

# Project Outputs

## Research Articles

- [1] **Ian D. Campbell, Krishnakumar Gopalakrishnan, Monica Marinescu, Marcello Torchio, Gregory J. Offer and Davide M. Raimondo.** ‘Optimising lithium-ion cell design for plug-in hybrid and battery electric vehicles’. *Journal of Energy Storage (Accepted)* (Jan. 2019). *The highlighted authors are joint first authors with equal contributions.*
- [2] Krishnakumar Gopalakrishnan, Teng Zhang and Gregory J. Offer. ‘A Fast, Memory-Efficient Discrete-Time Realization Algorithm for Reduced-Order Li-Ion Battery Models’. *Journal of Electrochemical Energy Conversion and Storage* 14.1 (Feb. 2017), p. 011001. ISSN: 2381-6872. DOI: [10.1115/1.4035526](https://doi.org/10.1115/1.4035526).
- [3] Andrea Pozzi, Gabriele Ciaramella, Krishnakumar Gopalakrishnan, Stefan Volkwein and Davide M. Raimondo. ‘Optimal Design of Experiment for Parameter Estimation of a Single Particle Model for Lithium-Ion Batteries’. *57th IEEE Conference on Decision and Control (CDC)*. Ed. by Amir G. Aghdam. Miami Beach, FL: IEEE, 2018, WeB22.2. URL: <https://cdc2018.ieeecss.org/>.
- [4] Krishnakumar Gopalakrishnan and Gregory J. Offer. ‘An Electrolyte Enhanced Composite Single Particle Model using System Identification Techniques’. *IEEE Transactions on Sustainable Energy (manuscript in preparation)* (2018).

## Conference Presentations


- [1] Ian D. Campbell, Krishnakumar Gopalakrishnan, Monica Marinescu, Marcello Torchio and Davide M. Raimondo. ‘Optimising Lithium-ion Cell Design for Plug-in Hybrid and Battery Electric Vehicles’. *UK Energy Storage Conference (UKES)*. Newcastle, UK, 2018. Presented by Ian D. Campbell.
- [2] Ian D. Campbell, Krishnakumar Gopalakrishnan, Monica Marinescu, Marcello Torchio, Gregory J. Offer and Davide M. Raimondo. ‘Optimised Cell Layer Configurations via Modelling: Common Module Design for Electric Vehicle Platforms’. *Catapult Energy Storage Conference 2017*. Coventry, UK: WMG/JLR-Catapult, 2017. Presented by Ian D. Campbell.
- [3] Krishnakumar Gopalakrishnan, Teng Zhang and Gregory J. Offer. ‘A Fast, Efficient Discrete-Time Realization Algorithm for Reduced-order Battery Models’. *13th Symposium On Modeling & Experimental Validation Of Fuel Cells, Batteries & Electrolysers*. Lausanne: Swiss Federal Energy Office, 2016. URL: <https://modval13.epfl.ch/>.
- [4] Krishnakumar Gopalakrishnan, Teng Zhang and Gregory J. Offer. ‘A Fast, Efficient Discrete-Time Realization Algorithm for Reduced-Order Battery Models’. *Meeting Abstracts of the Electrochemical Society (ECS)*. Vol. MA2016-03. 2. The Electrochemical Society, June 2016, pp. 844–844. URL: <http://ma.ecsdl.org/content/MA2016-03/2/844.short>.

- [5] Wasim Sarwar, Gregory J. Offer, Krishnakumar Gopalakrishnan and Nick Green. ‘Combined Battery/Supercapacitor Hybridised Energy Storage Systems for Hybrid Electric Vehicles’. *Meeting Abstracts of the Electrochemical Society (ECS)*. Vol. MA2016-03. 2. Chicago, IL: The Electrochemical Society, June 2016, pp. 443–443. URL: <http://ma.ecsdl.org/content/MA2016-03/2/443.short>. Presented by Wasim Sarwar.

## Posters

- [1] Krishnakumar Gopalakrishnan, Ian D. Campbell, Monica Marinescu, Marcello Torchio, Gregory J. Offer and Davide M. Raimondo. ‘Optimising lithium-ion cell design for plug-in hybrid and battery electric vehicles’. *15th Symposium on Modeling and Validation of Electrochemical Energy Devices, ModVal 2018*. Ed. by Erik J. Berg, Felix N. Büchi, Jens Eller and Lorenz Gubler. Aarau, Switzerland: Electrochemistry Laboratory, Paul Scherrer Institut PSI, Apr. 2018, p. 160. DOI: [10.3929/ETHZ-B-000240521](https://doi.org/10.3929/ETHZ-B-000240521). Created by Ian D. Campbell and presented by Monica Marinescu.
- [2] Ian D. Campbell, Krishnakumar Gopalakrishnan, Monica Marinescu, Marcello Torchio, Gregory J. Offer and Davide M. Raimondo. ‘Optimising Li-ion Cell Layers Rapid Cell Design For EV Fast Charging’. *Kraftwerk Batterie Advanced Battery Power Batterietagung 2018*. Münster, Germany: Haus Der Technik E.V., 2018. URL: <http://2018.battery-power.eu/en/>. Created and presented by Ian D. Campbell.
- [3] Ian D. Campbell, Krishnakumar Gopalakrishnan, Yatish Patel and Gregory J. Offer. *Reducing Li-ion Degradation with Applied Compression*. Solihull, UK, 2017. URL: <https://futurepowertrains.co.uk/2017/>. Created and presented by Ian D. Campbell.
- [4] Wasim Sarwar, Gregory J. Offer, Krishnakumar Gopalakrishnan and Nick Green. ‘Combined Battery/Supercapacitor Hybridised Energy Storage Systems for Hybrid Electric Vehicles’. *18th International Meeting on Lithium Batteries (IMLB)*. Ed. by Doron Aurbach. Chicago, IL: The Electrochemical Society (ECS), June 2016. URL: <https://ecs.confex.com/ecs/imlb2016/webprogram/Paper78263.html>. Created and presented by Wasim Sarwar.

## Computer Software

- [1] Battery Optimal Layer Design (BOLD) toolbox (in MATLAB). Co-created by this thesis author along with Ian D. Campbell and Davide M. Raimondo. All three authors contributed equally to this toolbox. DOI: <https://doi.org/10.5281/zenodo.1016405>. MIT license. Downloadable from Github.  
 [https://github.com/ImperialCollegeESE/BOLD\\_Toolbox](https://github.com/ImperialCollegeESE/BOLD_Toolbox).
- [2] Finite volume codes (in Python) for numerical simulation of Pseudo Two-Dimensional (P2D) lithium ion battery model. Co-created by this thesis author and Ian D. Campbell with equal contributions from each developer. Available upon request.