TRANSNATIONAL ACCESS
USER PROJECT FACT SHEET

USER PROJECT	
Acronym	H2AI
Title	a study of Hybrid reconfigurable inverter algoritHms associated with Artificial Intelligence for water pumping using modular power converters
ERIGrid Reference	**06.009-2019**
TA Call No.	**06**

HOST RESEARCH INFRASTRUCTURE			
Name	**D-NAP laboratory at University of Strathclyde**		
Country	**United Kingdom**		
Start date	**13/02/2020**	**Nº of Access days**	**10 (physical + remote)**
End date	**21/02/2020**	**Nº of Stay days**	**9**

USER GROUP			
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Country (Leader)		**France**	
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1.USER PROJECT SUMMARY (objectives, set-up, methodology, approach, motivation)

Over a billion people lack access to electricity and clean water, effectively locking them below the poverty line. The TA User group works together in research and development of a low-cost, multi-function and reprogrammable power electronics power converter, through the OwnTech Project. In this TA project, the group has studied how to use the OwnTech generic power kernel in water pumping.

Figure 1 - TA User Group and Host

The OwnTech power kernel is composed of a generic power converter and its reprogrammable controller which, together can be adapted to different power conversion function.

The objective of this work was to use the OwnTech power kernel to drive asynchronous and synchronous machines and to estimate their parameters use by associating the data from the power kernel embedded sensors to machine learning tools.

This access was divided into two parts. The first part was a physical access at the D-NAP laboratory of the University of Strathclyde which allowed the user group to test the power converter, its control algorithms and the possibility of gathering data through them. The second part, which will take place sometime in the Summer/Autumn 2020 will focus on using the Real-Time Simulator to test machine learning techniques and their association with the control algorithms.

2.MAIN ACHIEVEMENTS (results, conclusions, lessons learned)

The TA User group has managed to create 3 different control algorithms (V/f, 6-pulse and vector control), which were successfully tested in open-loop.

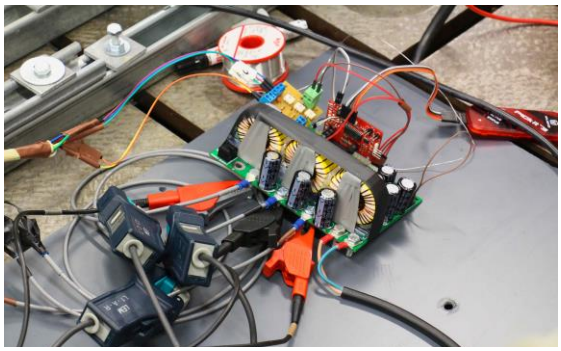

Figure 2 - Test setup for the Synchronous Machine Test.

Both the synchronous and the Asynchronous machine have spun, validating the concept of the generic power converter architecture and the control modularity.

The most important lesson learned in this project was the robustness of the power converter and the complexity of gathering useful data.

Several hardware and software issues were raised and are currently being addressed by the research group. The most important one was related to the sensor measurement chain. These issues have been solved and data acquisition will be operational before the virtual access.

3. PLANNED DISSEMINATION OF RESULTS (journals, conferences, others)

All the information will be made available through open-source licenses to the users of this project and the scientific community. A git repository at LAAS-CNRS currently holds all the algorithms developed during the project along with all the schematics, the routing, and the BOM files of the modular power electronics converter used in this work (https://redmine.laas.fr/projects/owntech). Any issues emerging from the project will be documented on the git repository wiki.

Future research will be published in open-access in relevant journals an conferences.