SmarTon ETH zürich

Smarton Technology – Power Supply EDA Software Platform

Participating University: ETH Zurich, Babson College

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Introduction of ETHZ

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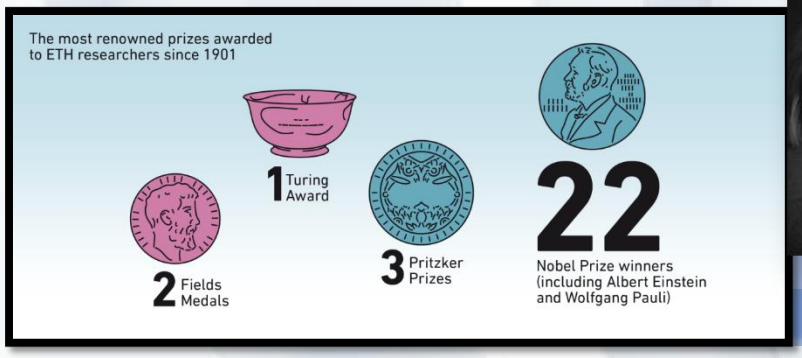
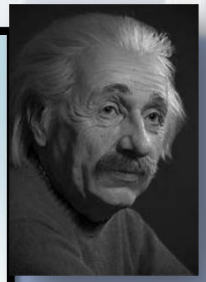
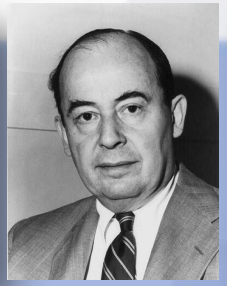





Albert Einstein ; Wilhelm Conrad ; Röntgen Wolfgang E.Pauli ; John von Neumann ; Wernher von Braun

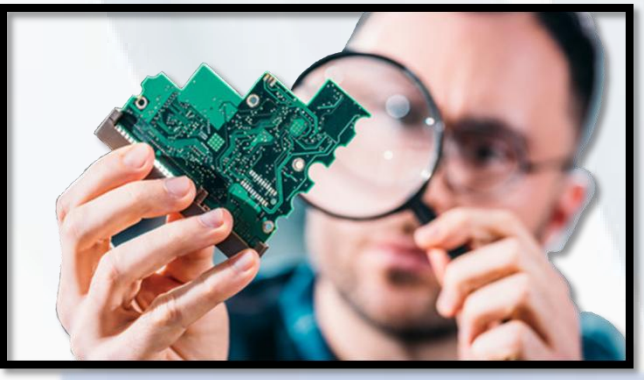
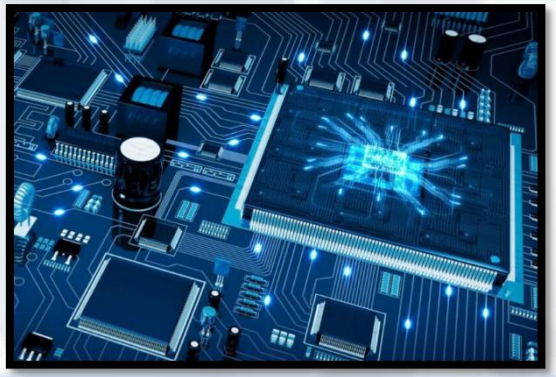


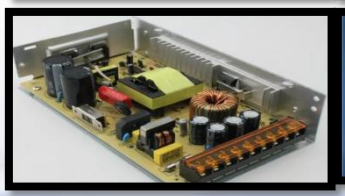

"The first university in Europe"

In 2021, QS ranked 6th in the wo

Background

How many kinds of software are needed for the hardware design of a product?


Software

PAIN POINTS
in the hardware design industry:
TOO FUSSY AND SLOW!

- *Circuit simulation*
- *Finite element simulation*
- *Structural design*
- *Schematic & PCB design*
- *Mathematical programming*
- *Device simulation*
- *Thermal simulation*
- *Magnetic simulation*
- *3D modeling*
- *.....*

Maple, ptc mathcad, MATHEMATICA, MathWorks, FEKO, Ansys HFSS, Maxwell, COMSOL, LTspice, Simulink, PSIM, plexim, SIMetrix TECHNOLOGIES, Flotherm, Saber, Caspoc, ALTIUM DESIGNER19, PSpice, SOLIDWORKS, ?

Pain Points of Hardware Design

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Power Supply Market | Signal Processing and Communication Market | Analog Circuit Design Market | Digital Circuit Design Market

R&D Bed on
Labor
and
Experience

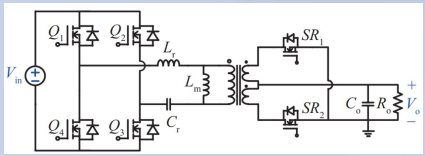
***Difficulty** in communication*
***Expensive** design software*
***Depends** on engineer experience*
***Hard** for technical accumulation*
***High** learning cost*
***Slow** iteration speed*
***Long** design cycle*
***High** error rate*

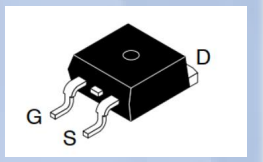
How to Get Rid of the Reliance on Engineer
Experience?

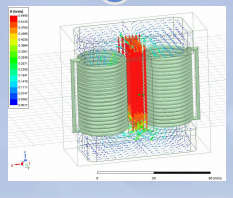
Design Process of Power Supply

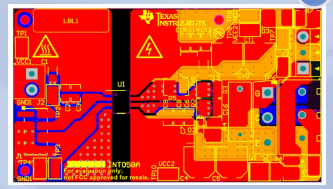
TRIAL AND ERROR & ITERATION

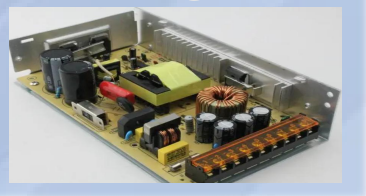
Topology Selection → Parameter Calculation → Device Selection → Magnetic Component design → Loss Calculation → Schematic Diagram & PCB → Experimental Verification











Features of Conventional Power Supply Design

- Product differentiation
- Complicated design process
- The higher demand for efficiency
- Manual iteration are slow

→ Design Cycle in Years

Product Concept

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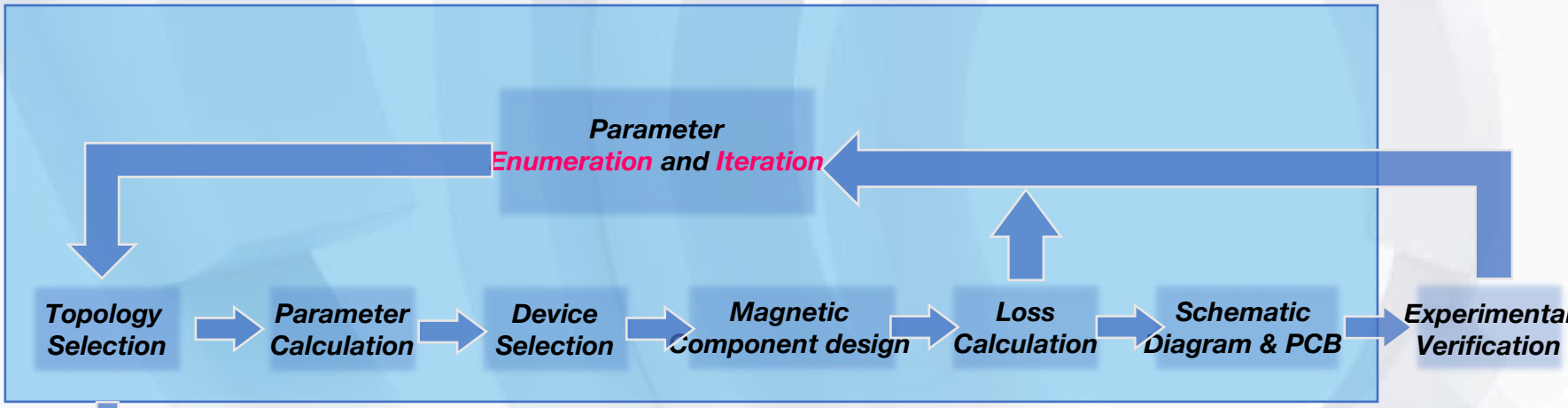

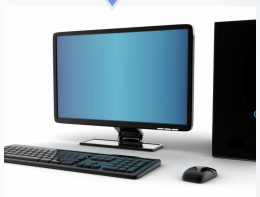

Input: Requirements

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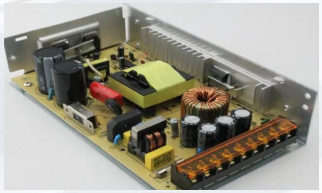
Output: Design scheme



Integrated Automated Design software

- **Faster** design speed
- **More accurate** calculation
- **More comprehensive** schemes selection

Don't rely on engineering experience

Break through the whole design process

Technical Support – Database

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Database

Calculation Model Database
Switching loss calculation model
Copper loss model of magnetics
Core loss model of magnetics
Thermal model of converter ……

Component Database
Semiconductor (lossmap, Rdson, …)
Inductor (coil, core, …)
Capacitor (Coss, Ciss, Crss, …)
Heatsink (type, thermal resistance, …)

PCB layout Database
Parasitic parameter
Signal loop
Heat dissipation
Electromagnetic interference……

Theoretical calculation data

Analog circuit design data

Simulation data

Digital circuit design data

Engineering measured data

System control mode data

Actual Engineering Cases Data

(Gradually expanding from the power supply design field to other fields)

Software Product

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SmarTon ***World's First Integrated power electronic automation design software platform***

Input

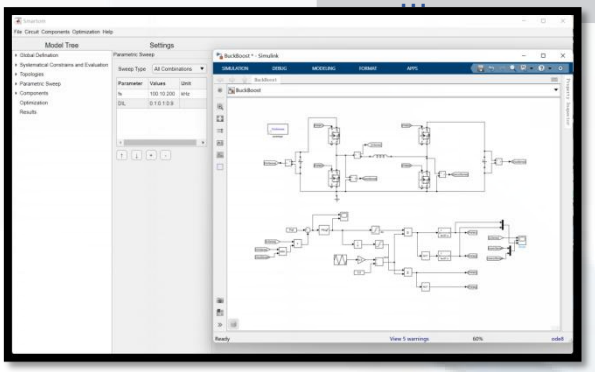
Specifications & Constrains
Optimization target
Topologies
Parametric sweeping
Component Settings
Optimization Algorithms
...

Process

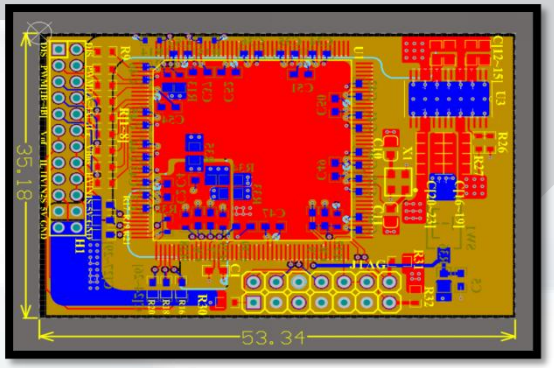
Sweeping parameters
Calculating waveforms
Calculating stresses
Optimizing component
Designing PCB and mechanical structure
Evaluating performance

Output

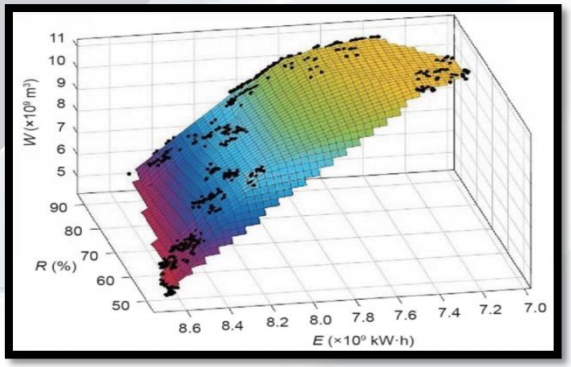
Pareto front
Circuit design
Component design
Controller design
PCB & Mechanical design
Performance



Topology input



PCB design output



Performance output

Targeted Market

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Global Hardware Design Market

Custom Power Supply Market

Other Market

Targeted Market

- **Power supply market**
- **Analog circuit and digital circuit design market**
- **Communication Engineering & Signal Processing design market**
- **Chip peripheral circuit design market**
- ……

Business & Costumer & Model

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Database constantly updated

Main business	Targeted Costumer
 Software and Service	SIEMENS, ABB
 Design Service	Texas Instruments, ROHM Semiconductor, Analog Devices, MPS

Development Plan

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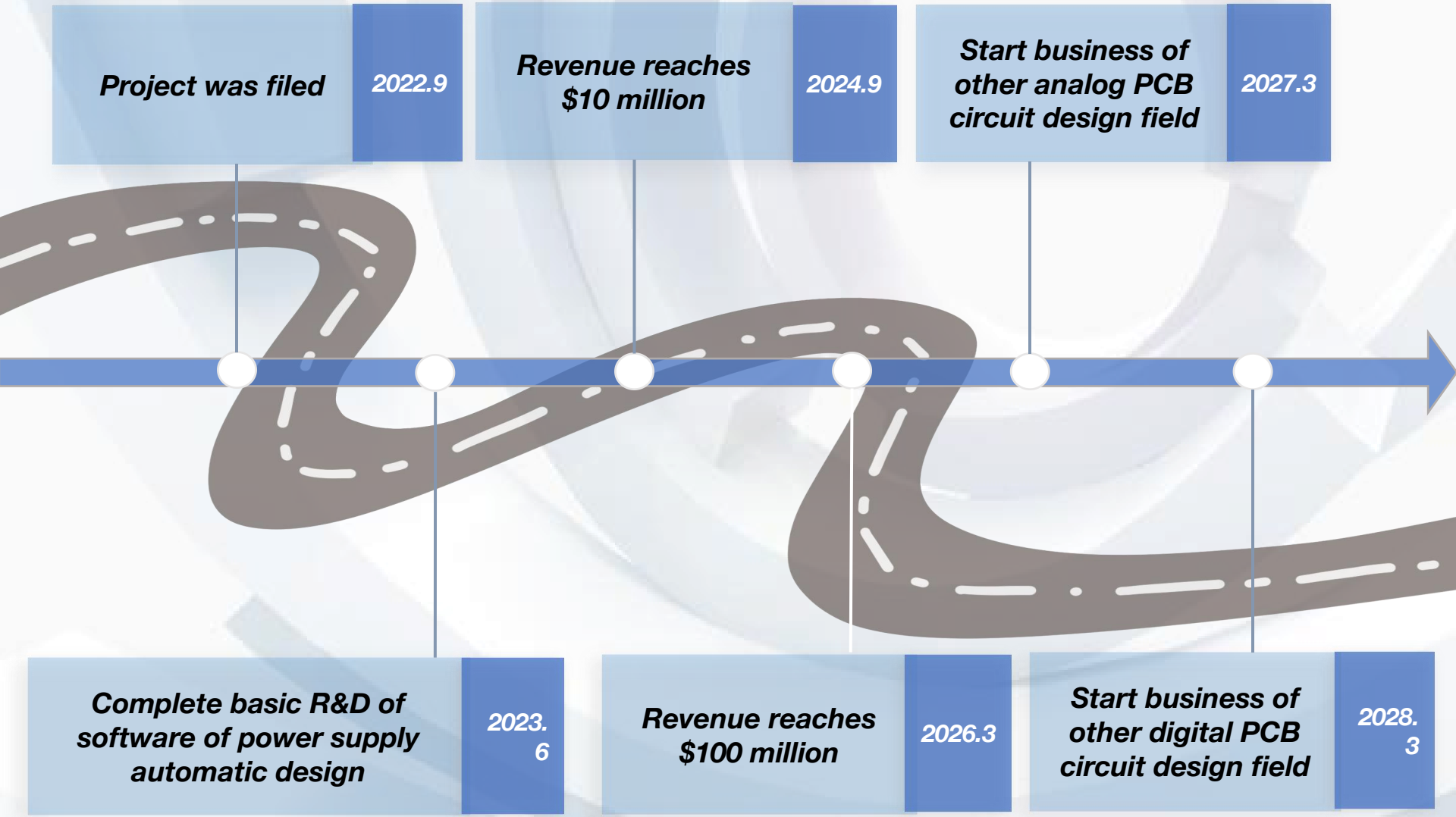

Our Vision

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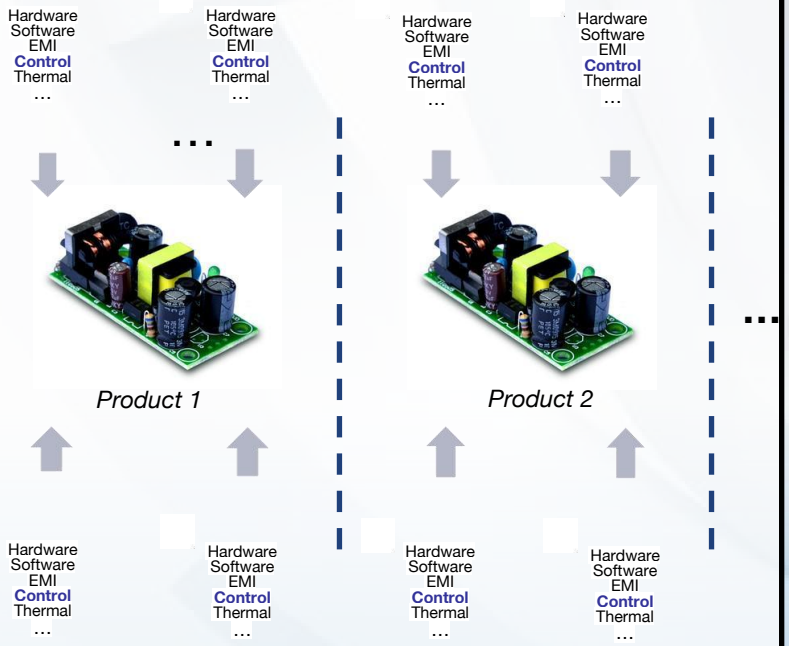
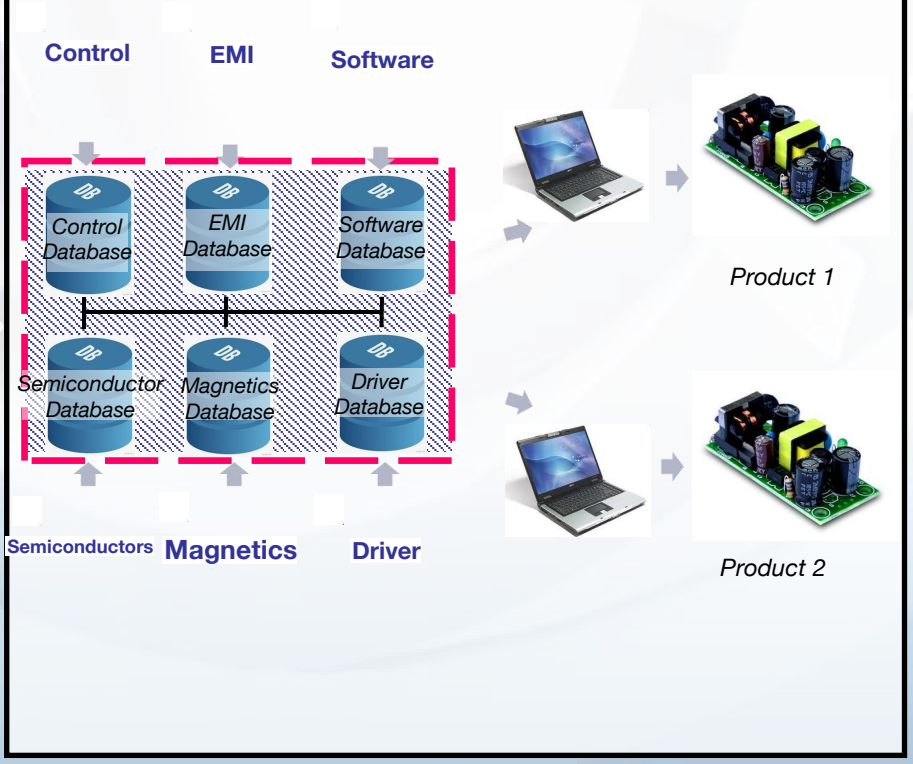
Leading the R&D Revolution in Hardware Design

Current R&D System in Units of Products



Future R&D System in Units of Technology



SmarTon *Integrated power electronic automation design software platform*

Founders

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Swiss Federal Institute of Technology in Zurich

Zheyuan Yu

COO

Xi'an Jiaotong University

He Yan

CMO

Babson College

Social And Educational Value

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- Improve designing efficiency
- Freeing engineers to do more creative work

Empower Engineers

The professional level of team members has been dramatically improved

Individual Ability Improvement

- Improve enterprise operation efficiency
- Promote the digital transformation

Improve Enterprise Efficiency

It can be applied to the professional ability training of college students

Academic Outcome

Reducing power consumption and carbon emissions

Ecological Civilization

we has trained a total of 3 doctoral students and 2 master students

Talent Cultivation

Thank you

SmarTon

He Yan
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