

NEWSLETTER

Project meetings

Almost 3 years after the WiPLASH project kick-off meeting, a face-to-face plenary session was finally possible at IBM's research facility in Zurich, Switzerland.

[04.05.2022] Sixth plenary meeting.

The team was thrilled to get back to normal. Bilateral discussions were lively and enthusiastic.

The meeting included a reminder of the objectives, a short summary of the status of the project and a heads up for next months.

The initial goals of the project remain with a few additions: Show radiation coming off the graphene antenna and contribute all together to the design space exploration framework.



Meet the WiPLASH's Partners



Dr Giovanni Ansaloni and PhD student Joshua Klein from the Embedded System Laboratory at École Polytechnique Fédérale de Lausanne (EPFL) explain their role within the WiPLASH project.

EPFL leads the WP 5 on **Multi-Scale Simulation**.

Their job is to find solutions at the system level that exploit wireless links to offer high performance and energy efficiency.

WP 5 uses the outputs and characterizations done by the other WP as inputs for the modeling the hardware. [Link](#)



Dr Sergi Abadal, Dr Akshay Jain, Prof Eduard Alarcón and Prof Albert Cabellos from NaNoNetworking Center in Catalunya (N3Cat) at Universitat Politècnica de Catalunya (UPC) refer to their work within WiPLASH.

UPC coordinates the project and leads the WP 3 on **Wireless Communications within Package**.

WP3 performs channel characterizations at the mmWave-THz frequency within the computer chip to develop communication protocols that fulfill the requirement of this particular scenario and that dynamically adapts to the architecture. [Link](#)



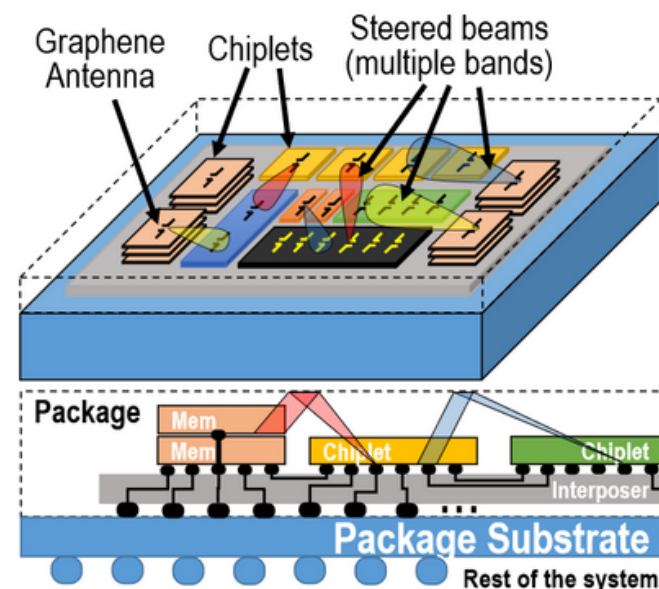


Selected Publications

Journals

- G. Ottavi et al., "Dustin: A 16-Cores Parallel Ultra-Low-Power Cluster with 2b-to-32b Fully Flexible Bit-Precision and Vector Lockstep Execution Mode," , 2022
- A. Garofalo et al., "A Heterogeneous In-Memory Computing Cluster for Flexible End-to-End Inference of Real-World Deep Neural Networks," IEEE Journal on Emerging and Selected Topics in Circuits and Systems, 2022
- A. Garofalo et al., "Darkside: A Heterogeneous RISC-V Compute Cluster for Extreme-Edge On-Chip DNN Inference and Training," IEEE Open Journal of the Solid-State Circuits Society, 2022
- **S. Abadal et al., "Graphene-based Wireless Agile Interconnects for Massive Heterogeneous Multi-chip Processors," IEEE Wireless Communications Magazine, 2022**
- T. Knobloch et al. "Improving stability in two-dimensional transistors with amorphous gate oxides by Fermi-level tuning," Nature Electronics, 2022

The paper by **Abadal et al.** propose the use of graphene antennas with reconfigurability properties in the THz band to enable an heterogeneous architecture. This paper gathers the work of 20+ researchers part of WiPLASH and it perfectly sums the vision of the project. It has been accepted for publication in one of the top journals of the field: IEEE Wireless Communications Magazine.



Journals

- D. Rossi et al., "Vega: A Ten-Core SoC for IoT Endnodes With DNN Acceleration and Cognitive Wake-Up From MRAM-Based State-Retentive Sleep Mode," IEEE Journal of Solid-State Circuits, 2021
- H. Okuhara et al., "A Fully Integrated 5-mW, 0.8-Gbps Energy-Efficient Chip-to-Chip Data Link for Ultralow-Power IoT End-Nodes in 65-nm CMOS," IEEE Transactions on Very Large Scale Integration (VLSI) Systems, 2021
- F. Montagna et al., "A Low-Power Transprecision Floating-Point Cluster for Efficient Near-Sensor Data Analytics," IEEE Transactions on Parallel and Distributed Systems, 2021
- M. Imani et al. "Metasurface-Programmable Wireless Network-on-Chip," Advanced Science, 2021
- A. Ganguly et al. "Interconnects for DNA, Quantum, In-Memory and Optical Computing: Insights from a Panel Discussion," IEEE Micro, 2022
- F. Ponzina et al. "E2CNN: Ensembles of Convolutional Neural Networks to Improve Robustness Against Memory Errors in Edge-Computing Devices," IEEE Transactions on Computers, 2021

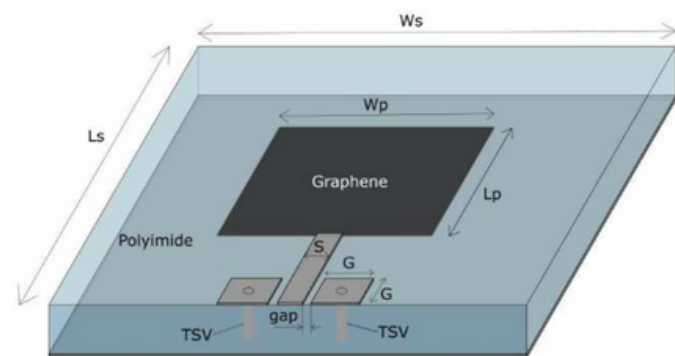
The WiPLASH project was present at the 12th Graphene Conference in Aachen. AMO GmbH was part of the organization committee for the conference. Prof. Max Lemme was the chairman on the 2D materials session and Dr Zhenxing Wang was an invited speaker in the industrial Forum. Dr Wang lectured on 2D/3D Heterostructure Diodes for High Performance Electronics and Optoelectronics.



Conferences

- R. Medina et al., “System-Level Exploration of In-Package Wireless Communication for Multi-Chiplet Platforms,” in Proc. ASP-DAC 2023, Tokyo, Japan, January 2023.
- F. Rodríguez-Galán et al., “Towards Spatial Multiplexing in Wireless Networks within Computing Packages,” in Proc. ACM NANOCOM’22, Barcelona, Spain, October 2022
- **E. Pereira de Santana, et al., “Integrated Graphene Patch Antenna For Communications At THz Frequencies,” in Proc. IRMMW–THz, Delft, The Netherlands, September 2022.**
- R. Guirado et al., “Wireless On-Chip Communications for Scalable In-memory Hyperdimensional Computing,” in Pro. IJCNN/WCCI 2022, Padova, Italy, July 2022.
- N. Bruschi et al., “Scale up your In-Memory Accelerator: Leveraging Wireless-on-Chip Communication for AIMC-based CNN Inference,” in Proc. AICAS 2022, Incheon, Korea, June 2022

E. Pereira de Santana et al. presents at the IRMMW–THz in the Netherlands. This work explores graphene-based antennas at THz frequencies for faster and more efficient devices. In this paper a graphene patch antenna design that can be integrated into transceivers is presented.



Invited Talks

- D. Rossi, "PULP: Energy-Efficient ML at the Extreme Edge of the IoT," SSIE Summer School, Brixen, Italy, July 2022..
- D. Rossi, "PULP: Embedding AI at the Extreme Edge of the IoT," CIS Edge AI Summer School, EPFL, Lausanne, Switzerland, June 2022..
- D. Rossi et al., "Open Source On-Chip Communication from Edge to Cloud: the PULP experience," Special Session on NOCS, Virtual Event, October 2021.
- L.Benini and D. Rossi, "Working with RISC-V: from open ISA to open Architecture to open Hardware," HiPEAC ACACES Summer School, Fiuggi, Italy, September 2021.

WiPLASH was very well represented at the DEI – IEEE Italy Section PhD. Davide Rossi from Unibo lectured on Energy-Efficient at the extreme edge of the IoT. For advanced topics in ML, Giovanni Ansaloni from EPFL lectured on A Swiss knife, not a silver bullet to unlock pervasive AI.



WiPLASH's Collaborations

Oct 2021–Sept 2022

As part of our efforts to raise awareness of the gender gap in ICT, WiPLASH project was thrilled to contribute in the podcast series organized by the **Spear project**. In the episode of Daughters of Marie, four female partners of the WiPLASH project discussed challenges and barriers that girls face when they aspire to pursue STEM careers. They also shared their personal experiences in the matter.



The WiPLASH project was proud to support the **Women in Data Science** event held in Barcelona in April 2022. This initiative aimed to educate, inspire and support all scientists, regardless of gender.





WiPLASH

Third Year



EQUAL4EUROPE
GENDER EQUALITY PLANS



The project engaged in collaborations with multiple gender EU projects to raise awareness of gender inequality issues and create Gender Equality Plans in European institutions.



LeTSGEPs



SPEAR

WiPLASH's Consortium



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 863337.

