3.7 Enhanced Adaptive Cruise BBW AWB Dispulsion Mechatronic Control Systems

The number of automotive vehicles travelling world’s roads and highways are still increasing on a daily basis. Unfortunately, traffic congestion and the number of road accidents are also increasing. There is an ever-pressing necessity to regulate traffic flow and make driving much safer [RILEY ET AL. 2000].

Automotive vehicle manufacturers develop more intelligent vehicles every year. These enhancements allow many people to foresee a completely autonomous vehicle in the not-so-distant future. There are several organisations in the world that promote the development of safer, more intelligent vehicles. For instance, the US Government’s support of the development of more intelligent automotive vehicles is evident from the Surface Transportation Act (STA) passed recently. The STA may provide direction, stability, and growth for Intelligent Transportation Systems (ITS) that save lives, time, and money in the 21st century. ITSs include advanced technologies that help drivers avoid accidents, reduce traffic jams, and improve traffic flow. One particular topic of ITS may be an intelligent cruise control termed adaptive cruise control (ACC). In the meantime, more and more sensors are being scattered throughout automotive vehicles, especially sensors that look outside: at street surfaces, and at obstacles in front, alongside, and behind the vehicle. These sensors include video cameras, radar and photoelectric, those capture and transmit a colossal amount of data in real time for the ECUs within the vehicle. In addition to the now familiar ABS, sensors may also adjust the vehicle’s ride and traction mechatronic control. Another innovative technology is the ACC. A pulse Doppler radar system scans the road ahead and reduces the vehicle velocity as the vehicle approaches the one in front in order to modulate the preset distance between them. Even wheel-tyre pressure monitoring system may be in place to warn of unsafe wheel-tyre pressure [CROFT 2000].

An exemplary adaptive cruise (AC) BBW AWB dispulsion mechatronic control systems is shown in Figures 3.38 and 3.39 [CADENCE 2003].

Fig. 3.38 AC BBW AWB dispulsion mechatronic control system [Renault; CADENCE 2003].

ACC is an extension of the existing cruise control feature that links together a forward obstacle detection system for monitoring traffic directly in front of the vehicle, the cruise control system (throttle valve), the braking system, and the driver’s input as to the desired cruise-control set vehicle velocity. Identical criteria are used to determine the distance to the preceding vehicle.

The key objectives of ACC are improved traffic flow and increased driver comfort while reducing the driver’s workload. Figure 3.40 shows the components and subsystems used to achieve ACC on a host vehicle [RILEY ET AL. 2000].