Chapter 7

Conclusion

The performance analysis of WCAN using Token Scheme as presented by Lun et al. (2012) is revisited and extended to response time analysis of WCAN using Token Scheme by simulation using QualNet v 5.1 and the results are validated with SAE benchmark. From the analysis it is observed that all the periodic messages meet their deadline and all but one sporadic message meets the deadline while one signal fails to be implemented by the sporadic messages. In such cases, stochastic response time analysis is proposed in place of worst case response time analysis. The probability that messages of a real time system meet its deadline is a measure of its reliability. If the reliability factor is acceptable then the real time system is guaranteed. In the analysis of the simulation results it found that the sporadic messages of WCAN using token scheme have a packet delivery ratio of 0.9645 and as the probability that the messages meet their deadline is quite high, the WCAN using token scheme is recommended.

Encouraged by this result, WCAN implementation is attempted, here IEEE 802.15.4 is used as the wireless interface to communicate CAN messages wirelessly. As satisfactory results are obtained, a suitable application like WCAN based Fire and Gas safety system is identified and implemented using FlexDevel board from Eberspaecher, Germany. The CAN bus traffic is analyzed through the real bus of CANoe v7.6 and from the trace window of CANoe the response time of WCAN based fire detection system is measured, and found to be comparable with the theoretical values. A boundary condition is adopted for the WCAN based fire detection system to meet the regulation of National Fire Protection Association (NFPA) of maximum allowable delay of 90 sec between the alarm message and the fire extinguish message.

In addition, the ZigBee protocol that is used as the wireless interface to communicate the CAN messages is analyzed in terms of signal strength and delay spread and is found to satisfy the requirement of minimal latency and minimum transmission power. ZigBee is also found to be better suited for WCAN based critical application than the other wireless protocols.

The results show that the implementation of the WCAN based Fire and Gas safety system using FlexDevel board and ZigBee interface, guarantees real time applications of WCAN, in accordance to National Fire Protection Association (NFPA) regulations.

From both simulation results and implementation results, it is concluded that the proposed wireless controller area network is guaranteed for real time applications.