

A Reflecting Back Support System for Train Driver Training

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1. Purpose and background

Train drivers are prone to commit human errors due to psychological uneasiness or tension. Errors can even occur due to relaxation after properly taking action. To prevent such unwelcome situations, it is important for train drivers to objectively review their own trends in taking action and their psychological states that occur during their training when abnormal train operation situations are encountered. Such objective reviews should be conducted using data recorded during the training sessions in order for drivers to correctly understand psychosomatic conditions into which they will potentially fall. However, it is not easy for train drivers to acquire useful knowledge through “reflecting back” by themselves within the limited training time. We developed, therefore, “A reflecting back support system” to effectively and efficiently support their reflecting back process in their training using a simulator. We also verified the system’s practicality for actual applications.

2. Principal functions

The system has the following functions to enable effective and efficient reflecting back.

- Records and controls en bloc four-split images of action data on train operating manipulations, heart rate data related to the degree of tension, train operation environment and their own expressions/behavior shot at various angles.
- (1) Has a high-usability interface to enable smooth retrieval and display of the scenes drivers want to review (kilometer posts/passing time) (Fig. 1) and (2) displays synchronized records/data in various categories immediately after completion of training.
- Automatically judges whether or not an event is an error in case one has occurred ac-

ording to the rules on train operation and outputs a list of judgment results, error contents, places of error occurrence and other particulars on “Train operation check sheet” (Fig. 2).

3. Verification of practicality

We nominated 20 instructor-class subjects who have experienced train operation for a test to evaluate the reflecting back support system. They sat before a train operation simulator that runs an actual training program to experience abnormal scenarios for approximately 30 minutes and reviewed the course thereafter for approximately 30 minutes. Then, we performed a questionnaire survey to check whether the functions of the reflecting back support system had been effective for their retrospective thinking process. As a result, we obtained satisfactory results from the survey to demonstrate that the system is highly viable for practical applications.

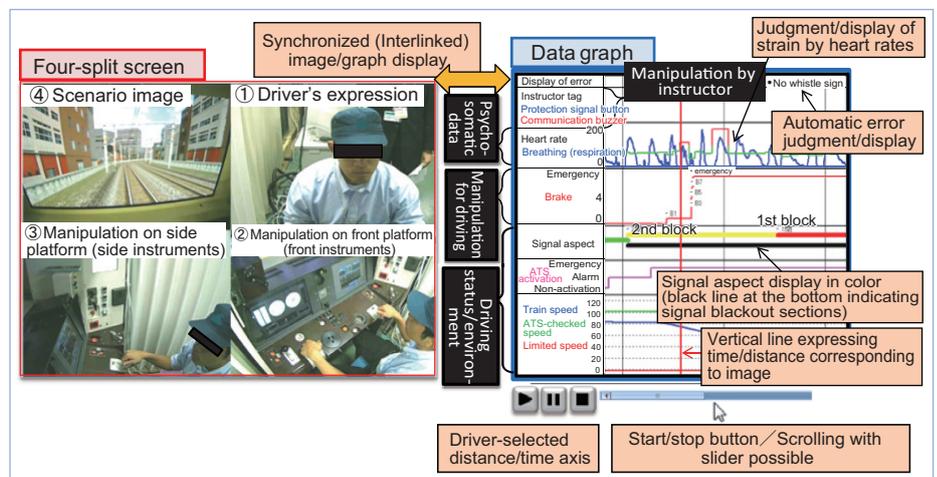


Fig. 1 Displays of playback subsystem (Left picture: screen display spit into four, right picture: data graph)

	List of regular driving procedures	Result of detection	Comment	Kilometer point	Time	Knowledge
1	When to contact the conductor, carefully coast the train.					Driver shall stop the train in principle when communicating with conductor or other personnel except on simple matters, or carefully coast or run the train at low speed in the meantime.
2	Whether or not the driver has noticed the blackout of the 2nd block signal.					
3	Stop the train at a point 50m past the 2nd block signal.	!	Train has overrun the stop position.	6.693km	13:04:27	
4	Wait for one minute.					Until an adequately long distance is secured behind the train ahead.
5	Receive (acknowledge) instructions from traffic controller.	PB Check				Driver can run the train when necessary at his/her discretion without being protected by a block system, provided that he/she notifies the traffic controller of his/her unprotected status.

The symbol “!” indicates that the driver has possibly committed an error. “PB Check” means that the situation shall be checked with a playback display.

Fig. 2 Train operation check sheet