World's First Single-chip Battery Management System (BMS)

Complexity Collapsed.

Adoption Accelerated

STARTUPS
Cohort 14

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Art of VLSI

Rajesh N. Gupta, Dr. Krishna Kanth Avalur

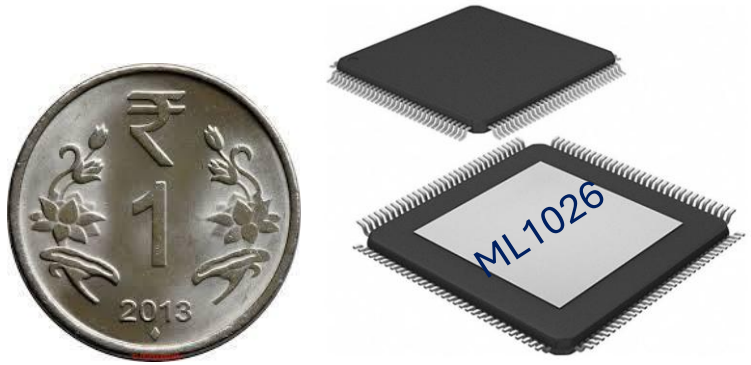
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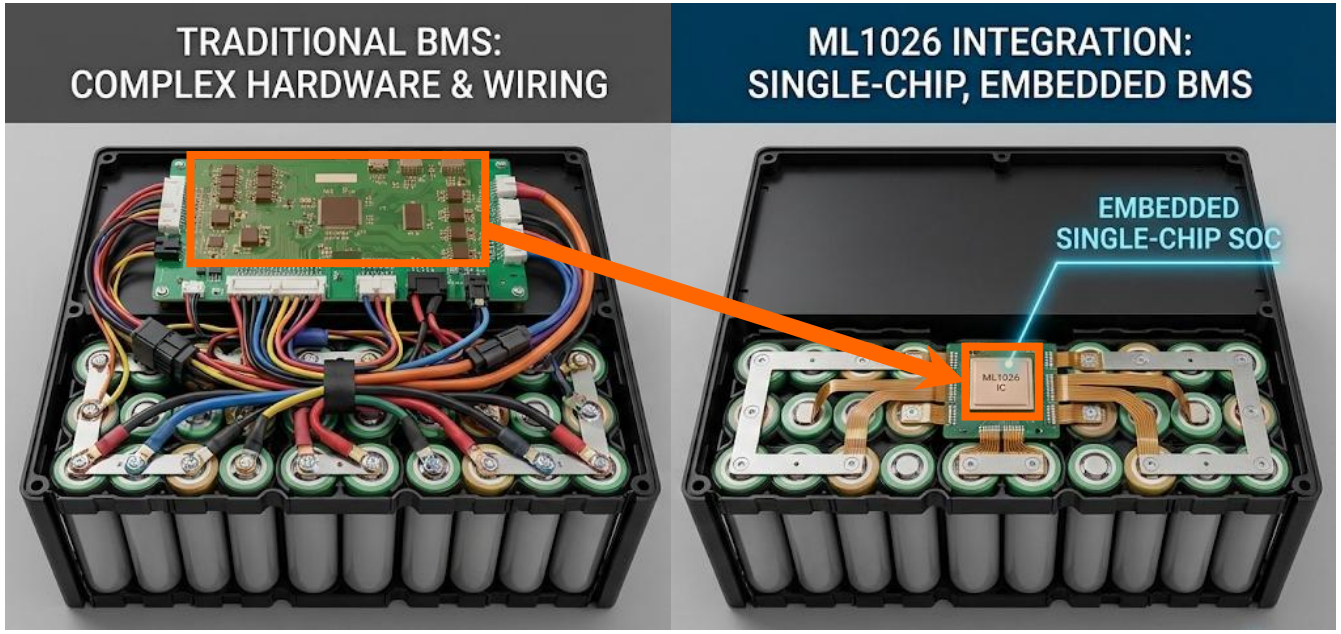
Recognized by DPIIT Department for Promotion of Industry and Internal Trade

Battery Management System on Chip

–for high energy (>3KWh) batteries

Best Precision	➔ *Higher battery range*
Tru EIS (Patent Pending)	➔ *Higher battery life*
Compact	➔ *Embed inside batteries*





Hire a BMS engineer to design a complex PCB.

Single chip ➔ ***Smaller, Cheaper and higher performance***

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Architects of BMS Today. Inventors of the Future.



Rajesh Gupta (CEO)

Summary 27 years in VLSI

- 13 years as Country Head: Micron, ams-OSRAM
- 25+ Patents

Academics B. Tech. IIT, Madras(EEE, AIR127)

- Ramasarma Kolluri Medallion
- MS in ECSE, Rensselaer, NY USA

Past customers Apple, Tesla, Samsung, One+, BMW, Global Foundries, AMD, Freescale



Dr. Krishna Kanth Avalur (CTO)

Summary 23 years in VLSI

- 3 years as Dir. Analog design, ams-OSRAM
- 12+ Patents, 10 IEEE Publication

Academics B. Tech & M. Tech (Dual Degree), IIT Bombay 2002,

- Presidents' Gold Medal 2002
- PhD from IIIT Hyderabad

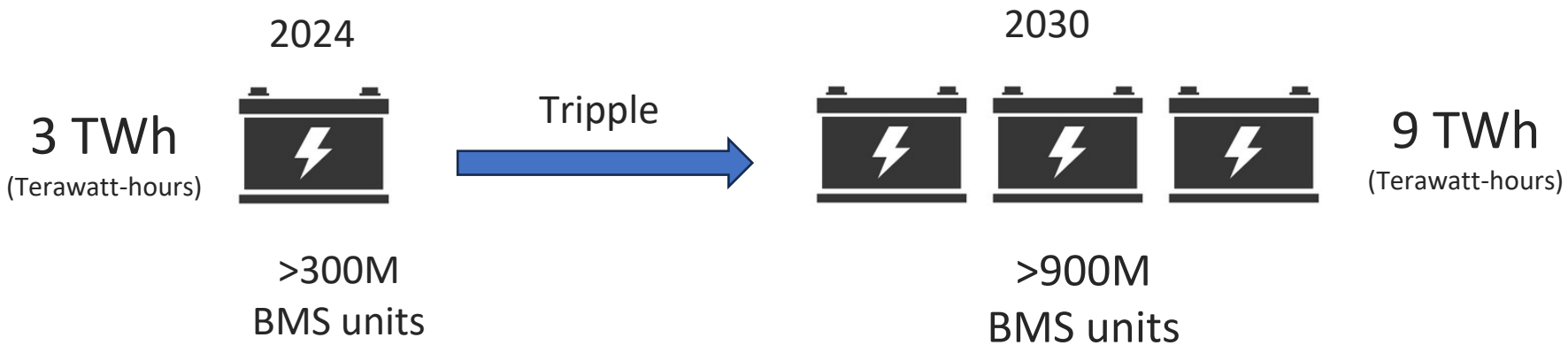
Past Customers Apple, Tesla, Samsung, One+, BMW, Conti, Bosch, Hyundai Mobis, Magneto Marelli

We led the development of IVT sensors ASICs, while at ams-OSRAM, now in Tesla and BMW cars for over a decade

TESLA

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Scalability Crisis and performance limitations



"Every battery pack needs a BMS. There is no electrification without BMS."

- BMS complexity is exploding
  - More cells/BMS, sensors and more complex algo
- Inaccurate balancing ➔ lower battery range and life
- Missing Cell wise predictive battery health

The present architecture cannot scale to 900M units/year.

Reference: IEA
https://www.iea.org/commentaries/the-battery-industry-has-entered-a-new-phase

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Integration is inevitable *and the time is ripe*

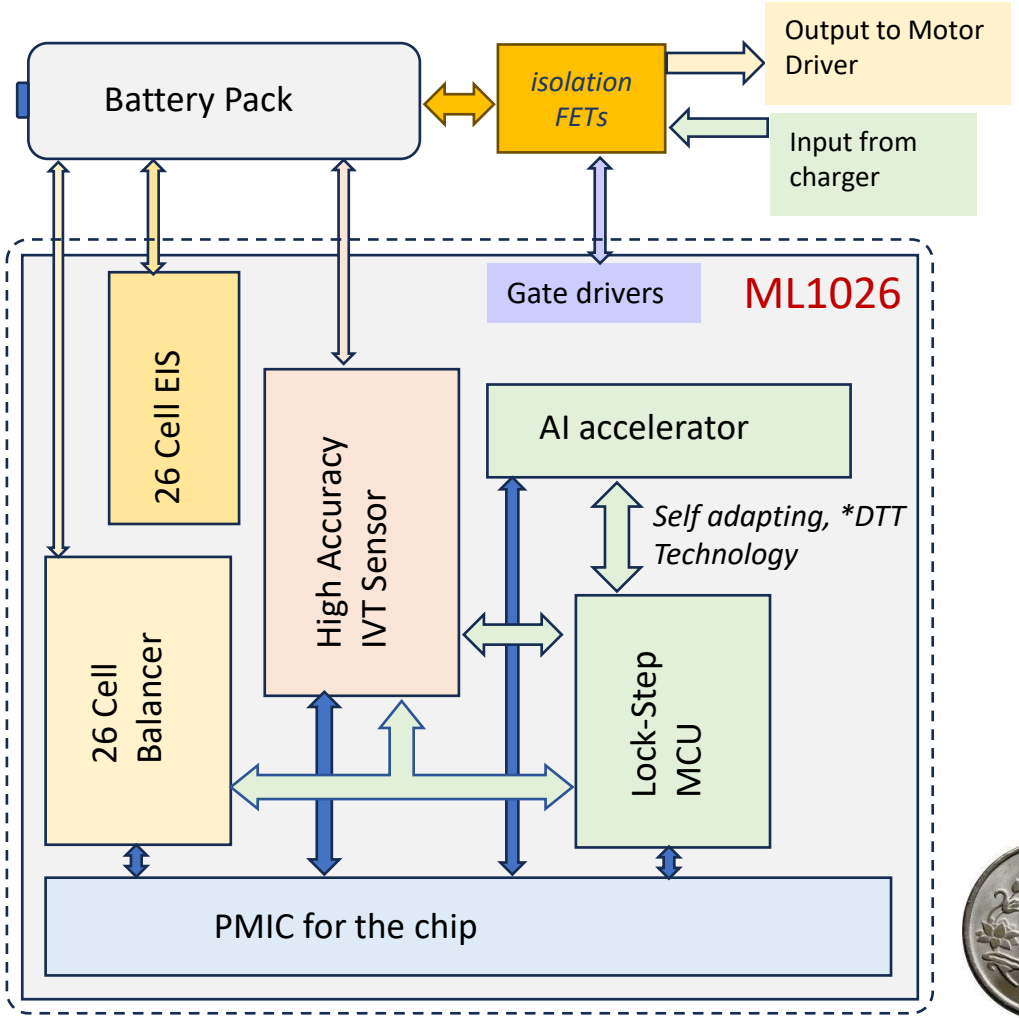
- Fabs have 3nm for pure CMOS
  - **Yet,** High voltage, automotive CMOS **only available at 180nm**
  - Single chip BMS requires CMOS <65nm, to pack reasonable digital content

- **55nm High Voltage + Analog + Automotive CMOS technology**
  - Semiconductor Fab capability **only available now**
    - UMC (Fab) ‘Oct 2025
    - Global Foundries 2027 (expected)

Fab technology to enable a single chip is available only now.

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ML1026: *Collapse 6+ chips*



- Best Accuracy ➔ 0.5mV, <0.1% error
  - Inline Tru-EIS ➔ Realtime battery health per cell
  - High-precision IVT sensor
- Hardware Abstraction Layer (HAL)
  - Low level firmware to configure the IC

Complexity Collapsed. Performance Unlocked.



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ML1026 Integrates all functions in one chip

Feature	MOSart Semi ML1026	Texas Instruments BQ79826Z-Q1	NXP BMA7418	Qorvo PAC22140/PAC25140
Whats Included	**AFE + EIS + PMIC + MCU w/AI accelerator + Gate Drivers**	AFE + EIS	Voltage Balancing only	**AFE + PMIC + MCU + Gate Drivers**
Cell Support	**Upto 26**	Upto 26	Upto 18	Upto 20
Processor	**M55 lock-step**	N/A, Separate IC	N/A, Separate IC	ARM Cortex M0 (PAC22140) / **ARM Cortex M4F (PAC25140)**
EIS-Electrochemical Impedance Spectroscopy	**Tru-EIS, 2A ➔ 0.5% accuracy. 1mHz to 10kHz**	1A ➔ 1% accuracy. 10mHz to 3.5kHz.	Fourier transform, based. Not a Ture EIS.	No
Current Sensing Accuracy	0.1% vs. Temperature.	0.1% vs. Temperature.	N/A, Separate IC	1% vs. Temperature.
Voltage Sensing Accuracy	0.5mV vs. Temp	1.7mV vs. Temp	0.8mV vs. Temp	2.5mV at Room Temperature
Temperature Sensing	**18 +1**	8+1	9+0	8+0
Cell Balancing	300 mA per cell	Up to 300 mA per cell	300 mA per cell	Integrated balancing FETs (50 mA)
Security	PUF. SHA-1, SHA-2, EC-KCDSA authentication	N/A, Separate IC	N/A, Separate IC	SHA-1, SHA-2
Safety	**ASIL-D (highest safety rating)**	**ASIL-D**	ASIL-D	N/A
Package	128-pin HTQFP (15mm x 15mm)	100-pin HTQFP (12mm x 12mm)	64-pin LQFP (10 mm × 10 mm)	60-pin QFN (9 mm × 9 mm)/ 68-pin QFN (PAC25140:10mm x 10mm)

Best Accuracy across top competitors

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BMS Market (India, World) & Traction

Serviceable Addressable Market (SAM)

BMS consumption across EVs and BESS
(units and IC cost)

	2025	2030
India	5 M-units➔ $60M	25 M-units ➔ $300M
World	300 M-units➔ $3.6B	900 M-units➔ $11B

M-units ➔ Million units

Interested Customers

- Ather Energy (2W OEM)
- Adani New Industries
- Yuma Energy (BaaS)
- ETRNL Energy (Battery Cell)
- The Energy Company (BESS OEM)
- Vecmocon (BMS ODM)
- ReVex (BMS ODM)
- Nextica (BMS ODM)

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GTM, Funnel & First-Year Projection

Direct Enterprise Sales

Tier-1 Automotive & BESS OEMs

Funnel: Ather, Adani new industries, JBM other possible OEMS.

600K units (ASP $8) in 2028

ODM & Partner Ecosystem

"Powered by MOSart" Program for BMS companies

Funnel: Vecmocon, ReVex, Nextica Tech, Soul of Silicon, xBattery, etc.

300K units (ASP $10) in 2028

Turnkey Distribution

Complete "Black Box" BMS Module + SW Stack.

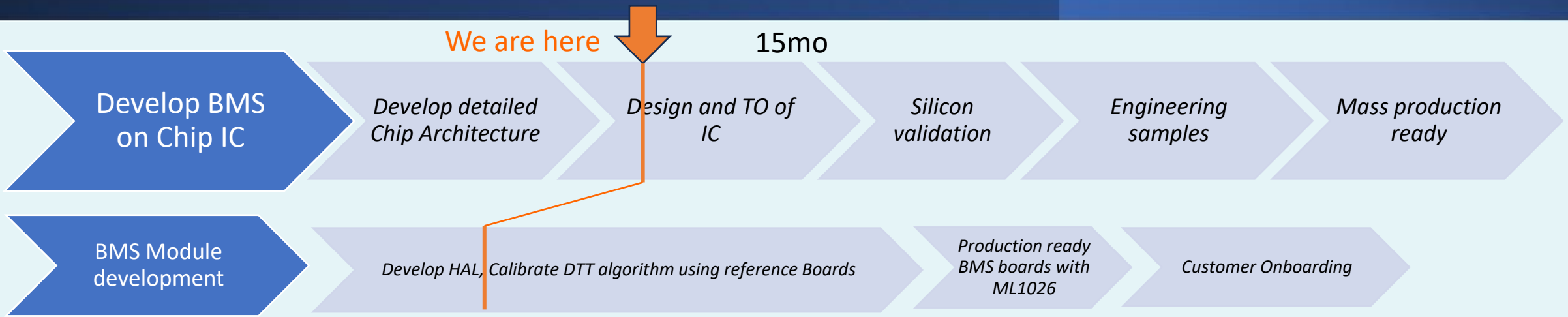
Distributors (DigiKey, Arrow..).

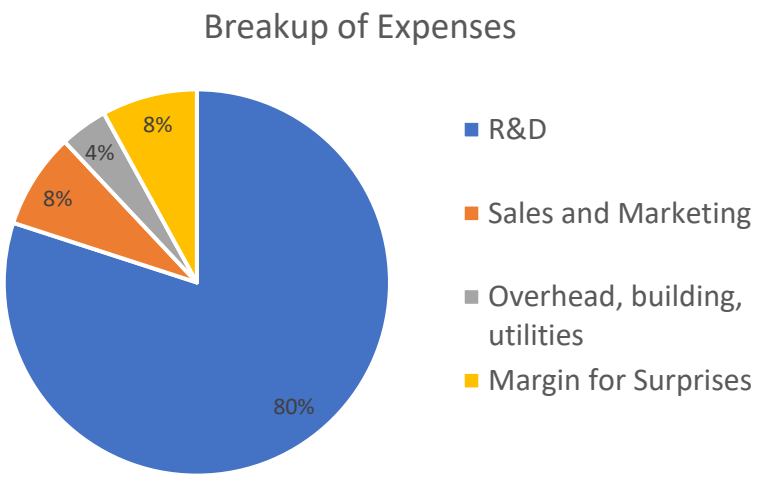
100K units (ASP $20) in 2028

Total 1Million units ~ INR 100Cr annual revenue in 2028

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Fueling the Shift: $4M to Tape-Out.





Raise $4M/INR 36Cr (15mo runway)

- Takes us to Tape-out
  - Soft interest from Investors ~$1M to support a lead investor

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Thank you for your kind attention

Connect with us ➔ breakout room
or schedule a meeting on Calendly

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