

SERGE CHRISTIAN IBALA

CONTACT INFORMATION

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EDUCATION

University: University of Limerick, Limerick, Ireland
Degree: Ph.D. in Electrical and Computer Engineering **Feb 2014**
Thesis: Exploring FPGA Dynamic Reconfiguration for Sound Source Localization and Tracked Algorithms

RESEARCH WORK

- **CXL/PCIE:** Workload distribution from host to endpoints for AI inference computation on FPGA.
- **AI MODELS (Transformers/CNN/LLM/LMM):** Analyzed AI model architectures for optimized inference deployment on hardware platforms (ASIC/FPGA). Application: Video/Text Correlation
 - Papers Published: “Intel AI guided ultrasound homecare and analysis with digitalized images for cyst detections. SPWC 2021”
 - "Data Extraction and Preparation for AI Inference in a Distributed Computation Load Based FPGA Design” MIXDES 2023 (RTL Coding: Floating Points)
- **DV:** Exploring the Integration of AI with Python based Design Validation flow using PYUVM and Cocotb

PROFESSIONAL EXPERIENCE

Artificial Intelligence Engineer at Alpha Analytic Solution (Dec. 2024 – Present)

- Developing coarse-grained configuration array (CGRA) for acceleration of dense linear algebra applications, such as machine learning, image processing and computer vision for the automotive industry.
- Video and sound processing for entertainment and driving safety.

Hardware Logic Design Engineer, Intel Corporation, Hillsboro, OR (ASIC/FPGA) (Sept. 2020 – Nov 2024)

- **Design/Integration/Validation** of Soft IPs (On-Chip Memory, GIC, USB3.1, SPI, etc.): Conducted design and integration (RTL/Firmware), pre-silicon validation, and performed RTL collateral checks (LINT, CDC, VCS) to ensure quality and functionality. RTL Micro Architecture. **Interface: APB, AHB, AXI (DMA)**
- **Paper Published: From Documentation to Automatic IPs Generation and Validation (AE2024)**

Hardware/Software/Integration Engineer, Intel Corporation, Hillsboro, OR (FPGA) (Sept. 2018 – Sept. 2020)

- **IP Prototyping:** Integrated and validated Audio and Video Systems IPU (Image Processing Unit) for pre-silicon system validation on Tiger Lake Intel Core using HAPS80/FPGA/Virtex Ultrascale XCVU440/Protocompiler.
- CAD tools development and flows research to automatize and accelerate RTL IP implementation and validation.
- **Papers Published:**
 - **Reducing FPGA prototyping and Debug time to speed up time to market (DTTC 2019)**
 - **Improving validation flow to reduce the cost of late bugs discovery (TECHNOVATE 2022)**

Research and Development Engineer, RDPHYS, Ashtabula, OH (Oct. 2014 – Aug. 2018)

- Worked on a low-cost, web-based, real-time tracking application to track vehicles and merchandise concurrently.
 - A web-based interface is used to display tracking data (Position, Route, Speed, Time etc..).
 - The data were collected via a cellular network and GPS using a ARM processor.

Research Fellow, University of Limerick, Ireland and Mons Belgium (Jan. 2010 – Sept. 2014)

- Our research interests were in object tracking using wideband signals analysis, classification tasks and distributed computing in embedded multi-agent systems.

- Main area of work is on voice recognition algorithms to locate a particular speaker in a restricted area with multiple other speakers.

Product Application Engineer, Xilinx Europe (FPGA)

(Jan. 2003 – Sept. 2009)

- Main expertise hardware validation and synthesis (Netlist, Timing issue, Design Floorplanning)
- Support of Partial Reconfiguration and Multibooting flow (Using ISE/Vivado)

PUBLICATIONS

- **Artificial Intelligent (AI) Papers:**
 - S. C. Ibala, J. G. de la Mora, A. Muralidharan and C. Y. Tan Lee, "**Data Extraction and Preparation for AI Inference in a Distributed Computation Load Based FPGA Design,**" *2023 30th International Conference on Mixed Design of Integrated Circuits and System (MIXDES)*, Kraków, Poland, **2023**, pp. 100-104, doi: 10.23919/MIXDES58562.2023.10203270
 - Satoshi Suzuki, Serge Ibala and al. "**Intel AI guided ultrasound homecare and analysis with digitalized images for cyst detections.**" *SPWC 2021*
- **CAD Tools/Flow (Partial Reconfiguration) Papers:**
 - Ibala, Serge Christian, and Chee Yoong Tan Lee. "**From Documentation to Automatic IPs Generation and Validation.**" *2024 International Conference on Applied Electronics (AE)*. IEEE, **2024**.
 - Serge C Ibala, Tan Lee Chee Yoong "**Improving validation flow to reduce cost of late bugs discovery**" "*Technovate 2022* Penang Malaysia Nov 15-17
 - S. C. Ibala, D. R. Valdes, J. M. Eugenio "**Reducing FPGA prototyping and Debug time to speed up time to market,**" In *Proceedings of Design and Test Technology Conference (DTTC)*, Portland, Oregon, May **2019**.
- **DSP (Digital Signal Processing) Papers:**
 - S. C. Ibala, S. Astapov, F. Bettens, C. Valderama, "**Combining Multiple Sound Source Localization Hybrid Algorithm and Fuzzy Rule Based Classification for Real-time Speaker Tracking Application,**" *In Proceedings of International of Mathematics and Computer Science*, Vol. 4, No. 1, pp. 12-25, 2013.
 - F. Escobar, X. Chang, S. C. Ibala, "**Fast accurate Hybrid Algorithm for Sound Source Localization in Real-Time,**" *In Proceedings of International Journal of Sensor and Related Networks*, Vol. 1, Issue 1, Feb. 2013
 - S. C. Ibala, F. Escobar, X. Chang, C. Valderama, "**Hybrid Algorithm Computation Methodology to Accelerate Sound Source Localization,**" *In Proceedings of International Journal of Microelectronics and Computer Science*, Vol. 3, No. 3, 2012 pp. 99-110. ISBN. 2080-8755
 - S. C. Ibala, J. Vachaudéz, C. Valderrama, "**Novel interface drivers to combine real-time localization and tracking algorithms,**" *In Proceedings of Applied Electronics*, Czech Republic, Sept. 2012
 - S. C. Ibala, J. Vachaudéz. C. Valderrama, "**Combining Sound Source Tracking Algorithms Based on Microphone Array to Improve Real-Time Localization,**" *In Proceedings of MIXDES*, LODZ Poland pp. 24-29, May 2012.

TOOLS

- **AI Frameworks:** Reviewing TensorFlow, PyTorch, Keras and Hugging Face, LMM, MLLM, LLM
- **Hardware Tools:** AMD/Xilinx Chipscope, Vivado, Intel/Altera Signal TAP, Quartus, SystemVerilog, C/C++, Matlab, Simulink, LabView (FPGA), Modelsim, VCS, Spyglass, Python (FPGA, ASIC)
- **Software Tools:** Skilled in PYUVM (UVM RTL Validation) JavaScript, HTML, CSS, NodeJS, SQL

LANGUAGE SKILLS

- Fluent in English, French and Lingala.

RESEARCH INTERESTS

- Computer Vision and Pattern Recognition Statistics, Machine Learning, Algorithm optimization, Cyber Security, Database, Human Computer Interaction, Internet of Things, Games, Robotics