Porting & Optimization Techniques for C++ Based Image Processing Algorithm on TMS320C62x™ DSP

Upendra Patel, Head-Embedded Systems Group, eInfochips Ltd.

Learn about the porting and optimization methodology for a PC-based algorithm that includes C++ to embedded C architecture conversion, effective usage of DSP architecture, memory optimization and optimization of floating-point calculations on fixed-point DSPs.

Much research work is done in the image processing area with most of the basic development on a PC platform. Once the concept is proven, the real application is implemented on DSP. Developers assume that the ANSI C compatible PC code should work directly on a DSP, but direct porting of such algorithms on the DSP platform cannot give optimum performance without modifying the code to take advantage of the DSP architecture. See how eInfochips has successfully ported and optimized an image processing algorithm on the TMS320C6205 DSP with a 50 times performance improvement. The algorithm execution time was reduced from 5 seconds to 0.1 seconds approximately.

Presentation Outline
- Introduction about image processing algorithm
- Feasibility of porting signal processing algorithm
- Algorithm porting methodology
  - Converting C++ based architecture to C
  - How to take advantage of DSP architecture
  - Memory and stack optimization
  - Optimizing critical loops
  - Optimizing floating-point calculations on fixed-point DSP
- Major challenges and solutions
- Conclusion

Target Audience
DSP Algorithm and software developers who have software ready in the form of standard C/C++ code on PC and want to port the same to DSP and achieve higher performance.

Attendee Prerequisite Knowledge or Experience
The attendees should have knowledge in the areas of:
- C++ / C programming
- TMS320C6000™ DSP architecture
- Exposure to Code Composer Studio™ IDE

Speaker Biography
Upendra Patel is Head - Embedded Systems Group at eInfochips, Limited. He has 19 years of experience in embedded products design and manages various embedded systems projects based on DSPs, RISC processors and multi-processors designs. He has worked on many TI DSP-based projects in video/imaging processing, telecommunications, and evaluation board design. Patel holds a Bachelor's Degree in electronics and communications.

Speaker's Previous Speaking Experience

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<tr>
<th>Event</th>
<th>Date</th>
<th>Topic</th>
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<tr>
<td>Embedded System Workshop at Engineering College</td>
<td>July 1999</td>
<td>Embedded Systems Design</td>
<td>3 Hours</td>
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<td>Gnosis at Nirma Institute of Technology</td>
<td>April 2002</td>
<td>Embedded Systems</td>
<td>1.5 Hours</td>
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<td>TI Developer Conference</td>
<td>August 2002</td>
<td>Optimized ATM SAR implementation on C64x™ DSP</td>
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<td>Satellite based</td>
<td>October 2002</td>
<td>Embedded Systems</td>
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education to students of 20 engineering colleges

Co-Author
Ketul Patel, Embedded Software Engineer