**Submitted Paper:** Multi-core synthesis and maximum satisfiability for optimal sizing of solar photovoltaic systems

**Authors:** Edilson Galvão, Alessandro Trindade, and Lucas Cordeiro

**Targeted Journal:** IEEE Systems Journal

**Original Paper:** Synthesis of Solar Photovoltaic Systems: Optimal Sizing Comparison

**Authors:** Alessandro Trindade and Lucas Cordeiro

Issued as a chapter of the 12th Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE), <https://doi.org/10.1007/978-3-030-63618-0_6>. Online on December 06, 2020.

**Summary of Changes**

The submitted paper is a substantially extended version of the above-mentioned original manuscript. Moreover, both papers resulted from Trindade's PhD research defended in January 2020, which had Professor Cordeiro as primary supervisor.

Our original manuscript presented superior outcomes; it was promising since the beginning of the experimental stage in 2019. In particular, the qualitative aspect of the results was outstanding. However, we faced performance issues on comparative results because, depending on the case study, even ten hours were necessary to deliver the optimal sizing.

The subject of this newly revised paper is the same, i.e., optimizing solar photovoltaic systems using model checking. We kept the same seven case studies, the comparative with a commercial simulation tool (HOMER Pro), and the outcome validation with PVSyst. However, we focused on performance improvement without loose the qualitative aspect of the results. We introduced a new solver tool (vZ) based on maximum satisfiability and a new algorithm specifically to deal with multi-core synthesis to achieve that goal. We decided to use a new hardware configuration for all verification engines to keep a fair comparison. The database used to search for the optimal solution was updated from 40 to 70 commercial equipment, thereby increasing the problem's complexity.

Note that we revised the abstract and introduction sections, which are entirely new. The theoretical foundation for PV systems and how to size a stand-alone solar PV system is the same as the original paper. However, the explanation for the multi-core synthesis and the related algorithm is all-new; our analysis of the experimental results is new due to the new nature of the employed algorithms. The threats to validity and conclusions are also new.

Lastly, the Boolean expressions passed to the solver () were revised considering the new maximum satisfiability algorithm. In summary, we can state that more than 50% of the submitted paper is new material; the result is a good quality paper.

We expect that our manuscript can be evaluated in this respectful journal with this contextualization.

The authors.