Chapter 8

Conclusion and Future work

8.1 Conclusion
8.2 Future work direction
8.1 Conclusion:

To sum up the overall work done, following are the important conclusion which highlights the outcome of the research based on objectives.

- The systems Power requirement decides how better the system is. Therefore one can say that power consumption becomes very critical issue and it should be handled with care for effective power optimized embedded systems. For designing embedded system, designer should look for the application specific power optimization techniques. Mainly there is trade-off between area, delay and power consumption, so one should have design approach where there is little-bit of compromise of any one of the three factors.

- Pipeline architecture is always essential for better throughput, but at the same time pipeline architecture needs to be backed by branch prediction logic otherwise it is going to create an overhead to the system. Most of the version of ARM architecture has got the pipeline architecture (3-stage to 7-stage). By using simplescalar toolset branch prediction technique is implemented. The implemented technique can be fit to various architecture like PISA, APLHA, x86, SPARC and ARM Instruction Set Architectures. By implementing the BTFNT (Backward Taken Forward Not Taken) one can easily avoid the pipeline hazards and remove pipeline stalls from the architecture. The suggested method BTFNT gives very good prediction rate compared to Taken and Not taken prediction scheme.

- Process level parallelism is achieved by embedding RTOS on ARM7TDMI architecture, by embedding the RTOS multitasking is observed and throughput of the system is increased. Thus, enhancing the ARM7TDMI architecture for better performance.

- Power management by enabling and disabling the various analog and digital blocks is realized with the help of Cortex-M3 architecture of
PSoc5. ARM Cortex – M3 is enhanced for power efficient applications. The same can be extended for the battery operated portable devices like mobile phones, I-pad and various gadgets.

- ARM enabled board like RaspberryPi can be effectively used as independent complex embedded machine. ARM11 architecture is enhanced to work as single board computer. The board is programmed and ported to have all the facilities of a conventional desktop computing along with application specific interface. Various ARM versions support porting of an operating system. So, by porting Raspbian open source operating system on RaspberryPi, architecture is enhanced to work as good as portable handy computer.

- For the application point of view real time monitoring and data acquisition system is implemented and verified on Cortex-M3 architecture of PSoC5 and RaspberryPi (ARM11) through Arduino.

At the end I conclude that the research has provided considerable amount of contribution in the field of Architecture and embedded system to be precise and thereby in the field of electronics and communication at large.

8.2 Future Work Directions:

I would like to quote “nothing is permanent except change”, therefore the work presented by me in this thesis can be upgraded for the future work, and here are some of the suggestions to take up the thesis for the future work.

- As discussed branch prediction technique for betterment of performance – the presented work describe about the simplescalar toolset. One can go for the entire system design using OVP (Open Virtual Platform) – whereby you will have liberty of defining custom peripherals to ARM core and then simulate the same.
- One can do the survey on PLC (Programmable Logic Controller) features and can look how ARM based PSoC could replace the most of the functionality of PLCs.

- VLSI based FPGA implementation of ARM core is also the challenging option for modification and enhancement in the architecture.

- One can also look for ARM based board to have enhanced wireless module support which works for effective data transmission and receive. Apart from that one can even go for smaller distance communication module like ZigBee.