

Software Integrity Analysis Applied to IRIO EPICS Device Support Based on FPGA Real-Time DAQ Systems

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PROPOSAL

What do we present?

- SW Integrity analysis of a RT-DAQ system based on PXIe Fast Controller architecture
- We have applied methodologies used in the Aerospace Industry
- We use RAM, FMECA, FTA, MISRA-C, Specific Standards

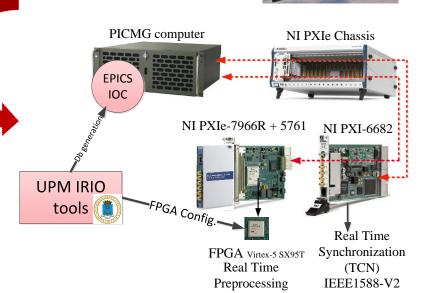
System under analysis

- Industrial computer
- PXIe Chassis
- FlexRIO device
- IEEE 1588 Timing board
- IRIO tools for FlexRIO config. and EPICS IOC app implementation

- Example: IXV SW characteristics
 - Critical SW (DAL-B)
 - Hard Real Time
 - Fault tolerance









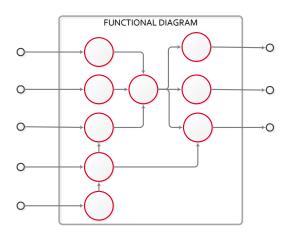


GRUPO DE INVESTIGACIÓN EL INSTRUMENTACIÓN Y ACÚSTICA APLICADA

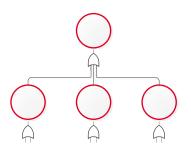


ANALYSIS METHODOLOGY

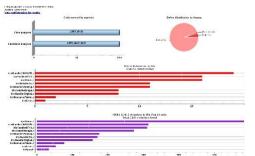
Functional diagram



Fault Tree Analysis



- Failure Mode Effect Criticality Analysis
 - We base the study on the aviation certification standard DO-178C
 - Partitioning is not required (hypervisor)
 - Isolation through different processes has been considered
- Software standards, and good coding practices
 - IEC 12207, IEC 60880, MISRA-C, etc.
- Software Verification (Results)



Unit	Proven	Green	Red	Gray	Orange
Inchandlerimage - Result_Code_Prover_20160206_095124	98.3%	1216	0	11	21
irioDriver - Result_Code_Prover_20160208_095124	98.3%	2614	0	14	46
IntoError - Result_Code_Prover_20160206_095124	95.9%	184	0	1	0
inchandlerDigital - Result_Code_Prover_20160208_095124	95.6%	683	0	11	32
irioHandlerDMA - Result_Code_Prover_20190208_095124	95.5%	1479	0	11	71
irioHandlerAnalog - Result_Code_Prover_20160208_095124	95.0%	839	0	11	45
hioHandlerSG - Result_Code_Prover_20160208_095124	94.1%	960		12	61
inortandlerDt6AGPU - Resulf_Code_Prover_20160208_095124	94.0%	1530	1	11	99
HoResourceFinder - Result Code Prover 20160208 095124		400	0		
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