



**PROGRESSUS: Highly efficient and trustworthy electronics, components and systems for the next generation energy supply infrastructure**

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# Newsletter August 2022

## Issue Number 3

PROGRESSUS is a European Union project funded under the **H2020-ECSEL-2019-2-RIA** work programme, launched on April 2020. During the last 12 months, significant progress has been made by all partners in order to fulfill the PROGRESSUS objectives. Specifically:

1. for the **development of efficient and intelligent high power converters for EV charging applications**, PROGRESSUS has focused on a multi-stage solution of DC/DC converter where a preliminary prototype of BBLLC rated at 5kW, analysed the performance of a charger module based on GaN that achieve significant power-loss reduction, on the design of an EV charger, where the development stage has started, as well as on a protective interface, where a prototype of a 30-kVA dynamic voltage restorer has been developed.
2. for the **provision of bidirectional and modular EV charging solutions connected to facility grids**, PROGRESSUS has focused on a bidirectional power converter which is at the development phase, on the design and evaluation of the targeted battery system, where an early prototype is already developed, and on a modular 7kW AC/DC power converter, which have been already evaluated through extensive simulations.
3. for the improvement of a **DC microgrid management for**

**efficient energy and service provision**, PROGRESSUS has developed a coordinated day-ahead and intra-day approach for the scheduling of the resources in a local energy community, which is now improved in terms of scalability.

4. for the **promotion of cooperation in self-organised grids**, PROGRESSUS works on the development of a Reinforcement Learning approach for the real-time energy management of a smart home, which will be extended for microgrid applications, as well as of a Federated RL approach for energy control, for intelligent energy management of self-organized grids.

5. for the **mass-introduction of charging stations**, progress has been achieved on the development of smart-charging algorithms, that have been deployed on a small scale and tested in field experiments. In parallel, the development of a grid topology estimator and optimization algorithm have been completed and tested software-wise, in order to showcase their ability to reconstruct or determine the topology and state of unknown power grids.

6. for the **enhancement of sensing technologies and methodologies**, significant progress has been achieved through the implementation of a Hall sensor with a bandwidth of at least 10 MHz, which is 10 times better than the state-of-the-art Hall sensors, through the

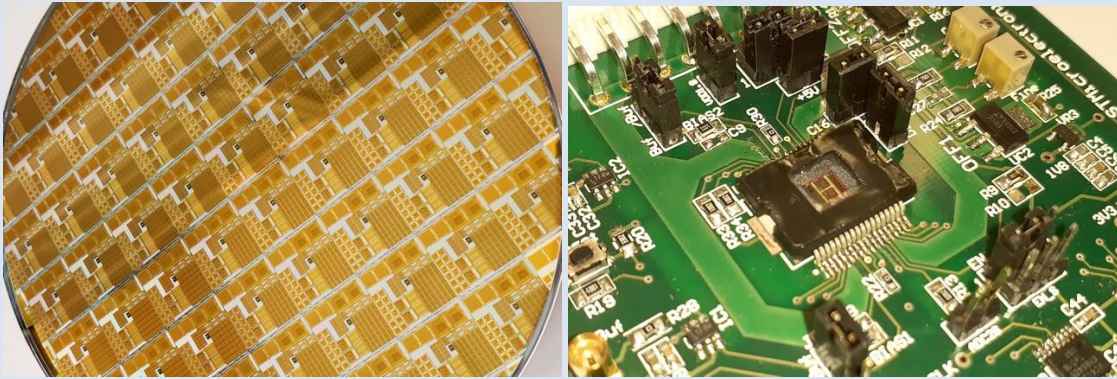
enhancement of a TMR sensor, that will be integrated with power switches targeting a cost reduction by a factor of 100, through the design of a CS-based data processing that is expected to decrease the power/bandwidth merit by a factor of 10, with respect to the actual state-of-the art in CS-based converters, and through the design of an AC/DC converter for sensing applications targeting to improve conversion efficiency by at least 20% compared to the state of the art solutions.

7. for the **incorporation of security modules for self-organised grids**, PROGRESSUS introduces the first concept for secure logging with blockchain technology and blockchain applications featuring hardware security, implements the Security2GO blockchain application kit, and incorporates the Security controller OPTIGA Trust M™ into the monitoring solution.

8. for the **development of platforms for accelerated scheduling and predictive monitoring**, PROGRESSUS focuses on the development of a hardware accelerated task scheduling and of a predictive maintenance- monitoring platform, which has been enhanced with time-series database and notifications, while security technologies integrated into the platform and the necessary APIs have been implemented.

## PROGRESSUS Dissemination Activities

PROGRESSUS' partners University of Bologna and STMicroelectronics have issued a Press Release regarding their joint work on "[A new microelectronic sensor for intelligent energy-consumption monitoring](#)"!



PROGRESSUS was present at top-level International conferences!



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**Twitter**  
[@progressus20](https://twitter.com/progressus20)

**LinkedIn**  
<https://www.linkedin.com/in/progressus-project/>

## Latest Publications

### Journals

1. L. Anoldo et al., "Study of the Thermomechanical Strain Induced by Current Pulses in SiC-Based Power MOSFET," **IEEE Electron Device Letters**, vol. 42, no. 7, pp. 1089-1092, July 2021.
2. G. Iannaccone, C. Sbrana, I. Morelli and S. Strangio, "Power Electronics Based on Wide-Bandgap Semiconductors: Opportunities and Challenges," **IEEE Access**, vol. 9, pp. 139446-139456, October 2021.

### Conferences

1. N. Zanatta, T. Caldognetto, G. Spiazzi and P. Mattavelli, "A Two-Stage Isolated Resonant DC-DC Converter for Wide Voltage Range Operation," **in Proc. IEEE ICPE / I&CPS Europe**, 2021.
2. P. Montegiglio, G. Acciani, M. Dicorato, G. Forte and F. Marasciuolo, "A Decentralized Power Regulation Approach for DC Microgrids," **in Proc. IEEE ICPE / I&CPS Europe**, 2021.
3. D. Arbet, M. Potočný, M. Kováč, L. Nagy and V. Stopjaková, "Fully On-Chip Low-Drop Regulator for Low-Power Applications," **in Proc. MIPRO**, 27 Sept. 1 Oct. 2021.
4. L. Ceccarelli, X. Xu, G. Tibola and J. L. Duarte, "Design and Analysis of a High-Efficiency All-SiC Dynamic Voltage Restorer for Wide-Range Sag/Swell Mitigation," **in Proc. IEEE ECCE**, 10-14 Oct. 2021.
5. C. Paolino, F. Pareschi, M. Mangia, R. Rovatti and G. Setti, "An architecture for ultra-low-voltage ultra-low-power compressed sensing-based acquisition systems," **in Proc. IEEE NorCAS**, 26-27 Oct. 2021.
6. F. Rezazadeh, H. Chergui, L. Blanco, L. Alonso and C. Verikoukis, "A Collaborative Statistical Actor-Critic Learning Approach for 6G Network Slicing Control," **in Proc. IEEE GLOBECOM**, 7-11 Dec. 2021.
7. N. Zanatta, T. Caldognetto, G. Spiazzi and P. Mattavelli, "Analysis and Performance Evaluation of a Two-Stage Resonant Converter for Wide Voltage Range Operation," **in Proc. IEEE APEC**, 20-24 Mar. 2022.
8. G. Malta et al., "High speed thermal mapping on six-pack SiC-based module for hybrid and electric vehicles," **in Proc. EuroSimE**, 25-27 Apr. 2022.
9. C. Hotz, S. Baum, E. Waffenschmidt and I. Stadler, "Estimating topologies of low voltage grids from electric vehicle charging point measurement data," **in Proc. CIREN Porto Workshop 2022: E-mobility and power distribution systems**, 2-3 Jun. 2022.
10. F. Marasciuolo, M. Dicorato, G. Forte and P. Montegiglio, "Effect of V2G Technology Integration on MV Distribution Grids," **in Proc. IEEE MELECON**, 14-16 June 2022.
11. F. Marasciuolo, M. Dicorato, G. Forte and P. Montegiglio, "The influence of electric vehicle position on technical operation of a distribution grid," **in Proc. IEEE ICPE / I&CPS Europe**, 28 Jun-01 Jul. 2022.

## PROGRESSUS on the web!

PROGRESSUS is present in:



So please check out our project website and follow us on our social media accounts to keep up to date with the project progress!