Title: Study on the potential application of electronic wedge brake for vehicle brake system

Author/Authors: Fauzi Ahmad, Saiful Amri Mazlan, Hairi Zamzuri, Khisbullah Hudha, Hishamuddin Jamaluddin

Abstract: This paper presents a study of the potential application of an electronic wedge brake for vehicle brake system using human-in-the-loop simulation. Simulation was made in MATLAB Simulink software which interfaces an imaginary vehicle with a real time input from a human, such as throttle and brake input. The imaginary vehicle model that is used is a vehicle dynamic model that has been validated experimentally using an instrumented experimental vehicle. A validated electronic wedge brake actuator model was then used as the brake actuator model where a suitable control strategy, namely proportional-integral-derivative and proportional-integral controllers, was utilised as the force and gapping control respectively. To verify the effectiveness of the proposed actuator in a vehicle, the simulation results are compared with the results of human-in-the-loop simulation of a vehicle using a conventional hydraulic brake and the response of the experimental vehicle using the same dynamic test, namely the sudden braking test. The simulation results show that the proposed simulation method and actuator with appropriate controller strategy have similar behaviour to a hydraulic brake in terms of its capability to produce the desired braking force to reduce the speed and halt the vehicle. The outcomes from this study can be considered in design optimisation and implementation in a real vehicle.