

Space Qualification of the New Pico Event Timer

Presented by Johan Westin



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21ST INTERNATIONAL
WORKSHOP ON
LASER RANGING

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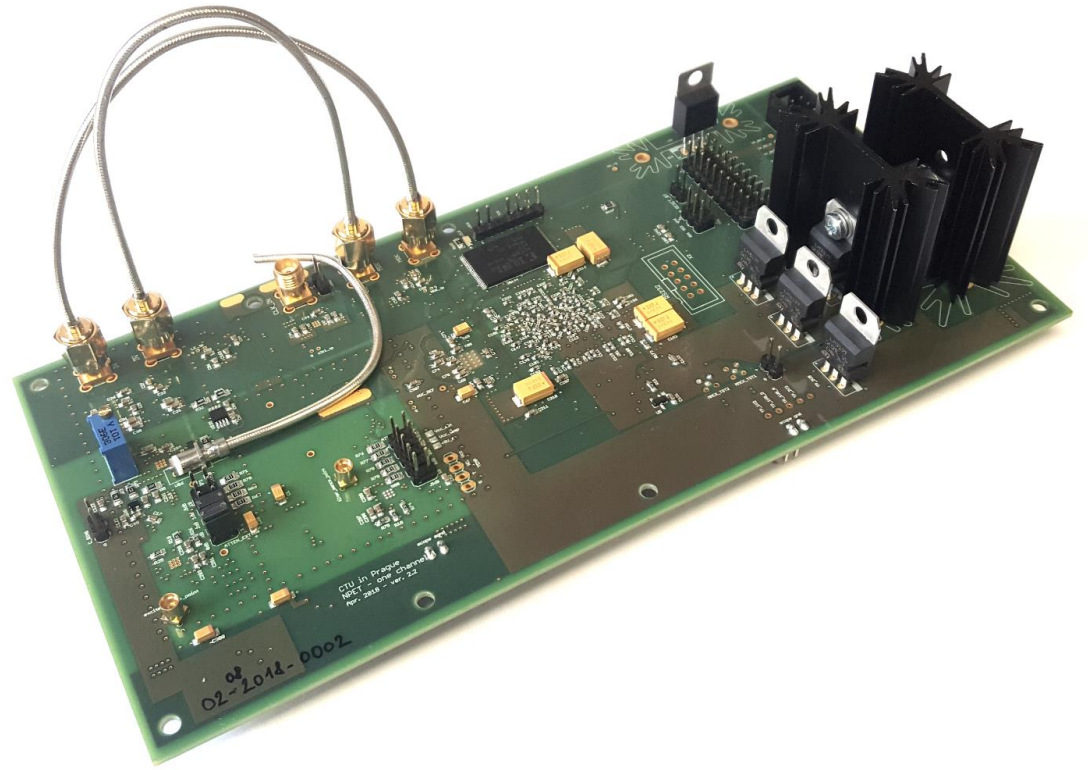
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Overview

- Sub-ps single shot resolution
- Sub-ps timing linearity
- TDEV < 10 fs over a 1000 second averaging period
- Stability



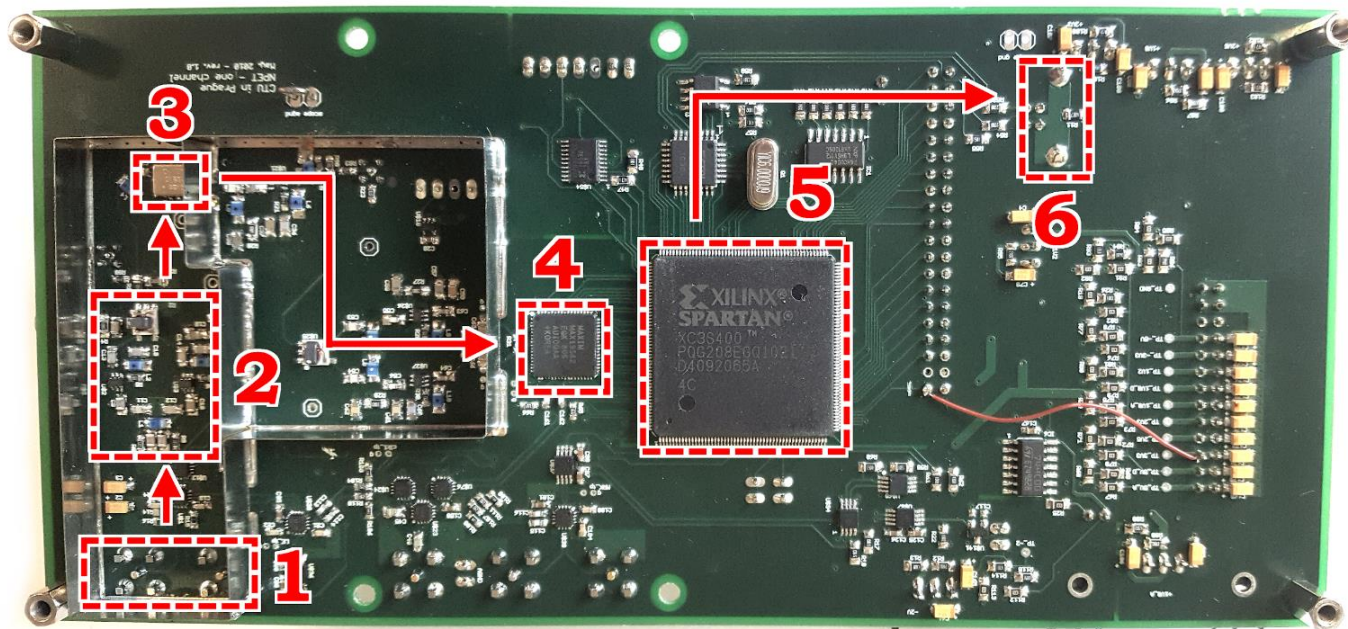
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Operating Principle

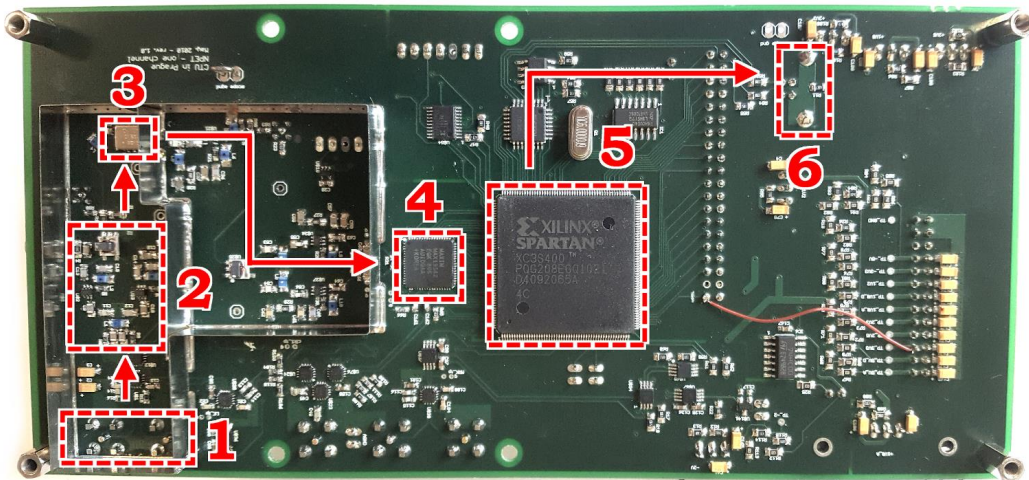
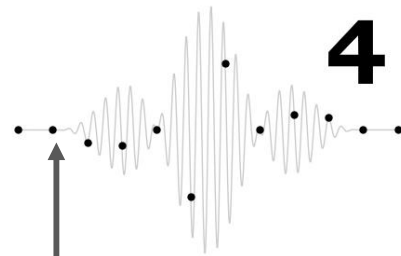
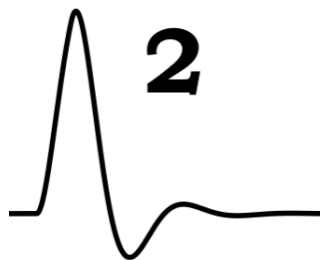
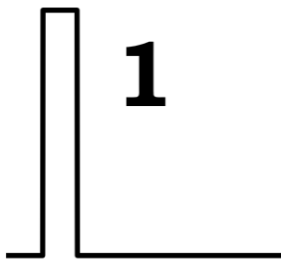


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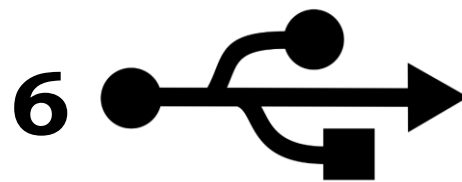
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Applications



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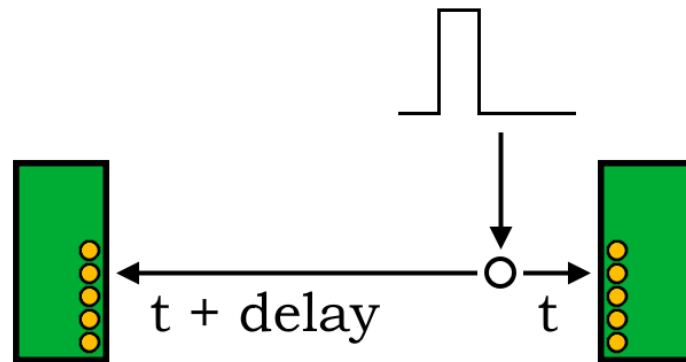
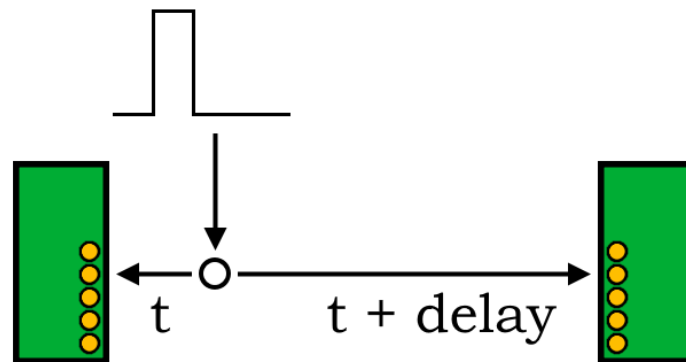
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Current Applications

- General purpose event timing
- Satellite laser ranging
- Station delay calibration for...
 - Laser time transfer
 - One-way ranging
 - Debris tracking
- Two-Way Time Transfer (TWTT)



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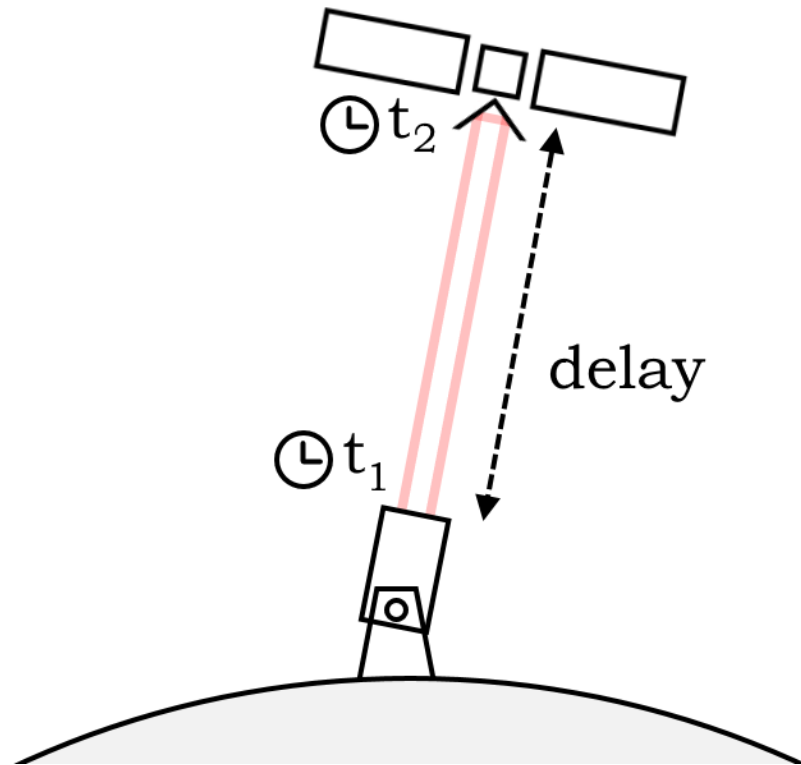
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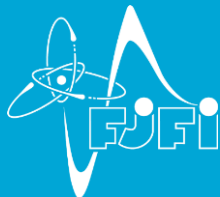
Future Applications

- Laser Time Transfer
- European Laser Timing
 - Atomic Clock Ensemble in Space (ACES)
 - ISS Space Optical Clock (I-SOC)
- GNSS Missions
 - BeiDou Navigation Satellite System (BNS)
- Tiangong-2 Space Station



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Development for Space Qualification



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Space-Grade Components

- Replace all components by space-grade equivalents
- A list has been compiled
- Final product will be radiation tested
- Design and construction still necessary



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New FPGA Firmware - Development

- Converts digitized samples to time interval estimates
- Rewritten to be open, customizable and maintainable
- To be ported to space qualified FPGA



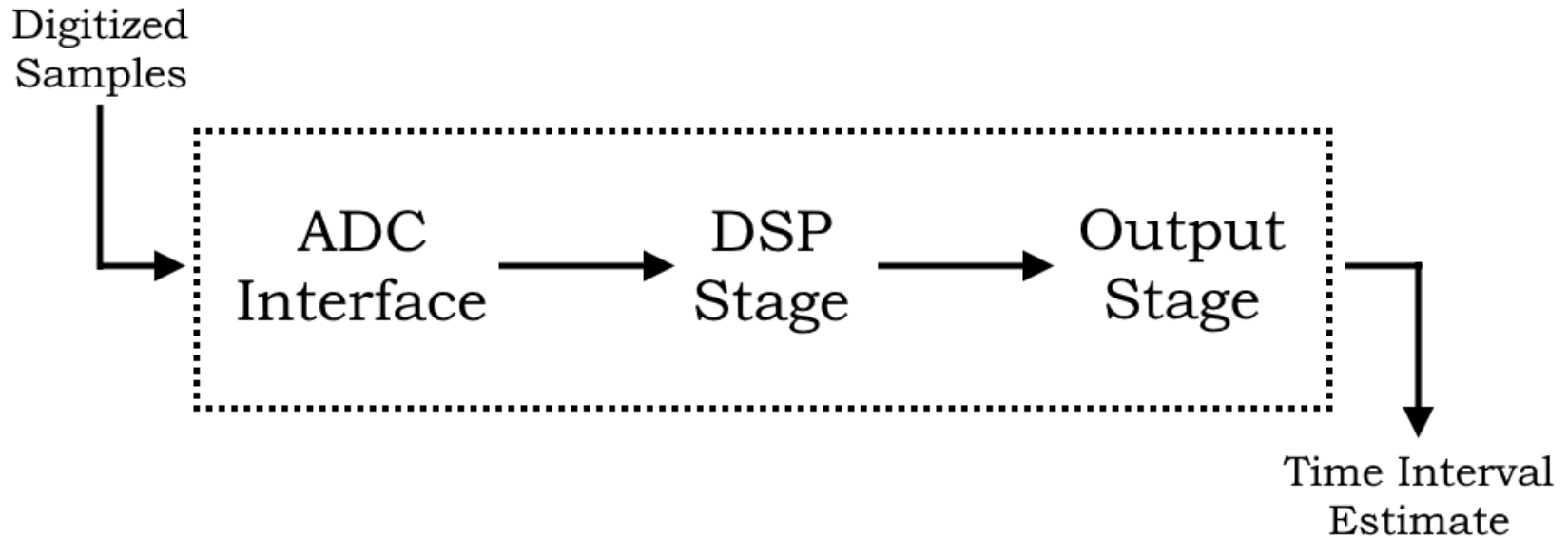
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New FPGA Firmware - Structure



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New FPGA Firmware - Status

- Input and output stages to be completed
- DSP stage \approx 60% complete
- Operating frequency \approx 16 kHz

Summary

- Space-qualified NPET board to be constructed
- Firmware to be completed
- Final product to be tested
- Completed in three years?

Thank You for Listening



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