



Li-ion Battery Fault Analysis using novel Deep Learning Approach

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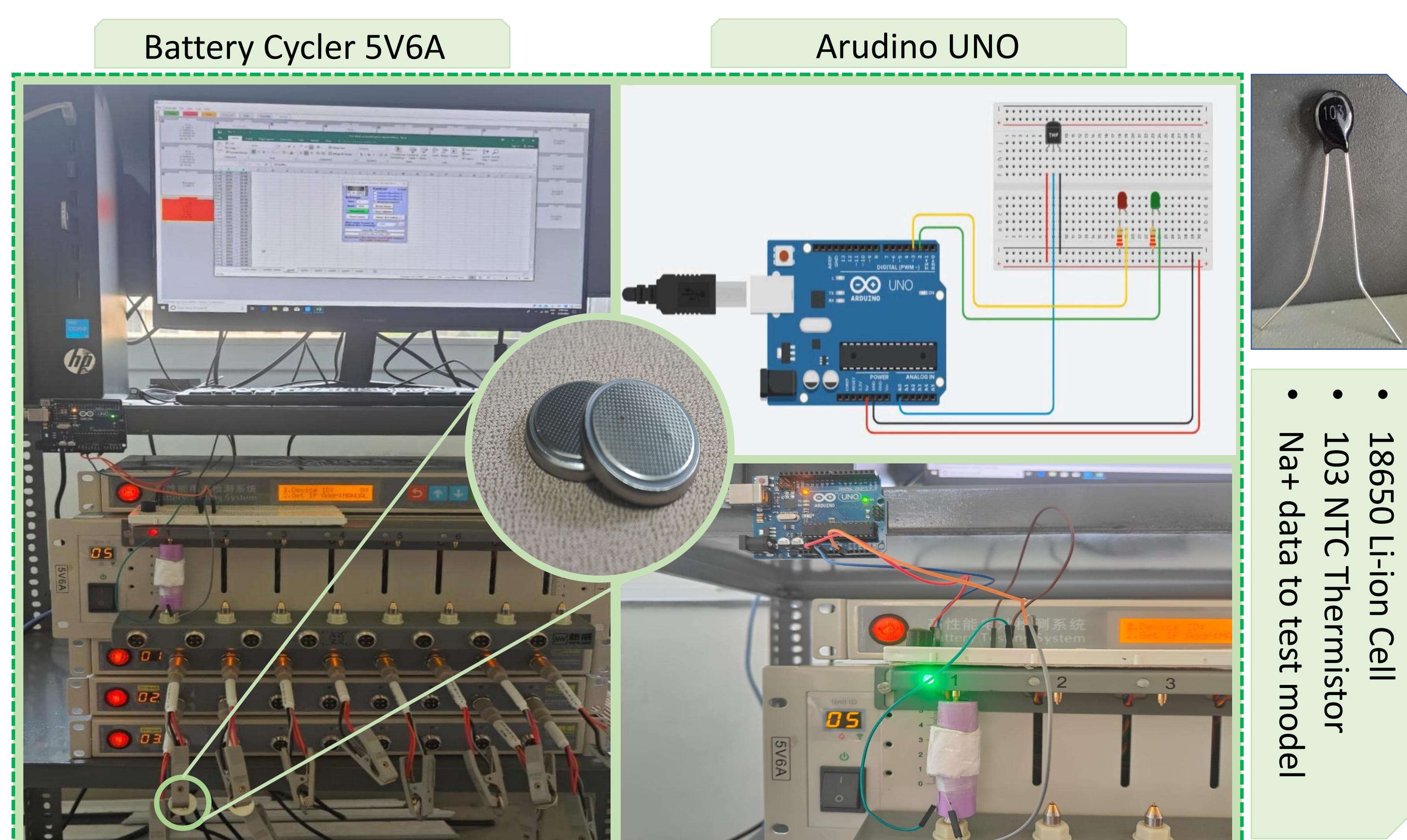


Predicting State-of-Health (SoH) of EV Batteries with LSTM Model Using Current, Voltage, and Temperature Data.

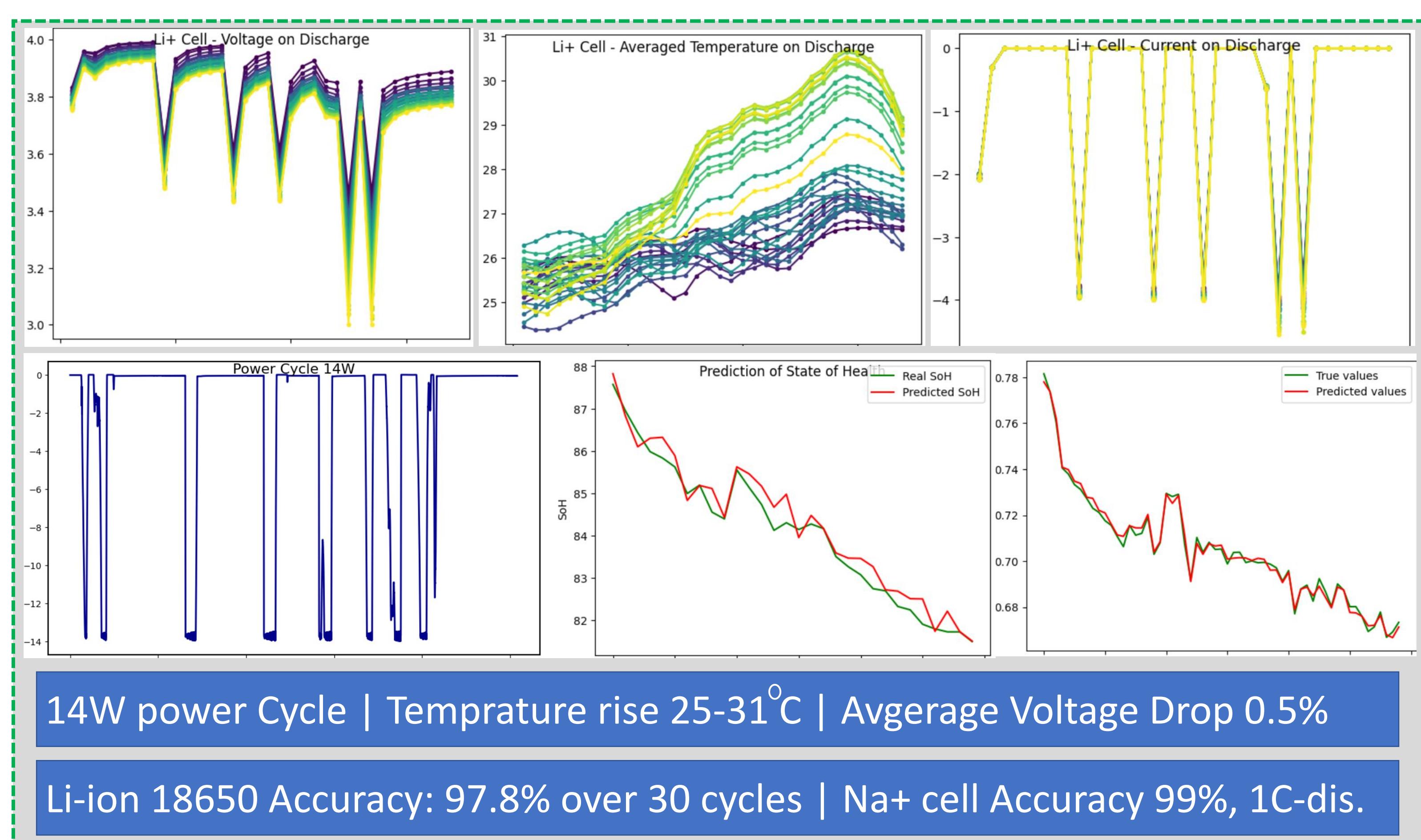
1 Motivation

- Li-ion batteries **degrade over time** and **usage**; impacting C[Ah] (**range**) and R[Ω] (**thermal safety**).
- **SoH** reflects this degradation & **indicates potential failure**; calculating **actual State-of-Charge (SoC)**; charge and discharge strategies; **reducing hazards**.
- Impedance spectroscopy, OCV and Galvanostatic Cycling are offline experimental methods; not for EVs.
- **LSTMs** captures **long-term dependencies** within the data in real-world scenarios and **uploads online**.

3 Experimentation & Setup



4 Results & Discussion



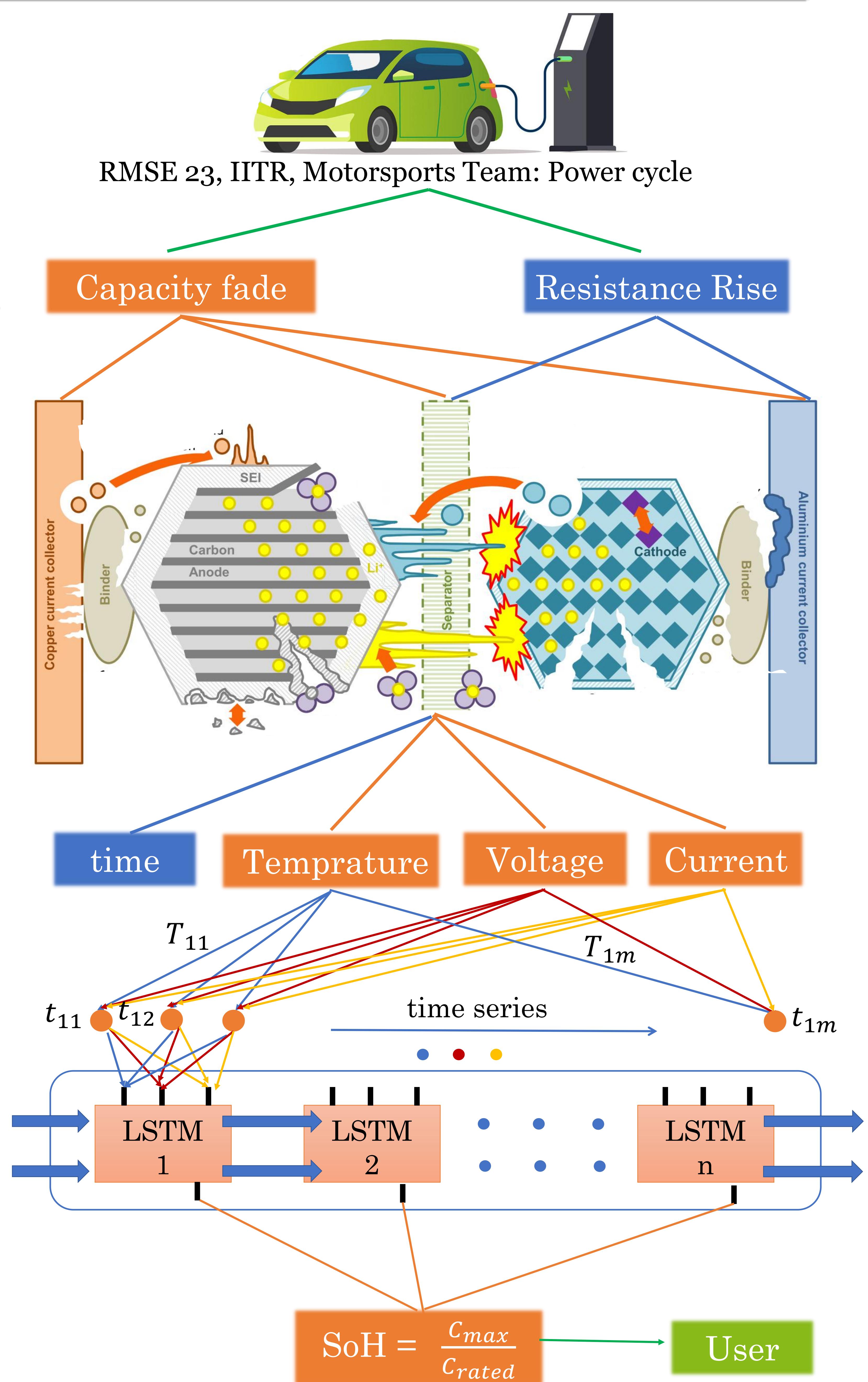
6 Conclusion

- As per above Model, If the predicted SoH is known, precise SoC can be calculated; for accurate milage prediction.
- The extreme fluctuations of actual capacity from the predicted capacity indicates fault; Early detection of faults.

Acknowledgement:

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2 Methodology



5 Future Perspectives

- Generalized model for various power cycles, **predicting SoH after set training cycles**.
- Predicting **pack dynamics** based on single cell analysis.
- Forecasting resistance and temperature rise to **determine maximum heat capacity** of degraded cells.
- Incorporating ambient temperature, **humidity**, **gas evolution**, stress, and coolant metrics to enhance the model.

❖ References: (For more details please Scan Here)

- SoC-and-SoH-estimation-tech by Martin Murnane and Adel Ghazel
- <https://arxiv.org/abs/2201.12358> | Battery Health Estimation
- Degradation diagnostics for lithium ion cells by Christoph R. Birk
- Estimation of SoH and internal resistances by Chi Nguyen Vana and Duy Ta Quang

