Khalid Abdulla

PhD CEng MIMechE

Personal Data

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Work Experience

Mar 2026 – Feb 2026 | Short-term Cloud Forecast Consulting for Solstice AI,

Applied state-of-the-art dense optical flow methods to satellite image forecasting to improve short-term solar power forecasts. The resulting forecast accuracy improvement (∼22%) enabled Solstice AI to go to market with a stronger value proposition, since small accuracy improvements translate to millions of dollars of revenue for large solar farms. The process of evaluating and developing these improved methods required me to build complex, user-intuitive visualisations that enabled key insights into forecast model refinements.

Dec 2025 – Nov 2022 | Senior Data Scientist at Intelligent Growth Solutions,

End-to-end owner of several data-driven machine-monitoring applications (from initial concept proposal and proof-of-concept testing, to monitoring the deployed apps and ensuring they met user's needs). Leveraged my background in hardware to collaborate with the engineering team on product refinements - including a detailed evaluation of new LEDs to ensure maximum light output for a given amount of energy input. Line managed an intern evaluating the efficacy of microphone-based fault detection/prediction.

Nov 2022 – May 2021 | Head of Systems & Modelling at Gravitricity Ltd.,

Lead several important areas of testing of the 250kW Gravity Energy Storage System; including planning & running tests, and analysing & reporting on the results. Responsible for Systems Engineering of full-scale projects, managing risks, requirements, and interfaces. Was also responsible for cost-modelling and optimisation of system configurations to deliver minimum levelised cost solutions. My detailed understanding of the system dynamics made it possible to ∼sing a duet with two 25t hoists!

Mar 2021 – Sep 2017 | Mechanical Engineer at Nova Innovation Ltd.,

Completed the front-end engineering design of the gravity base foundation for the next generation of the Nova-100kW tidal turbine, minimising the requirement for ballast whilst ensuring on-bottom stability. Designed a novel foundation connector to allow inter-changeability of nacelles and foundations. Oversaw manufacture of these subsystems leading to their successful installation in summer 2020.

Feb 2019 – Jan 2019 | Optimisation consulting for Mixergy Ltd.,

I developed an optimisation method and associated control code which was deployed to control the operation of some internet-connected domestic hot-water cylinders. The method included data-driven univariate forecasts of users' demand which were trained online (not requiring any data beyond what was already available), and a predictive optimisation method to minimise costs to the tank owners whilst ensuring no loss-of-service (water going cold!). This has been applied to a subset of the Mixergy fleet with some results presented here.

May 2017 – Feb 2014 | Research Intern at IBM Research – Australia

Energy & Weather Group

Working 1-day per week alongside my Ph.D, my research at IBM addressed the operational optimisation of energy storage assets, considering optimisation subject to forecast uncertainty and the impact of operational decisions on battery degradation.

Dec 2013 – Jun 2009 | Electrical & Mechanical Engineer at Aquamarine Power Ltd.,

During graduate placements I was exposed to most areas of this wave energy company: from physical/numerical modelling of new prototypes in the wave tank, to practical project & operations engineering on site in Orkney, where the Oyster Wave Energy Converter machines were installed. Later I was responsible for the concept and pre-detailed designs of the next generation Oyster 801 Cylinder Modules, and was the Technical Lead for a large package of Improvement Works (£1 million budget) completed during summer 2013 on the Oyster 800 Control & Instrumentation system.

Education

June 2017 Ph.D at Melbourne School of Engineering, **University of Melbourne**
Thesis: "Optimising the Operation of Energy Storage Systems Subject to Forecast Uncertainty"
Supervisor: Prof. Saman Halgamuge

May 2009 MEng in Electrical & Mechanical Engineering
1st Class Honours, **University of Edinburgh**
Thesis: "Optimising the Power Take-Off of Oyster WEC Arrays"
Advisor: Prof. Rob Bryden
GPA: 90/100

June 2004 International Baccalaureate Dipl. at **St. George's British Int. School**, Rome
Points: 43/45

Selected Publications & Patents

Journal Papers

'Multi-resolution Dynamic Programming for the Receding Horizon Control of Energy Storage', K. Abdulla, J. de Hoog, K. Steer, A. Wirth, S. Halgamuge, *IEEE Trans. on Sustainable Energy* (Accepted September 2017). https://doi.org/10.1109/TSTE.2017.2754505

'Optimal Operation of Energy Storage Systems Considering Forecasts and Battery Degradation', K. Abdulla, J. de Hoog, V. Muenzel, F. Suits, K. Steer, A. Wirth, S. Halgamuge, *IEEE Trans. on Smart Grid* vol. 9 (3), pp. 2086 - 2096, 2018. http://dx.doi.org/10.1109/TSG.2016.2606490

'Improving the On-line Control of Energy Storage via Forecast Error Metric Customization', K. Abdulla, K. Steer, A. Wirth, S. Halgamuge, *Journal of Energy Storage* vol. 8, pp. 51-59, 2016. http://dx.doi.org/10.1016/j.est.2016.09.005

Conf. Papers

'Accounting for Forecast Uncertainty in the Optimized Operation of Energy Storage', K. Abdulla, K. Steer, A. Wirth, S. Halgamuge, J. de Hoog *ISGT Asia 2016*, 28-30 November 2016, Melbourne, Australia.

'Integrating Data-Driven Forecasting and Optimization to Improve the Operation of Distributed Energy Storage', K. Abdulla, K. Steer, A. Wirth, J. de Hoog, S. Halgamuge *SmartCity 2016*, 12-14 December 2016, Sydney, Australia. (Winner of best student paper award.)

'Selecting an Optimal Combination of Storage & Transmission Assets with a Non-Dispatchable Electricity Supply.', K. Abdulla, A. Wirth, S. Halgamuge, *ICIAfS-2014*, 22-24 December 2014, Colombo, Sri Lanka. http://dx.doi.org/10.1109/ICIAFS.2014.7069628. (Winner of best paper award in its track.)

Patents

'GB2589118A - A tidal turbine with a seabed support structure', K. Abdulla, *Nova Innovation Ltd.*, Filed 21 Nov. 2019

'WO2021099766A1 - A tidal turbine with a progressively couplable structural interface between a nacelle and a seabed support structure and a method related thereto', K. Abdulla, *Nova Innovation Ltd.*, Filed 16 Nov. 2020

'US10530181B2 - Optimal distributed energy resource management system', K. Abdulla, J. Baldauf, J. de Hoog, S. Mashford, *IBM Corp.*, Filed 23 Aug. 2018

'US20200004950A1 - Tamper mitigation scheme for locally powered smart devices', J. de Hoog, T. M. Lynar, K. Abdulla, *IBM Corp.*, Filed 28 Jun. 2018

Prizes and Awards

2016	Best student paper award at IEEE SmartCity 2016 Conference
2014	Best paper award for 'Sustainable Energy Usage and Distribution' track IEEE ICIAfS-2014
2010	SET Awards finalist for MEng project thesis
2004–2009	University of Edinburgh class medals for Mechanical Engineering (1^{st}, 2^{nd}, 3rd years), Electrical Engineering (2^{nd} year), Horsburgh Prize for Engineering Mathematics (1^{st} & 2^{nd} years), class prize for best performance in Industrial Management 1H.
2003–2004	6^{th} Form Class medals for Economics, Maths, Chemistry & Physics.

Hobby / Maker Projects

I occasionally do hobby projects, a few examples are listed below. They are usually fairly playful but I find them a great way to learn new skills, and reduce the fear of trying out stuff which might not work.

2024	The Non-Orient Express - Designed and 3D-printed a set of train tracks in the shape of a Möbius strip for a set of toy trains handed down to my son.
2017	Bear-squirrel quaich cast in bronze at a local foundry using a custom-designed 3D printed pattern.
2016	Möbius ring cast using kitchen stove using custom designed 3D-printed mould, and fields metal.
2016	WiFi Power Toggler which automatically detects when your wi-fi router locks-up and power cycles it for you.
2014	4-Way Cake Pong in which users can play 4-way pong on a laptop using arrows made of icing as controllers.

Computer Skills & Languages

Basic Knowledge:	R, Java, C++, LaTeX, PostgreSQL
Proficient:	Python, Matlab/Simulink, MS Office (Excel, Word, Outlook, Powerpoint), SolidWorks, AutoDesk Inventor, Arduino
Languages:	English (Mother-tongue), Italian (Intermediate but rusty), French (basic spoken).

Professional Memberships

IMechE: CEng (Chartered Engineer) since 2014, and previously Young Member's Chair for Australia