

Artificial intelligence seen as a key technology to enable better balancing of UK's energy market

January 5 2017

Upside Energy and Heriot-Watt University have been awarded a Knowledge Transfer Partnership (KTP) grant by Innovate UK to maximise the opportunities presented by the emerging energy demand response market.

The project will use [machine learning](#), and distributed [artificial intelligence](#) methods to manage a portfolio of storage assets to provide real-time energy reserves to the grid.

Upside Energy's Virtual Energy Store aims to relieve stress on the grid by managing a number of distributed storage resources, thereby reducing the UK's reliance on the spinning reserve capacity provided by traditional power stations.

Upside has developed an Advanced Algorithmic Platform (AAP) which allows a substantial ensemble of algorithms that manage demand response of different devices to be run in parallel. Upside will work with Heriot-Watt University to optimise their existing selection of [control algorithms](#) and how they are utilised in different scenarios using the University's specialist skills in machine learning, artificial intelligence and stochastic optimisation.

The team from Heriot-Watt University will work closely with Upside to facilitate the transfer of these skills and to develop a novel ensemble

learning and algorithmic selection approach that will be required to support algorithm evolution within Upside's unique open innovation architecture.

Dr Graham Oakes, Founder and CEO of Upside Energy, said:

"This is a really exciting project. Both because machine learning is going to be fundamental to how Upside evolves its algorithms and hence delivers growing value to the energy system and wider society, and because it builds from the longstanding relationship that we have been developing with Heriot-Watt University. Our strategy is to work with academic partners to develop the intellectual property that will be at the heart of an intelligent energy system, one where resources are used carefully and thoughtfully and hence at low cost and with minimal impact on the environment. This partnership with Heriot-Watt is a great example of that strategy coming to fruition."

Dr Valentin Robu from Heriot-Watt University said:

"Demand response is emerging as a key technology to assure the stability of next-generation power grids, and there is an increasing need for smart control strategies that enable distributed energy storage assets to perform demand response. Techniques developed in the machine learning (ML) and distributed artificial intelligence (AI) communities will have an increasing role to play in enabling these efforts. ML and AI techniques can help not only in the design of control algorithms for individual assets, but also in the selection process of which of these algorithms perform the best under specific scenarios and conditions on the grid. Moreover, there is an increasing interest in advanced fusion prognostics techniques that enable real-time monitoring and accurate forecasting of the state of health of [energy](#) assets.

Upside Energy are one of the most innovative start-ups in the UK in this

area, and their Advanced Algorithmic Platform (AAP) to evaluate the performance of different demand response strategies is a truly cutting edge development. The Heriot-Watt team is excited to work with Upside Energy to help them to achieve this vision."

Provided by Heriot-Watt University

Citation: Artificial intelligence seen as a key technology to enable better balancing of UK's energy market (2017, January 5) retrieved 26 April 2024 from <https://phys.org/news/2017-01-artificial-intelligence-key-technology-enable.html>

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