Resume

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Topic of the graduation paper: Intelligent Diagnostic Systems of Technical Automobile Systems.

Annotation:

The modern automotive industry is in a process of rapid development. Safety systems are being improved. Comfort is emphasized. Much more information that facilitates steering is given to the driver. More and more systems and functions are being automated. Vehicles self-control and self-adjust to behave in an optimal way without human intervention. Investments are made in complementary functions which provide comfort and luxury. A main priority of mechanics and car experts is the stable behavior of the car on the road and the decrease of environmental damages.

The European Union has elaborated a series of emission standards for environmental protection. Euro 5 includes requirements for exhaust emissions and particulate matter emitted into the atmosphere.

On-board diagnostics has become a critical problem. The more cars integrate interacting electronic components, the more the problems with defective components intensify. The existing diagnostic systems are quite rudimentary. There is an elementary diagnostic process monitoring the condition of each component. When the symptoms are more complex, for instance a conflicting interaction between the components, the reasons remain unknown and the mechanic chooses the simplest decision - to replace all components. This increases repair costs significantly.

Today, the whole automotive industry is looking for solutions to carry out precise and efficient diagnostics and finer adjustment.

The objective of this graduation paper is to utilize a set of technical and software resources to create a car analysis system. The present scenario examines the condition of the particulate matter filter, whether it is in good working order, or it needs to be replaced, whether additional tests would be necessary. It also carries out a regeneration of the filter, if the prerequisites are satisfied.

The scenario develops through several stages, including regeneration:

- Information about the testing and checking of start-up conditions.
- Warm-up
- Regeneration and diagnostics
- Cooling
- Visualization of test results.

Both wide-spread programming practices and original solutions to specific problems are used in its realization.

Resources:

- Controller Area Network (CAN) – serial communication protocol used in high-speed networks. In car electronics, engine control components, sensors, anti-skid systems, dashboards, electric windows, are connected to the CAN network with a single cable, instead of the multiple cables. It efficiently supports a distribution control in real time with a very high level of safety.
- Object-oriented design technologies: UML, Rational Rose, C++ [MS Visual C++ 6.0]
- Design patterns for reusable object oriented software.
- Borneo Development Framework.
- ACE libraries allowing better flexibility and transfer.
- Trolltech QT – for the graphic interface and application internationalization.
- Data in XML format described in a scheme or DTD. Access and processing of BDomData objects.
- Transfer methods “Signal-Slot”

The elaborated scenario and its application for testing of particulate matter filters achieve:

- Preventive diagnostics. Protection of the engine against contamination and follow-up damage to other parts.
- Quick and easy testing with no need for the car to stay in a repair shop.
- Flexibility in terms of the language to communicate with the consumer. The on-board diagnostics system allows its adjustment: English, French, Japanese, etc.
- Environmental protection in terms of exhaust gases and particulate matter emissions.
- Conforming to the **European Emissions Standard Euro V**.

In conclusion, we find out that the application of various automation solutions has a most favorable effect on the automotive industry processes.

I would like to express my sincerest gratitude to Johnson Controls, which set up the best possible conditions for the realization of this work, and to the reviewer Gencho Staynov for his valuable input.

Furthermore, I would like to extend my thanks to my scientific adviser Assoc. Prof. Dr. Antonii Popov for his important advice and guidance without which it would have been impossible to accomplish this work, and also to all those who have stood by me and supported my efforts.