Qualified fabrication and machine learning enabled assessment of next generation high power RF front ends

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ABSTRACT

High-power wireless communication systems, such as Radars and SATCOMs, have an enormous impact on our life quality by supporting safe and effective transportation and long-distance communications. This is practically enabled only thanks to electronic components capable to deal with the corresponding Radio-Frequency (RF) signals. Since its foundation in 1985, the Microelectronics Research Group (MRG) has a continuous involvement and accumulated expertise in the field of microwave technology that through the years has matured into a technological platform of high TRL. Currently, the group is running two relevant projects, SMARTEC and PRIME, having diverse but complementary targets.

SMARTEC is a visionary project (funded by an H2020 Fast Track to the Innovation call-GA No. 869817), coordinated by THALES SA (France) a word leading company in the field of RF systems, that aims to establish an ISO 9001:2015 qualified pilot line capable to produce next generation RF transceivers (TRX), in Crete. The major project milestone is to upgrade an innovative nanoelectronic technology, based on the coplanar monolithic integration of GaN MMICs (Monolithic Microwave Integrated Circuit) with RF MEMS (Micro-Electro-Mechanical-System), from a prototype (TRL 6) to a complete and fully qualified system (TRL 8). This will be realized with the valuable collaboration of three more partners, from Belgium (TAIPRO), Italy (RF MICROTECH) and Spain (CIDETE).

PRIME on the contrary is a Marie Skłodowska-Curie Individual Fellowship project (H2020-MSCA-IF-EF-ST- GA No. 101032925) that aspires to enable predictive diagnostics concerning the reliability aspects of RF MEMS instigated during their high-power operation. To achieve this, the project will introduce methodologies that combine properly selected reliability testing with the strength of machine learning techniques. The aim is to enable failure predictions. This effort will be further reinforced by two secondment placements, one focusing on RF design (RF Microtech, Italy) and a second one putting emphasis on machine learning techniques (Imperial College London, UK). Overall PRIME envisions to present a smart reliability approach that will directly benefit the development of next generation reconfigurable power RF transceivers.

The two projects are mutually beneficial to each other whilst the team is continuously placing further efforts towards this direction by applying for additional follow up funding to support the sustainability of this activity beyond the end of these two projects. For the same reasons, dedicated personnel are focusing on leveraging intellectual property outcomes with the aim to induce additional value beyond the research ecosystem. Overall, we aspire the outcomes of these attempts to inaugurate the pilot nanoelectronic industrial production in Greece, acting as a seed for creating new employment opportunities through strategic collaborations with fabless SMEs, as well as for the attraction of future funds, supporting the local and national economy, society, and the attempts for brain-gain.

REFERENCES

[1] https://project-smartec.com/

[2] https://www.iesl.forth.gr/en/project/prime#tab-general