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IMPLEMENTATION AND ADVANTAGES OF THE DRIVER GRADING SYSTEM IN THE TROLLEYBUS SIMULATOR

Simulation is an imitation of a particular situation or process, so there is a fairly large variety of simulators and they are used for different purposes:

- practice;
- stuff training;
- testing of a certain technology;
- entertainment.

Usually, simulators are used when interaction with a real object is related to the inaccessibility, danger or high cost of such interaction. The simulator of the trolleybus, which will be discussed further, is used specifically for the purpose of working with the vehicle in a virtual way, since it is dangerous to put an inexperienced driver behind the wheel of a high-class vehicle and to entrust life and health of not only passengers but all road users.

The simulation system implements the trolleybus controlling function and simulates the real events associated with driving such vehicle. The simulation is provided by sets of scripts.

In order to determine the competence of the driver, user actions analysis subsystem has been implemented. Based on existing data, user actions were classificated into four types:

- neutral action
- positive action
- negative action
- warning

Neutral action and *warning* do not affect the driver's rating and are not analyzed. Neutral actions include toggle switches, doors opening etc. Among warnings there are actions like insignificant speeding within the limits of traffic rules.

Positive and *negative actions* affect driver's rating and are analyzed further. Positive actions are proper parking at a stop, driving according to the schedule and so on. Negative actions are speeding, driving with open doors and other driver’s actions that can lead to unwanted consequences.

A grading scale was implemented for the driver's final assessment. The final score is a value from 0 to 100. The starting point is 80 points. While testing, points are added or subtracted from the initial value based on different events and actions. For each positive action two points are added. For each negative action five points are subtracted. The final rating scale is shown in Table 1. An excellent result is a value higher than 90 points, good ranges from 70 to 89. If the final score is less than 70 the result is unsatisfactory.

Table 1

Driver's rating scale

Value	0-69	70-79	80-89	90-100
Rating	F (Unsatisfactory)	C (Acceptable)	B (Good)	A (Excellent)

To display the events, popup messages were developed. They are controlled by the corresponding scripts which are responsible for the general status of the popup messages and control the particular message in the queue.

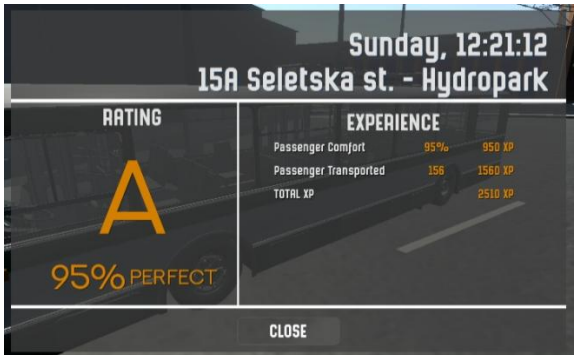

Fig. 1. Result visualization

For more detailed text reporting, a special script was created. It tracks the displaying of popup messages and writes them to a log file. Each file is named according to the date and time of the start of the testing and contains a list of all the messages received by the driver while driving. The header of the file defines the version of the simulator and the date and time of the start of the log. Entries depict time, type, current grade and message text.

Thus, it is possible to test players and get detailed information about the nature of their driving and predict the prospects for developing their skills using the user grading module.