# Engineers Showcase Skills in Solar Hackathon

*Exciting ideas emerge in a new competition to boost solar power*

**WINNERS AND ORGANISERS**
SPEAK TO CHRIS TAYLOR

**AUSTRALIA'S Commonwealth Scientific and Industrial Research Organisation (CSIRO) held its first *Solar Hackathon* event where engineers and programmers showcased their skills, competing for A$10,000 (US$7,300) in prizes and the potential to commercialise their ideas.**

The event was held over 8–9 April, where 16 teams competed in a solar hacking challenge at the CSIRO Energy Centre, Newcastle. Based on the hacking theme, the event gave teams the opportunity to 'break in' to solar energy technologies to create software innovations, over a 12-hour period.

The evening event on Friday allowed participants to meet and form the teams. The rules around team formation were flexible, and it allowed participants with existing relationships to work together, and allowed for new relationships to be forged with hackers of various skills and academic backgrounds.

### SOLAR ENERGY – THE SIX MAJOR CHALLENGES

- avoid electricity system overloading and identify a low-cost solution to accurately predict energy use and to manage demand – taking into consideration energy, weather and demographics
- create accurate solar system energy estimations which fully quantify the monetary value to the end user for a potential photovoltaic (PV) system
- identify low-cost cleaning solutions for large quantities of tightly-packed PV systems or heliostats (computer-controlled mirrors that keep the sun reflected on panels)
- create an application or tool that can be attached to the heliostat mirrors to measure and track movement, better assess performance, and improve energy yield
- create a marketing campaign to increase public awareness of the benefits of solar energy
- explore methods to cool solar panels for better energy output

### THE CHALLENGE

The challenge was to design software that offered a solution to one or more of the six major problems in solar energy systems (*see box*).

The teams had to present submissions in the form of a technical solution, a built mobile app, or a PowerPoint presentation.

The challenges were judged by a panel of five industry experts on the criteria of: how well the solution addresses the parameters of the challenge; how creative and innovative the solution is; how well the solution was executed; what impact the solution would have on the solar industry; and the user friendliness of the design interface and aesthetic graphics.

Glenn Platt, energy research director at CSIRO, said: "The challenges were diverse to encourage a range of participants and skill sets. This included developers, coders, researchers, engineers, marketers, business development, and finance. Participants were encouraged to be creative with their ideas to produce something impactful and meaningful."

First place claimed A$4,000 and acclaim from Australia's leading renewable research institute. The rest of the fund was split between second and third place, with A$3,000 and A$2,000 respectively, with the remaining A$1,000 awarded to the people's choice.

### TAKE CHARGE

First place was awarded to team *Take Charge*, for designing a comparison and ranking system for residential solar systems currently used by the Australian public.

The algorithms rank and compare households' energy consumption and generation behaviours. The system rates households of similar behaviours against each other as a means to monitor and improve their behaviour over a set time period. Tariff structures and historic versus live data could be measured to provide instant feedback on energy behaviour changes.

Data are collated into an interactive platform where the feedback is displayed in user-friendly info graphics that chart the return on solar investment in 24 hours instead of consumers

having to chart energy use from incremental power bills.

The team consisted of Joseph Harris, an electrical engineering post-graduate at the University of New South Wales (UNSW), Daniel Tam and Darcy Small, both PV engineering post-graduates at UNSW.

Harris said the combination of theoretical PV knowledge, technical coding and design skills, and presenting experience helped the team win the competition. The team also said previous experience of internships at Australian clean tech company Solar Analytics allowed them to gain knowledge of the solar industry and the ability to solve real-world solar problems.

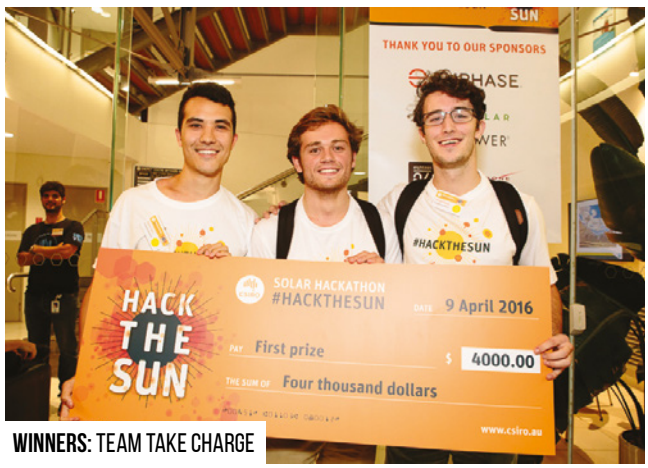
Harris said, "Each of us offered something unique to the team and we all contributed everything we had. I was extremely proud of how we had communicated the work we had done and the pitch went well. We did not expect a prize, we were just happy to have had the experience.

"When they announced us as the winners we were absolutely ecstatic and we just stood there, mouths agape in jubilant shock, until one of us said we had better get up there to accept the prize!"

Platt said the team's solution lends itself to making a positive impact on the Australian public's solar usage habits. It can allow people to look at how they use energy and how individual behaviour can influence energy efficiency, and how it compares with others for monetary rewards.

"The tool is also educational and profiles the impacts of solar energy use in a fun, relevant and engaging way," he added.

Harris said the team is now reviewing its design and discussing possible commercial opportunities. CSIRO says it will help all teams to progress their ideas further, in the form of advice and support.




**WINNERS:** TEAM TAKE CHARGE

## WALA (THE SUN GODDESS)

In a close competition, second place was claimed by *Team Wala*, named after the aboriginal goddess of the sun. The team included a chemical engineer, a software developer, a manufacturing engineer, and a chemist.

The team designed a cheap, self-powered, solar monitoring device that could be mounted non-intrusively onto any vehicle to provide a more geographically-dispersed measurement of solar radiation than is currently possible with stationary monitoring stations and satellites. This could help companies better evaluate sites for solar energy collection – and at a fraction of the cost of existing equipment. The plan for the device would use super magnets to stick the 3D-printed housing to the roof of the vehicle, and would also contain sensors to measure temperature and humidity, plus filtered photo diodes to monitor solar radiation in different wavelengths.

The team opted for an on-board Wi-Fi shield that would download the device data when it enters a hotspot. The team said they priced the required components to be A$68, with the aim to collect comparable data to the A$120,000 precision-monitoring stations currently in use. The plan they outlined would install the devices on taxis, buses, trains and backpackers to follow the sun at different times of day and cover many kilometres and gather an increased geographical spread of data. With higher densities of data in cities and remote regions, the team hopes to close the data gap between satellite estimations and limited ground station readings.

*Team Wala's* Jim Hinkley, solar energy systems scientist at CSIRO, said the data analysis for the device requires "an engineering philosophy" – meaning a step-by-step approach to complete the challenge.

Hinkley said: "I was able to identify the currently limited number of sites in Australia as well as find some interesting information about how much has been invested for improving the data available to potential project developers – A$5m."

Hinkley said the team is still working on the project, carrying out proof-of-concept testing for data quality and density and building prototype units. They hope these devices will give more accurate solar data on the ground in locations without monitoring stations to determine the best locations for new solar farms.

Hinkley said the solution can also be used in poorer countries where ground stations are unavailable and aerosols and dust can throw off satellite estimations.

As for the team's performance, Hinkley was happy to be in a prize position.

"We were really pleased with the way the team went, not least because it was a great bunch of people and we had a lot of laughs during the day as we pondered over some of the barriers. Coming second was the icing on the cake," he said.

Since the standard of the entries was so high, Platt said the *Hackathon* could be an annual event that could lead to potentially ground-breaking innovations in the solar sector. He hopes the teams will pursue their ideas to create startup businesses.

"We hope that the conversations around the ideas submitted don't stop at the *Hackathon*," said Platt. ■