

1st IEEE International Challenge in Design Methods for Power Electronics

2023 PELS-Google-Enphase-Princeton MagNet Challenge

MagNet 2023

Award Ceremony, February 28, 2024

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MagNet 2023 Team
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Welcoming Remark

- Prof. Patrick Wheeler (PELS)
- Dr. Shuai Jiang (Google)
- David Schumacher (Enphase)
- Dr. Kevin Hermanns (TC10)



Kevin Hermanns



Patrick Wheeler



"Yes we will pay!"



Shuai Jiang



David Schumacher



"Yes we do care!"



"Fire Fighting!"

MagNet Challenge Organizing Team



Haoran Li



S. Wang



T. Guillod



D. Serrano



M. Chen



C. Sullivan



MagNet Challenge Judge Committee



MagNet Challenge Judge Committee

PowerPoint interface showing a slide titled "Estimated Competition Ranking". The slide includes two graphs: "Ranking Graph" and "Performance Graph".

Note: Winning models may NOT be good, Good models may NOT be winning

Ranking Graph

Team	Accuracy Ranking	Size Ranking
Manchester	25	25
CU-Boulder	15	22
HDU	12	22
Tribhuvan	20	21
SAL	22	21
SEU-WX	18	19
KU Leuven	22	18
Tsinghua	10	17
NTUT	12	17
Bristol	5	15
IISc	8	14
NTU	25	14
XJTU	10	12
UTK	15	12
Fuzhou	5	10
TU Delft	8	10
ZJUI	15	10
Paderborn	5	8
ASU	8	8
Sydney	10	8
NJUPT	22	10
Polito	25	5
Mondragon	22	5
SEU-MC	25	5

Performance Graph

Team	Average Error (%)	Number of Parameters per Material
CU-Boulder	50	1.0E+07
HDU	50	1.0E+06
Tribhuvan	50	1.0E+06
SAL	450	1.0E+06
Tsinghua	10	1.0E+05
SEU-WX	15	1.0E+05
NTUT	15	1.0E+05
KU Leuven	20	1.0E+05
Bristol	5	1.0E+05
IISc	8	1.0E+05
XJTU	10	1.0E+05
NTU	25	1.0E+05
Fuzhou	10	1.0E+04
UTK	15	1.0E+04
NJUPT	20	1.0E+04
TU Delft	10	1.0E+03
ASU	10	1.0E+03
ZJUI	15	1.0E+03
Paderborn	5	1.0E+03
Sydney	10	1.0E+03
Polito	25	1.0E+03
Mondragon	50	1.0E+02
SEU-MC	50	1.0E+02

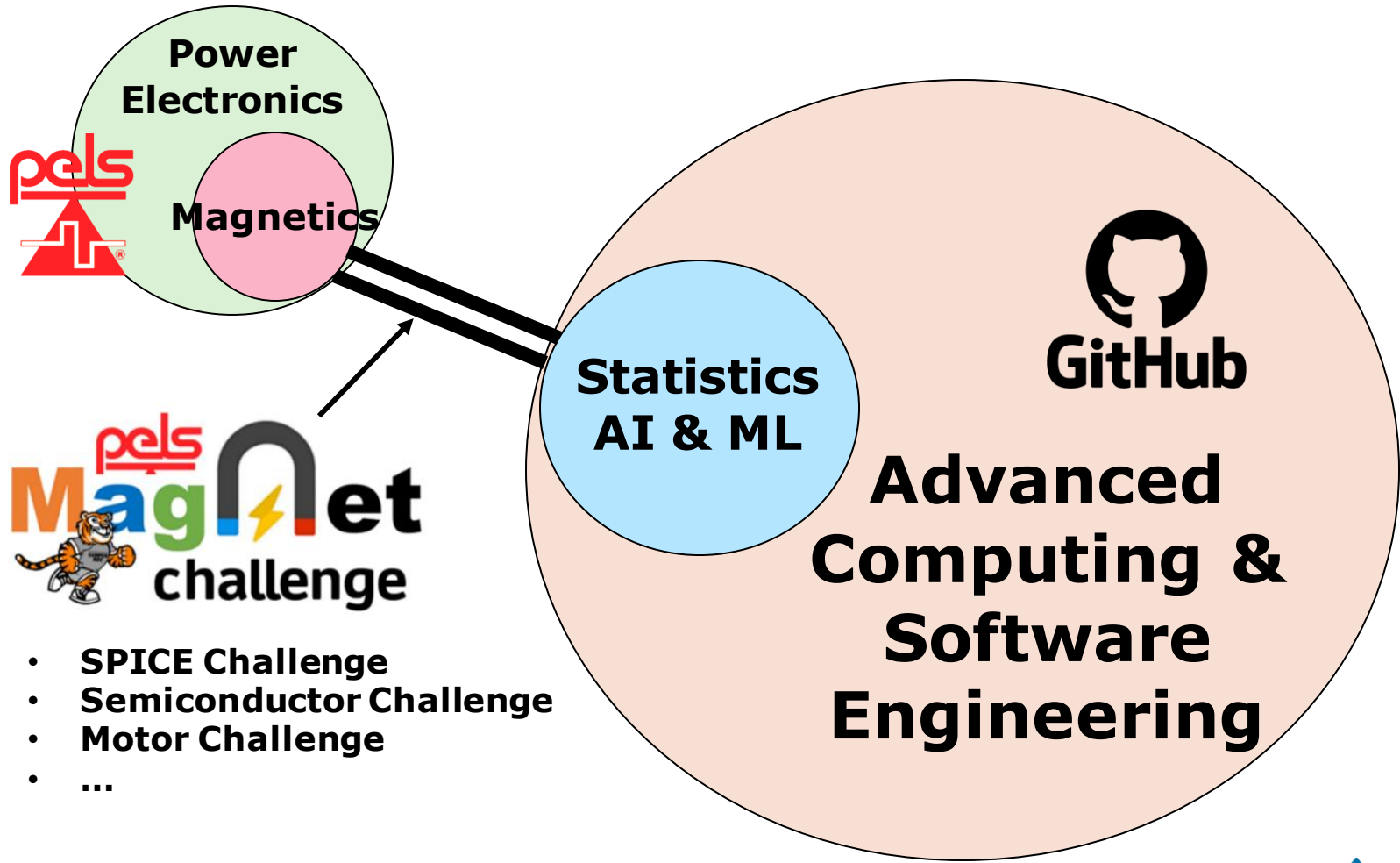
Top Performers

- Performance Track: Paderborn, Fuzhou, Bristol, TU Delft, Sydney
- Novelty Track: Sydney, Mondragon, SEU-MC, Polito, TU Delft
- Honorable Mention: ASU, IISc, XJTU, ZJUI, UTK, Tsinghua

IEEE POWER ELECTRONICS SOCIETY
Advancing Technology for Humanity

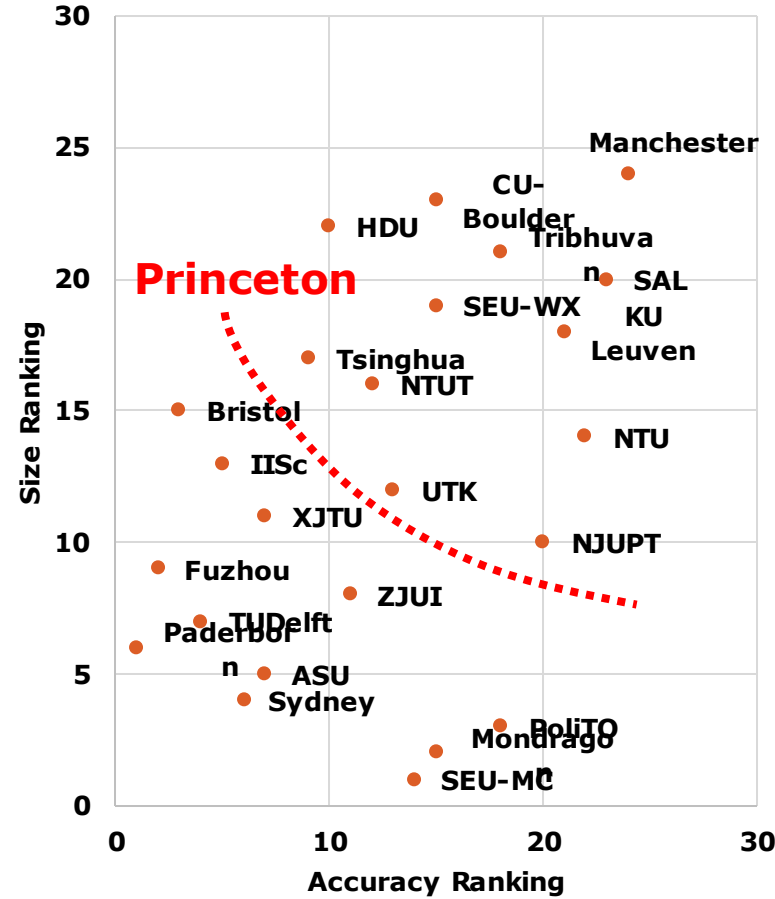
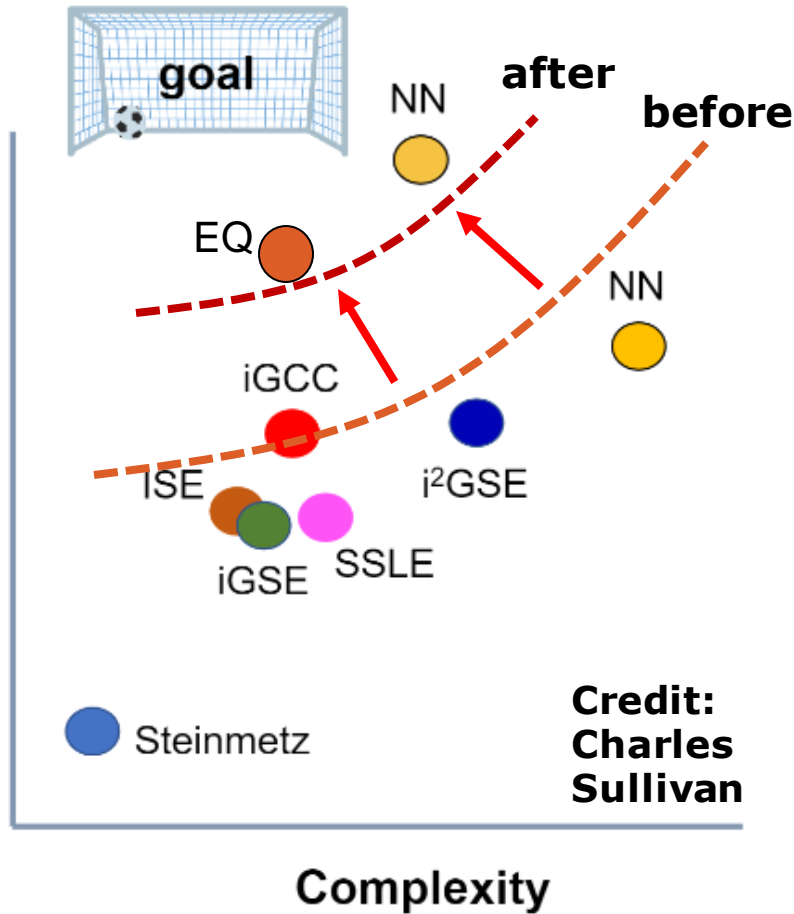


Connect PELS with AI/ML



- **SPICE Challenge**
- **Semiconductor Challenge**
- **Motor Challenge**
- ...

Advance Power Magnetics Modeling



Open Source in Power Electronics

**We are stronger TOGETHER
Ready for the new challenge?**



MagNet Challenge \$55,000 Prize Pool

Model Performance 1 st Place \$10,000	Model Novelty 1 st Place \$10,000	Outstanding Software Engineering \$5,000 Honorable Mention \$1,000 x 9
Model Performance 2 nd Place \$5,000	Model Novelty 2 nd Place \$5,000	
Model Performance 3 rd Place \$3,000	Model Novelty 3 rd Place \$3,000	



\$35,000



\$10,000



\$10,000



**PRINCETON
UNIVERSITY**



DARTMOUTH



Outstanding Performance Award, 1st Place

Nikolas Foerster, Wilhelm Kirchgaessner, Till Piepenbrock,
Oliver Schweins, and Oliver Wallscheid

*"for an accurate, compact, and elegant data-driven model
with systematic design method"*

(Paderborn University, Germany)

Accuracy #1, Size #6



Outstanding Performance Award, 2nd Place

Xinyu Liu, Chaoying Mei, Rui Zhao,
Gaoyuan Wu, and Hao Wu

"for their high performance model, and thorough understanding about power magnetics modeling and visionary exploration"

(Fuzhou University, China)
Accuracy #2, Size #9



Outstanding Performance Award, 3rd Place

Lizhong Zhang, Tom McKeague, Binyu Cui, Navid Rasekh,
Jun Wang, Song Liu, and Alfonso Martinez

"for their deep understanding about the data and the systematic design approach for data-driven power magnetics modeling"

(University of Bristol, United Kingdom)
Accuracy #3, Size #15



Excellent Innovation Award, 1st Place

Qiujie Huang, Yang Li, Yu Dou,
Bo Li, and Sinan Li

"for the novelty in hybrid equation-based and data-driven approach, and the outstanding model performance"

(University of Sydney, Australia)

Accuracy #6, Size #4



THE UNIVERSITY OF
SYDNEY



Excellent Innovation Award, 2nd Place

Zhengzhao Li, Reza Mirzadarani, Ruijun Liu, Lu Wang,
Tianming Luo, Dingsihao Lyu, Mohamad Ghaffarian Niasar,
and Zian Qin

*"for the novel method for designing data-driven power
magnetics model, especially multi-objective-optimization"*

(Delft University of Technology, Netherland)

Accuracy #4, Size #7



Excellent Innovation Award, 3rd Place

Asier Arruti Romero, Borja Alberdi Esuain,
Anartz Agote San Sebastian, and Iosu Aizpuru Larranaga

*“for the outstanding exploration on equation-based power
magnetics modeling and the automated algorithm”*

(Mondragon University, Spain)

Accuracy #15, Size #2



Best Software Engineering Award

Qiujie Huang, Yang Li, Yu Dou,
Bo Li, and Sinan Li

(University of Sydney, Australia)
Accuracy #6, Size #4
Software Engineering #1



THE UNIVERSITY OF
SYDNEY



Honorable Mention

Emmanuel Havugimana, Vivek Thomas Chacko, Sritharini Radhakrishnan, and Mike Ranjram

“for excellent model optimization and comparison”

(Arizona State University, United States)

Accuracy #7, Size #5



Honorable Mention

Neha Rajput, Himanshu Bhusan Sandhibigraha, Neeraj Agrawal, and Vishnu Mahadeva Iyer

"for the development of excellent hybrid data driven models"

(Indian Institute of Science, India)
Accuracy #5, Size #13



Honorable Mention

Alessio Giuffrida, Nicolo Lombardo, Fabio Marmello, Simone Morra, Marco Pasquale, Luigi Solimene, and Carlo Stefano Ragusa

"for excellent exploration of hybrid models"

(Politecnico di Torino, Italy)
Accuracy #18, Size #3



**Politecnico
di Torino**



Honorable Mention

Chengbo Li, Wei Qin, Xiang Ma, Boyu Zhang,
Zheng Wang, and Ming Cheng

*"for proposing and implementing a compact model for
power magnetics"*

(Southeast University, China)
Accuracy #14, Size #1



Honorable Mention

Wei Xu, Jiyao Wang, Youkang Hu,
Jing Xu, and Zhongqi Shi

*"for the development of a new data-driven approach for
power magnetics modeling"*

(Southeast University, China)
Accuracy #15, Size #19



Honorable Mention

Bowen Su, Yunhao Xiao, Min Yang,
and Kai Sun

"for the development of a high performance data-driven model as a full undergraduate team"

(Tsinghua University, China)
Accuracy #9, Size #17



Honorable Mention

Syed Irfan Ali Meerza, Kody Froehle, Han Cui,
Daniel Costinett, and Jian Liu

*"for bringing state-of-the-art machine learning insights to
power magnetics modeling"*

(University of Tennessee Knoxville, United States)
Accuracy #13, Size #12



Honorable Mention

Zhanlei Liu, Cao Zhan, Yongliang Dang, Yukun Zhang, Na Wang, Yiting Chen, and Yiming Zhang

“for developing a high performance data-driven model for power magnetics modeling”

(Xi'an Jiaotong University, China)
Accuracy #7, Size #11



Honorable Mention

Chushan Li, Yinan Yao, Tianxiang Hu, Lumeng Xu, Yiyi Wang, and Sichen Wang

"for developing a high performance data-driven model for power magnetics modeling"

(Zhejiang University-UIUC Institute, China)

Accuracy #11, Size #8

