Study of Electronic Throttle Control on Vehicle Control Area Network Transmission

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ABSTRACT

This study is proposed to develop a vehicle CAN (Control Area Network) bus DBW (Drive-by-Wire) control technology and system design integration methodology. By using suitable CAN bus control strategy and DBW controller, the response of the powertrain dynamic response characteristic can be accurately predicted and modified to achieve the desired controlled performance. This research used electronic throttle input and output experimental data to validate the dynamic characteristic of the established DBW electronic throttle model. It used a low-pass filter to reduce the noise content of a drive-by-wire throttle position and a MAF sensor, before they sent to the controller by CAN bus. Since the noise contents changed as operating condition varied, so it is hard to get the best filtered result if fixed cut-off frequency were used for filtering. This study used Curve Fit toolbox in MATLAB program to assist analysis to establish the optimized filter equation for different operating condition. In this study, the electronic throttle and control driver plant and the corresponding adaptive PID controller in CAN bus transmission was established according to the electronic pedal command signal and the feedback signal from Throttle Position Sensor (TPS). It used the analog and digital signal conversion circuit and CAN bus board made by this study to collect the experimental data. This study used Hardware In the Loop (HIL) technology to replace the real hardware, the command control signals can be varied by the simulation software to evaluate the corresponding response changes. The signal of the TPS was feedback sent into the controller to adjust the response in order to achieve the goal of throttle openings position control. This study can also help the engineer to reduce the trial-and error time and expanse for developing the future DBW system controller.

Keywords : CAN bus, Drive by Wire, Electronic Throttle Control, Adaptive Cruise Control

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