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The level of autonomation is strongly related to the problem of delegating control of the vehicle and its extent while driving. The essential role of the driver changes as the level of autonomation and delegation of control to the system increases. The driver moves from the position of decision-maker to that of a passenger, but with the possibility of taking over control functions, which requires a high degree of situational awareness on his part. The key is to increase the effectiveness of driver-system interaction by designing the interfaces so that the driver understands the current and planned actions of the vehicle and knows its limitations.

The analysis of the literature in the field of autonomizing driving systems allowed to develop the procedure of own research conducted within the framework of the dissertation and the set of parameters analyzed for the purpose of model development. The method for evaluating the assumption of control by the driver in vehicles with conditional autonomation thus required simulator tests, during which the correctness of assumption of control was evaluated on the basis of the driver's reaction time to signals sent by the car informing of the need to take control. The method was complemented by surveys determining the degree of comfort during the takeover of control of the vehicle, which were conducted immediately after the simulator ride.

Informing drivers to transfer control was done through dedicated HMIs using signals received through auditory, visual, or tactile vibration channels. Signals and messages were communicated via displays located in the control panel and on the dashboard in the vehicle. It was assumed that the interpretation of the signals should take place quickly and evoke an appropriate reaction of the driver to the situation. The aim of the conducted research experiment was to determine the factors influencing the correctness of taking control. We used scenarios involving the need for drivers to take control in selected traffic situations (road works including road reconstruction and its detour along an alternative route, as well as two traffic accidents). The primary dependent variable studied was the time from the moment the message appeared in one of three forms (visual; visual and auditory; visual, auditory, and haptic) until the driver made a meaningful intervention in the form of pressing the accelerator, brake, or turning the steering wheel.

A fuzzy model was used to evaluate the correctness of taking control, which was developed using the results of experimental studies. The most important parameter registered by the simulator was the time of taking control over the vehicle. To build the model, the evaluation of the drivers' feeling of comfort during taking control was also used. Application of the heuristic method in the form of fuzzy logic allowed for optimal use of a limited size of the data set and for taking into account variables of different nature (measurable and non-measurable). The dissertation indicates the most effective way of informing drivers about the need to take control by means of dedicated interfaces using specific modalities, as well as differences between the reception of information from interfaces of different modalities in different age groups and among females and males.

Experimental studies and the model created allowed to determine the impact of transfer time and the assessment of its comfort on the correctness of taking control of the vehicle in a situation requiring it. This knowledge can be used to implement appropriate systems in newly created autonomized vehicles.