Mi-V Virtual Summit Conference 2021





Key Takeaways From Porting A Computer Vision Application To The PolarFire SoC Icicle Kit



A Leading Provider of Smart, Connected and Secure Embedded Control Solutions



Presented by Alexander Wirthmueller July 21, 2021

MPSI Technologies

- MPSI Technologies is a start-up based in Munich, Germany
- It was founded in 2016 to promote innovative ways of getting embedded software projects done faster and with better code quality
- Founder's background: electrical engineering and photonics (lots of very specialized hardware)

Timeline:

- 2012-2016: Tasked to put a custom IR detector array to use in robotics research project; development of code generator to the side
- 2016-2018: Project becomes product Whiznium, covering wide range of embedded aspects, from FPGA's to Single Board Computers to Web User Interfaces
- 2018-2020: First revenue by applying Whiznium to customer projects
- 2020-today : Whiznium becomes Open Source project and use of the tool by external parties is encouraged



Whiznium: Leverage FPGA-SoC based hardware

Microchip PolarFire[®] SoC Icicle Kit





- Built around Microchip's PolarFire[®] SoC
 - quad-core 64-bit RISC-V CPU
 - NV-PL fabric with LE's, RAM and DSP's
- 2GB LPDDR4 RAM
- eMMC/SD permanent storage
- PCIe/Ethernet/USB/UART/CAN/SPI/I2C connectivity
- Ready to run Embedded Linux

Software Development with Whiznium





Whiznium onboarding: Tabletop 3D laser scanner



- Turntable driven by stepper motor
- ✓ Tripod-mounted camera + laser holder
- OV5640 five megapixels camera
- Two intensity-modulated red line lasers

NXP [®] i.MX6	Xilinx Zynq®	Microchip PolarFire [®] SoC	Intel Cyclone® V
 Toradex Apalis CoM on Ixora carrier board Quad ARM Cortex-A9 (32-bit) No FPGA 	 Digilent[®] Cora Z7 development board Dual ARM Cortex-A9 (32-bit) SRAM-based FPGA 	 Microchip[®] PolarFire SoC Icicle kit Quad RISC-V (64-bit) Flash-based FPGA 	 Aries Embedded MCV SoM eval. Platform Dual ARM Cortex-A9 (32-bit) SRAM-based FPGA
Swiss. Embedded. Computing.		Міскоснір	Intelligence for Industry



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Microchip PolarFire[®] SoC

- Microchip[®] PolarFire
 SoC Icicle kit
- Quad RISC-V (64-bit)

- Flash-based FPGA

- Intel Cyclone[®] V
- Aries Embedded MCV SoM eval. Platform
- Dual ARM Cortex-A9 (32-bit)
- SRAM-based FPGA





FPGA image processing: Libero[®] SoC workflow



Design Flow Design Hierarchy Stimulus Hierarchy Files Catalog

Steps for Libero SoC:

- Start out from existing (Zynq) VHDL code
- Replace e.g. DSP and memory primitives
- Re-write constraints file

Step for System Builder:

Define MSS to allow for comms across AXI

Conclusion:

- Straightforward port of RTL code
- Intuitive Libero SoC design flow
- MSS configuration greatly helped by tutorial series



Embedded Linux with the Yocto® project



github.com/mpsitech/wzsk-Whiznium-StarterKit

mpsitech / wzsk-Whiznium-StarterKit

Sign up

- Ingredients:
- Instructions from MPSI's GitHub account
- Microchip's Yocto BSP for the Icicle kit
- Custom device driver for PS-PL interconnect
- BitBake as part of the Yocto[®] project
- Cross-platform tabletop 3D laser scanner sources



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		Whiznium StarterKit version 0.1.28 released on 19-8-2020 © MPSI Technologies GmbH contributors: Catherine Johnson		
	_ Galery	libraries: png 1.6.36 and ezdevwskd 1.0 Whiznium StarterKit is computer vision software which powers MPSI's tabletop 3D laser scanner that represents the primary on-boarding vehicle for Whiznium.		
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Thank You

Get in touch: contact@mpsitechnologies.com

