CHAPTER 6
SUMMARY, CONCLUSIONS AND FUTURE SCOPE

6.1 SUMMARY

In this thesis, hard real time system is considered where the system architecture consists of Electronic control units performing computations referred as nodes. The process of communication between the nodes follows TTP/C protocol. The system is implemented with time triggered approach to have advantages of fault tolerance. The time triggered architecture is a hard real time system operated with task execution having predictability and featured with Composability, finding applications in safety critical systems like aeronautics and automotives. It is also observed that the scheduling of tasks over nodes of the system becomes complex if they are large in number. The existing algorithms such as Greedy Nearest Neighbor algorithm, Simulated Annealing, Ant Colony Optimization, Genetic algorithm and also proposed ADGA method discussed, for task allocation on nodes in Time Triggered systems are investigated for our understanding.

6.2 CONCLUSION

The scheduling of tasks over the nodes of time triggered system is simulated with existing algorithms using travelling salesman problem. Although greedy approach is simple and fast but may not yield to optimum value, also multi node scheduling is not possible. The greedy nearest neighbor visits all possible nodes to get the best solution. In Simulated Annealing the Cooling rate plays a vital role, if it is on higher note achieving of best solution takes more computation time else it moves towards Greedy nature. When it comes to Ant Colony optimization method the evaporation coefficient and ants' sight variation indulges in obtaining best solution, whenever evaporation coefficient is increased or ants' sight is decreased it leads to more local optima making global optimal solution difficult. In Comparison Genetic algorithm has fetched better optimization results i.e. best solution for Task allocation on nodes which is shown in Chapter 4. This made us to frame a modified version of GA for Time Triggered system application. The results show that ADGA gives a best solution for task allocation which is around 20 % when compared to simple GA.

From the comparison plot presented in chapter 5, it can be observed that proposed Adaptive Dynamic Genetic Algorithm approach delivers best possible solution than other existing methods. This method performs an optimization of task allocation defining the communication protocol with multiple schedules using the travelling salesman problem which is essential for best effort usage of resources. This has improved the scheduling based on time triggered communication protocol which is adopted for safety critical distributed architecture.

6.3 FUTURE SCOPE

Future improvement in schedulability can be achieved using up-to-date heuristics for node allocation based on conditions and features encapsulated by TTP for time triggered architectures. Furthermore architectures having both event and time triggered applications can also be investigated and may result in better resource optimization for a large class of safety critical applications.