

Track Fit Card Requirements for the Trigger Simulator

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- Functionality
- Simulate Versus Emulate
- Debugging DSP Code
- Future Plans for TFC TrigSim

Functionality

The trigger simulator framework allows us to

- Study and optimize algorithm design.
- Produce lookup tables for matrix computation and hardware coordinate conversion.
- Produce test vectors for DSP simulation debugging.
- Predict trigger efficiencies for physics analyses.

Simulate versus Emulate

- C++ code is not C code as understood by the DSP.
- However, we can
 1. Use equivalent algorithm (eventually, wrap DSP C code in C++).
 2. Use correct local variable precision.
 3. Use correct (packed) matrix and (eventually) hardware coordinate conversion LUT quantities.
 4. Use correct (bit-compatible) input/output data formats.
- Altera firmware for controller *modelled* using C++.

Debugging DSP Code

- The C++ code should closely model the C code that will run on the DSPs.
- Functional blocks represented are
 1. hit selection,
 2. matrix computation, and
 3. χ^2 determination.
- Store input/output (and intermediate values?) of each functional block in *debug chunk* for testing purposes.
- Debug chunk should be generic STT chunk for internal use (doesn't need to be official).

Future Plans For TFC TrigSim

- John - wrote original TFC code and will provide expertise when required.
- Wendy - first priority to get working C/C++ TFC algorithm.
 1. Take OOD and C++ courses.
 2. Get tsim_l2stt to work with PAC algorithm (converted from Fortran to C++).
 3. Debug integer version of modified static road 3 algorithm.
 4. Generate matrix computation lookup tables.
 5. Generate and verify hardware coordinate conversion lookup tables.
 6. Model the 60° sector structure.
 7. Maintain C++ algorithm as C code changes during DSP simulation studies.