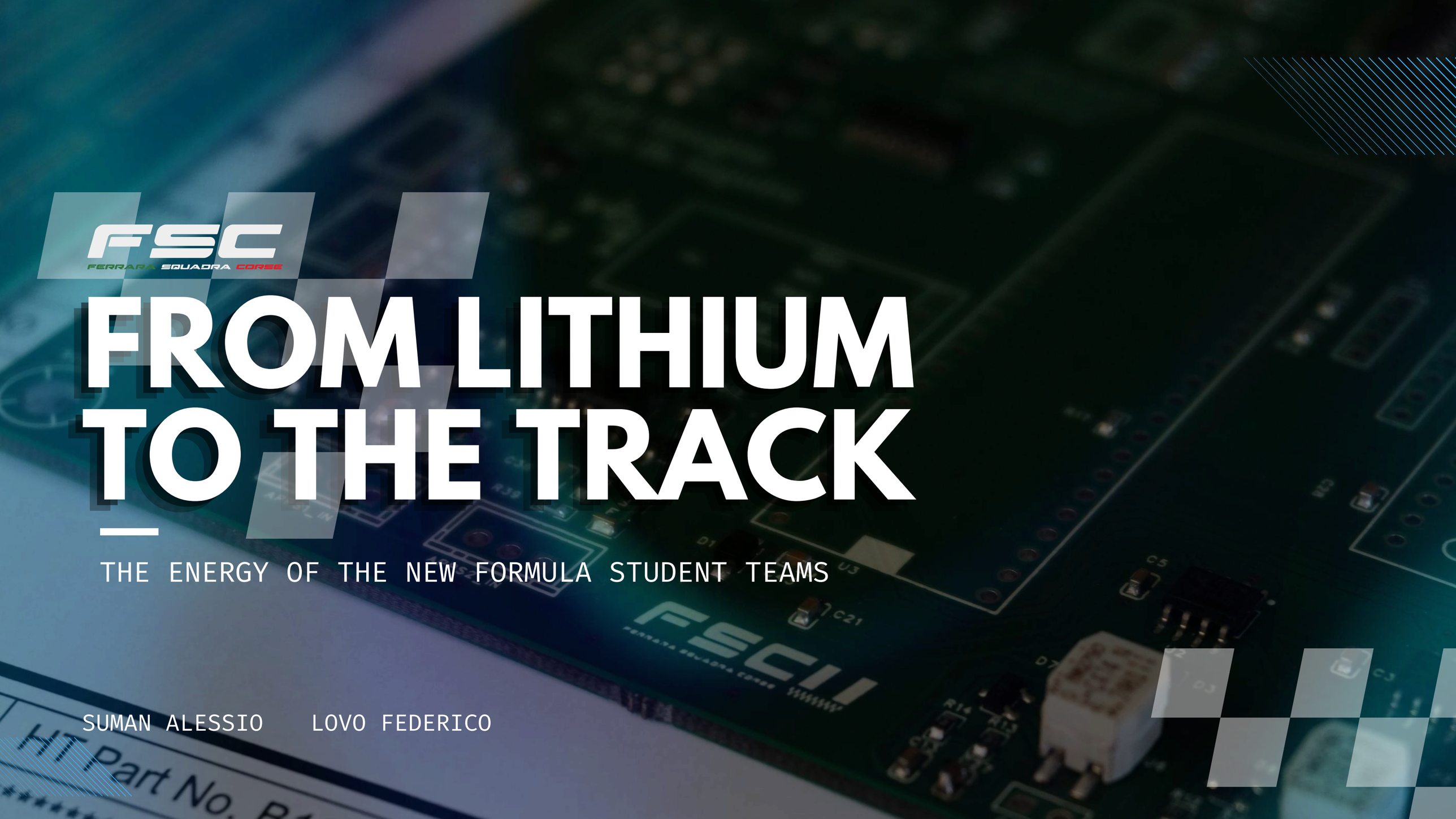


FROM LITHIUM TO THE TRACK

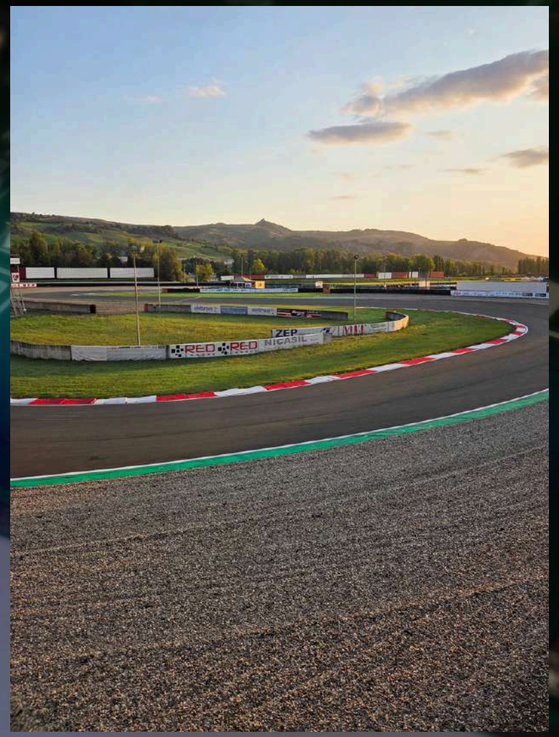
THE ENERGY OF THE NEW FORMULA STUDENT TEAMS

SUMAN ALESSIO LOVO FEDERICO

FORMULA STUDENT

ENGINEERING CHALLENGE:

A global competition involving over 600 universities worldwide, all tasked with developing an innovative prototype from scratch.



TALENT FACTORY:

A hands-on training ground that prepares future engineering and management leaders to perform under pressure, collaborate effectively, and meet real-world deadlines.

NOT JUST ENGINEERS:

The team isn’t judged only on track performance—it must also excel in static events, justifying its design choices, presenting cost analyses, and outlining a viable value creation strategy.

FERRARA SQUADRA CORSE

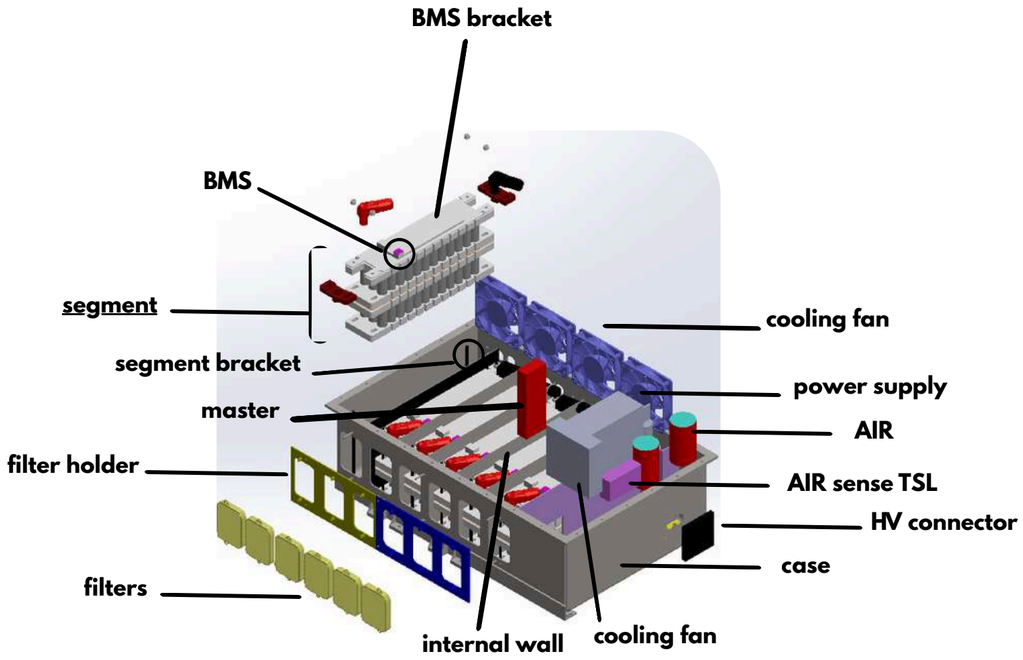
University Formula Student team is an ambitious, multidisciplinary project that brings together a passion for engineering with hands-on experience and real-world experimentation. It’s a true team effort that leads to the development of a new race car, which is then tested on track in competition against other university teams.

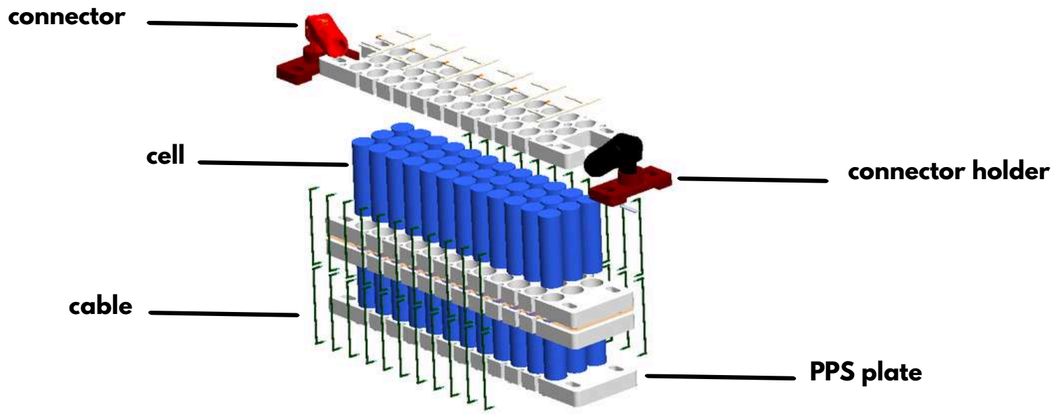
DESIGN DRIVERS

“OUR DESIGN DOESN’T START FROM THE BATTERY, BUT FROM THE CONSTRAINTS: **SAFETY**, **POWER**, AND **INSPECTABILITY**.”

- FORMULA SAE REGULATIONS
- HIGH POWER (80 KW)
- RELIABILITY UNDER DYNAMIC CONDITIONS
- MAINTAINABILITY

UPGRADES


BMS bracket
BMS
segment
segment bracket
master
filter holder
filters
internal wall
cooling fan
cooling fan
power supply
AIR
AIR sense TSL
HV connector
case


connector
cell
cable
connector holder
PPS plate

BATTERY PACK ARCHITECTURE

MODULARITY

- 6 SEGMENT 24S 3P
- TOTAL 432 CELLS

ELECTRICAL CONNECTIONS

- NICKEL-PLATED COPPER BUSBAR
- SHORT CONNECTIONS → PRECISE MEASUREMENT

LODI S.R.L.
COSTRUZIONI METALLICHE

THERMAL MANAGEMENT

"THE COOLING SYSTEM WAS DESIGNED USING CFD SIMULATIONS TO ENSURE THERMAL UNIFORMITY, NOT JUST HEAT DISSIPATION."

CELLS USED

Molicel
INR-21700-P50B

ACTIVE SYSTEM

- 8 fans (4 in, 4 out)
- Forced airflow

CFD

- Reduced Δp
- Increased flow rate

TESLA

BMS

TECHNOLOGICAL CHANGE

- AD7280 → ADBMS Analog Devices
- Completely redesigned system

DISTRIBUTED ARCHITECTURE

- Slave each module
- Central master

STRONG COMMUNICATION

- isoSPI in loop
- Redundancy

“WE ADOPTED A MORE SCALABLE AND ROBUST SOLUTION, TYPICAL OF AUTOMOTIVE APPLICATIONS.”

AISLER

ANALOG DEVICES

BMS

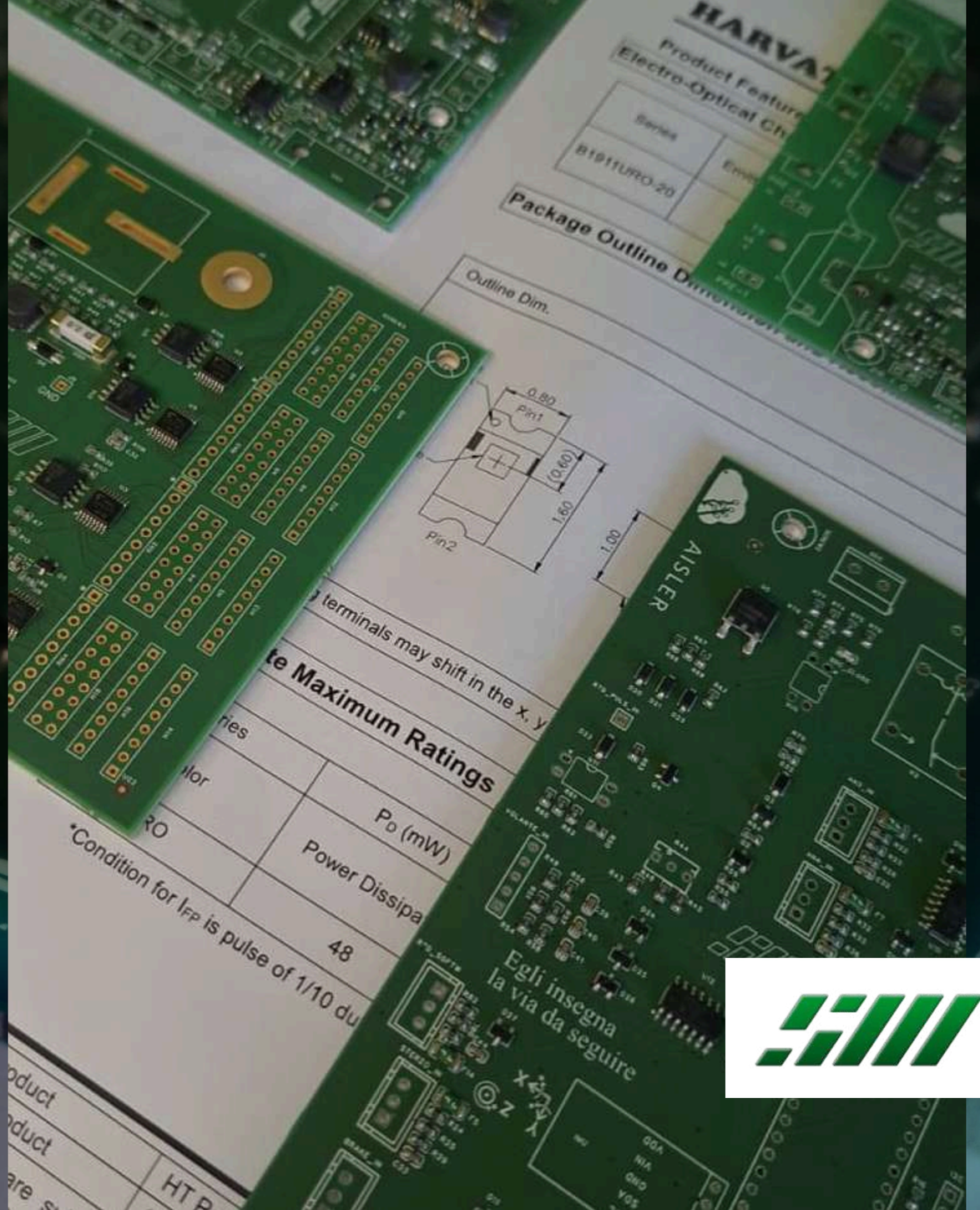
SAFETY

“THE BMS IS NOT JUST MONITORING, BUT AN ACTIVE PROTECTION SYSTEM.”

- Overvoltage
- overcurrent
- Temperature
- Insulation

“TECHNIQUES SUCH AS EIS ALLOW YOU TO GO BEYOND VOLTAGE AND TEMPERATURE, ENTERING THE INTERNAL STATE OF THE CELL.”

- SOH
- Degradation
- Matching cells




SEE YOU
ON TRACK!
THANK
YOU