past driving data. Moreover, the user also can enter his/her own qualitative targets

freely in text to follow up. Those targets can be seen both by the manager and the driver. Thus, the communications between them will be promoted, which will raise the safe driving awareness of the driver.

項目	前回数値	目標点数	実績点数	達成度
速度超過の改善目標	27点	95点	27点	0%
急ハンドル改善目標	100点	90点	100点	0%
アイドリング改善目標	0点	97点	0点	0%

Fig. 2 Screen for Safe Driving Plan

## (2) Recording

### ① Data record

Once the driver holds the driver's license up

to the IC card reader to start driving the vehicle, data of location of the vehicle, erratic driving, inter-vehicular distance, abrupt steering, sudden braking, movement, etc. is automatically sent to the cloud center by the communication function. Thus, regardless of which car the driver drives, the system collects the driver's driving data, and eliminates time to download the data to a computer after work. The system also prevents the driver from driving a vehicle without the driver's license or with expired driver license.

### (3) Analyzing

#### ① Safe driving diagnosis

The system diagnoses and scores safe driving of the driver for each item based on the characteristic data, and then automatically displays ranking and comments.

Since the system displays the ranking, scores for each element of safe driving and detailed analysis, the driver understands his/her safe driving level. The system also displays the achievement level and progress toward the planned targets.

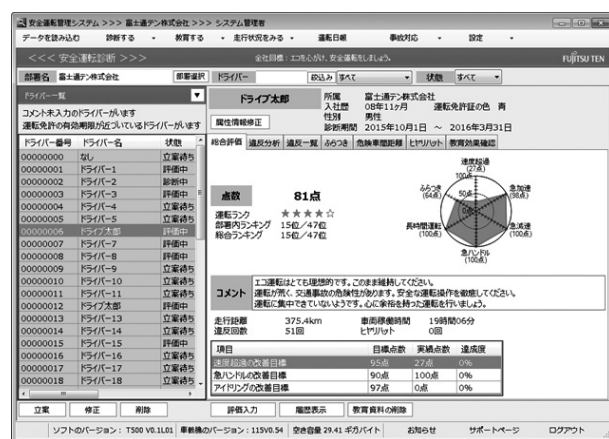


Fig. 3 Screen for Safe Driving Diagnosis

#### ② Safe driving diagnosis (detailed analysis function)

The system displays distribution of erratic driving and inter-vehicular distance per vehicle speed range and time of day, near-miss incidents, etc., to provide objective data for safe driving training through further detailed analysis.

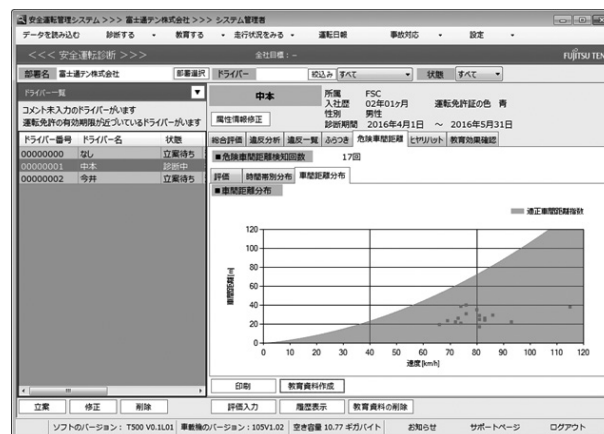


Fig. 4 Screen for Inter-vehicular Distance Distribution Analysis

#### ③ Automatic image analysis

The system accumulates, in the cloud center, enormous image data of company vehicles recorded when an impact has been detected. The system automatically identifies and highlights near-miss images having especially high risk of accidents, and then displays the highlighted images. Thus, the system can dramatically reduce workload of the manager who visually checks the video footages to find those near-miss cases.

### (4) Learning

#### ① Preparation support of near-miss training material (risk prediction training material)

The system provides service to smartly prepare for a training material based on one of near-miss images identified through automatic image analysis. The user first selects one near-miss incident from the identified ones. Then, he/she determines a range of the image used for the training, and prepares Q&A. The user can stress points in the image so that the driver can more easily learn what the risks were. The prepared material can be distributed to drivers as an e-learning material, and their learning results can be confirmed. Learning effect is enhanced by using actually-experienced near-miss images familiar to them.



Fig. 5 Screen for KY Material Preparation

## (5) Others

### ① Vehicle monitoring function

The system enables the manager to confirm the current location, communication status, track of driving, driving speed, etc. of a selected vehicle. Once detecting an event of an impact, the system displays the detected location of the event on the map and a still image at the event. Moreover, the system can gain the video footage at the time of the impact over the communication line, in addition to the still image.



Fig. 6 Screen for Vehicle Monitoring

### ② E-mail alert

Once detecting a strong impact on a vehicle that may be caused by an accident, the system sends an e-mail alert to the manager. The e-mail includes the time and date, company name, vehicle number, driver's name, location, still image, speed, and G value of the vehicle. The manager can understand the situation of the impact regardless of where he/she is. Thus, the

system can contribute to quick response to the accident. In addition, once detecting a problem with the camera or no card inserted in the slot, the system notifies the manager by e-mail. As a result, the system prevents failure of recording data before it is too late.

## 5.2 Center Analysis Technology Visualizing Near-miss Locations with Higher Risk of Accident

This system identifies locations with a higher risk of an accident, and then develops a near-miss map by accumulating and analyzing the driving data and the image data collected from all vehicles using this service. In the future, the system provides service that alerts drivers according to their attribution, such as gender, age, etc., so as to prevent accidents.

### (1) Near-miss map

The system does not only displays locations where a sudden braking was applied but also accumulates the data for each specific cause, such as pedestrian/object running out into the road and rear-end collision. The near-miss locations can be switched to be displayed per time of day, weather, area, cause and company owing the vehicle. When coming close to one of the near-miss locations, the drive recorder calls for attention by outputting audio guidance corresponding to the cause.

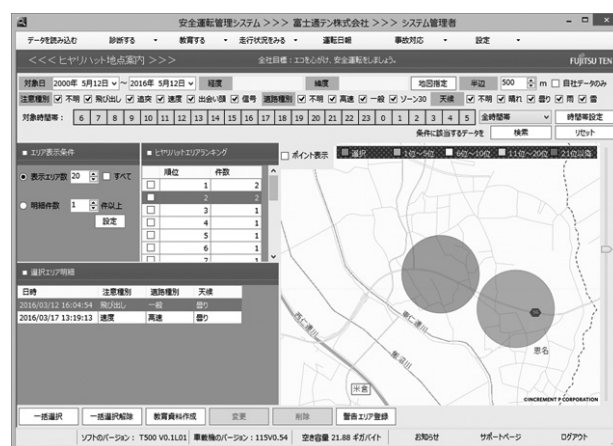


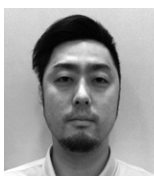
Fig. 7 Screen for Near-miss Map

## 6

**Conclusion**

This product contributes to an effort to "create the safe and secure automobile society." However, the effort is still ongoing. To that end in the changing circumstances, we believe that the society will need a system that will evolve and advance, adapting and accommodating itself to various changes in the environment and the society. The near-miss map of the system developed this time is one of examples. We would like to further develop the **Future Link™** such that we can offer unprecedented new values.

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