

Smarton Technology – Power Supply EDA Software Platform

Competition group: Creative idea group of graduate students from the main track of universities

Participating university: **ETH Zurich**

Corresponding University: **Xi' an Jiaotong University**

Reto Bonetti

Founder & CEO

Email: bonetti@lem.ee.ethz.ch



Introduction of ETHZ

The most renowned prizes awarded to ETH researchers since 1901



2 Fields Medals



1 Turing Award

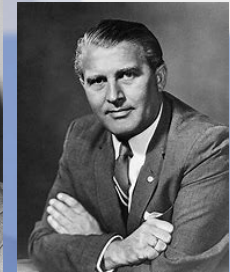
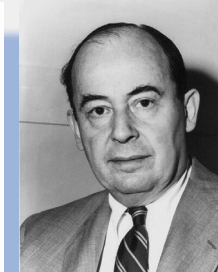
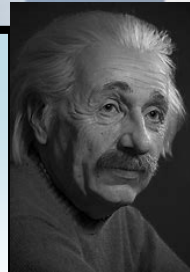


3 Pritzker Prizes



22

Nobel Prize winners (including Albert Einstein and Wolfgang Pauli)



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



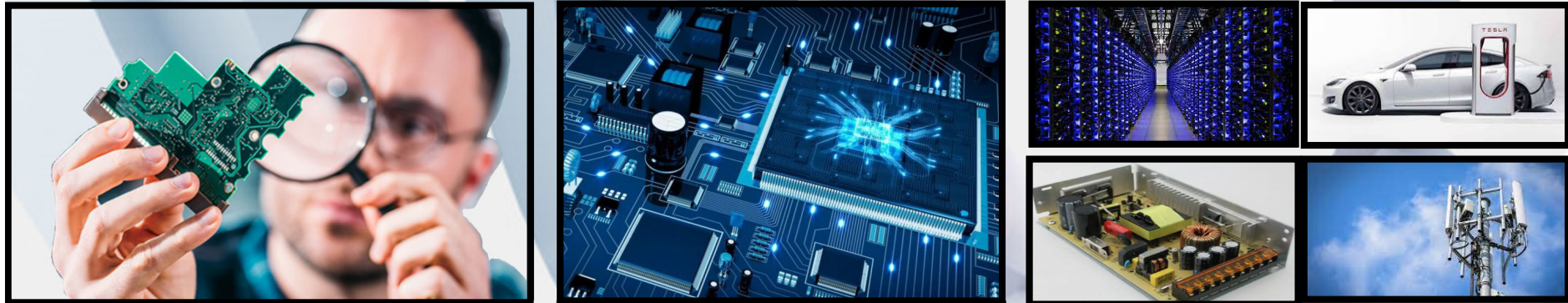
"The first university in Europe"

In 2021, QS ranked 6th in the world



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
-



Pain Points of Hardware Design

**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

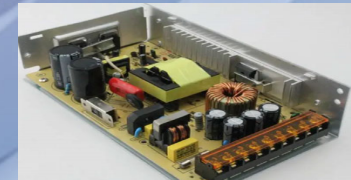
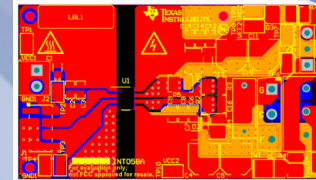
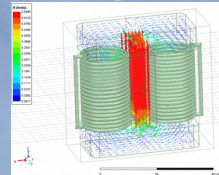
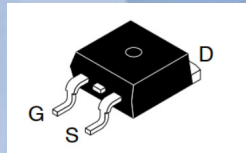
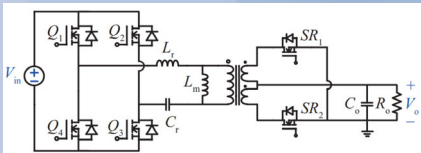
Device Selection

Magnetic Component design

Loss Calculation

Schematic Diagram & PCB

Experimental Verification

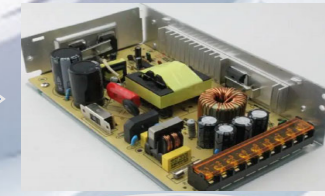
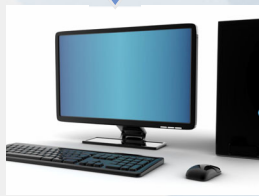
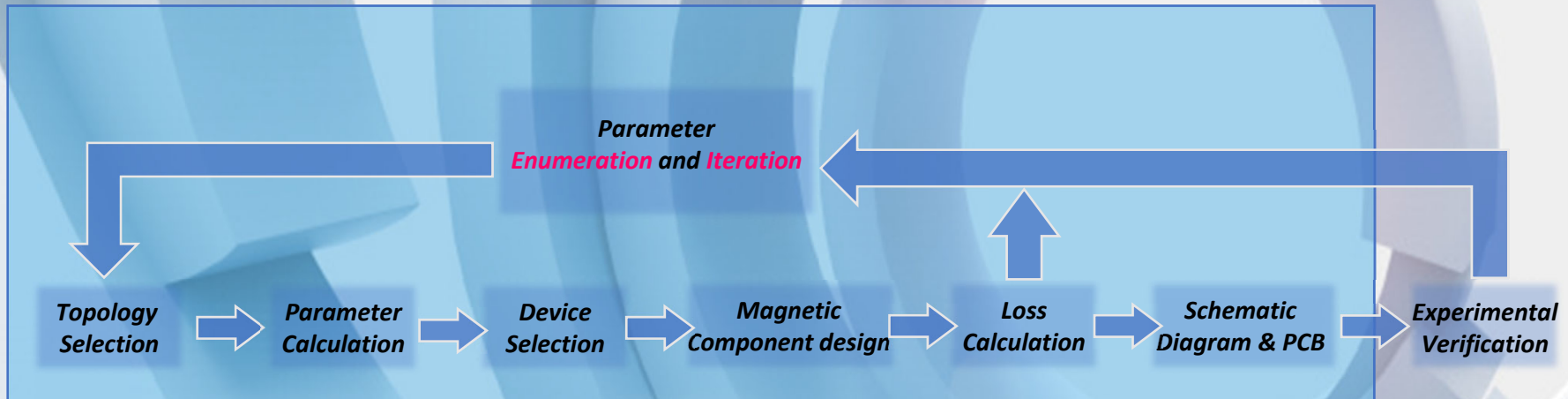


**Features of Conventional
Power Supply Design**

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

Design Cycle in **Years**

Product Concept



**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**

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)**

SmarTon

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

Input

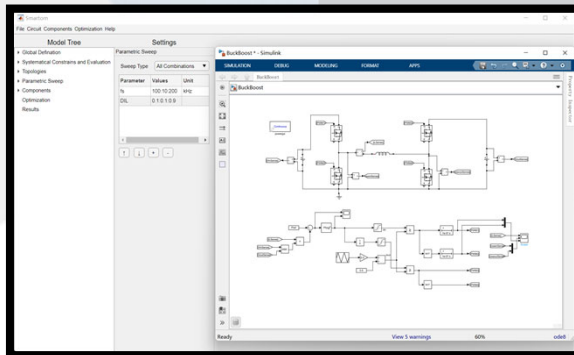
- Specifications & Constrains
- Optimization target
- Topologies
- Parametric sweeping
- Component Settings
- Optimization Algorithms

Process

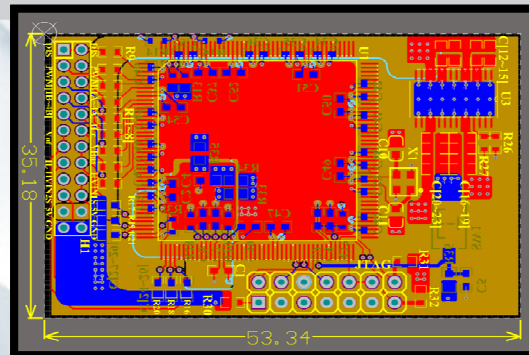
- Sweeping parameters
- Calculating waveforms
- Calculating stresses
- Optimizing component
- Designing PCB and mechanical structure
- Evaluating performance

Output

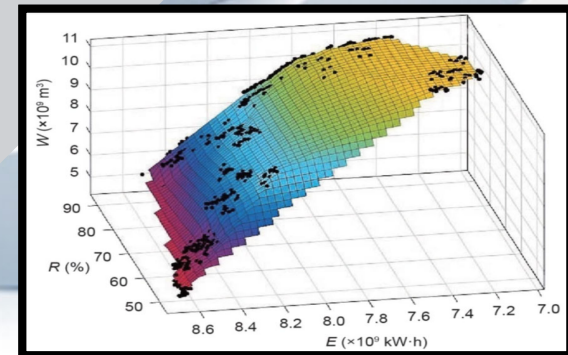
- Pareto front
- Circuit design
- Component design
- Controller design
- PCB & Mechanical design
- Performance



Topology input



PCB design output



Performance output

Targeted Market

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

.....



Main business

Targeted Costumer

SmarTon

Database
constantly
updated



Software and Service



Design Service

SIEMENS

ABB

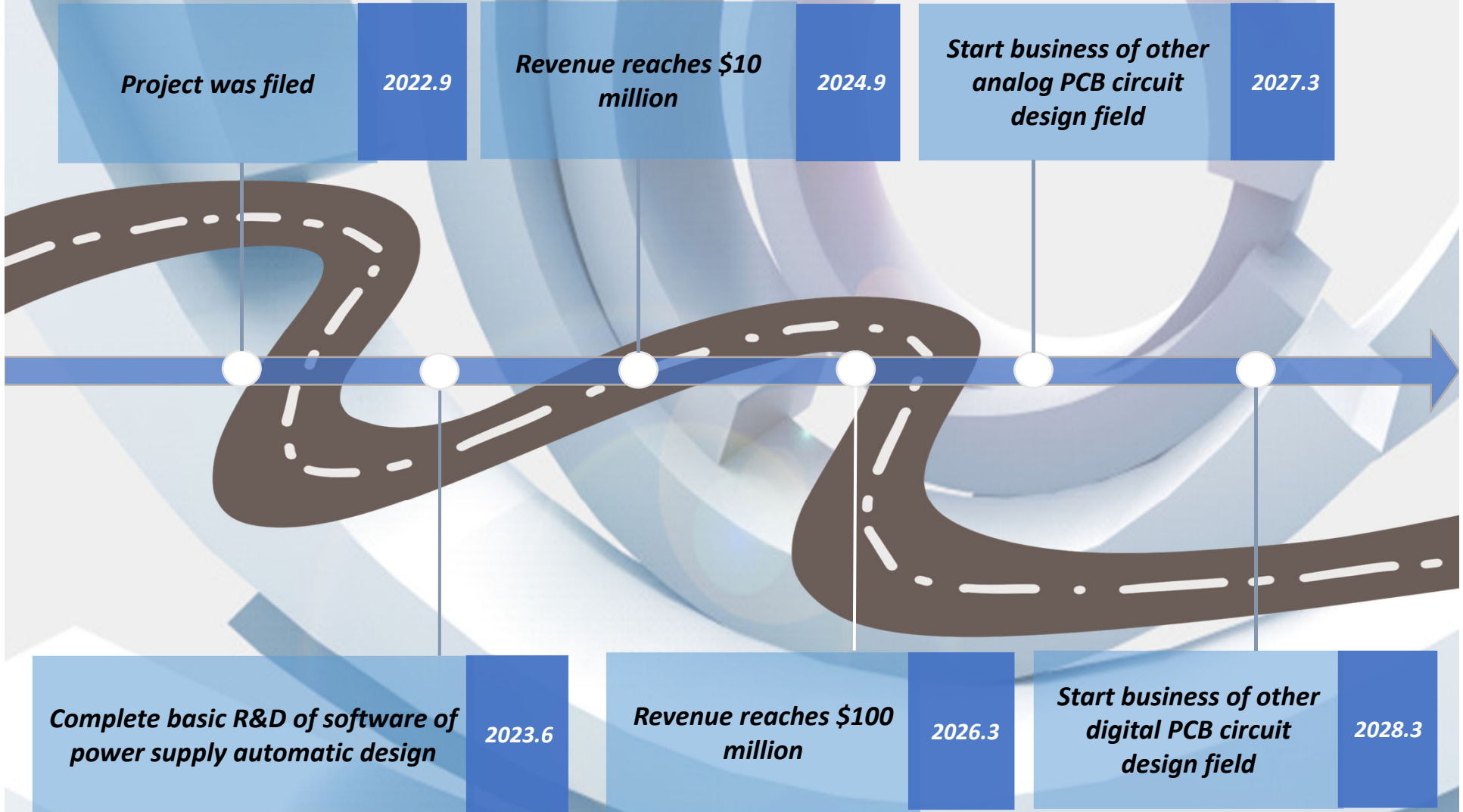
TEXAS
INSTRUMENTS

ROHM
SEMICONDUCTOR

ANALOG
DEVICES

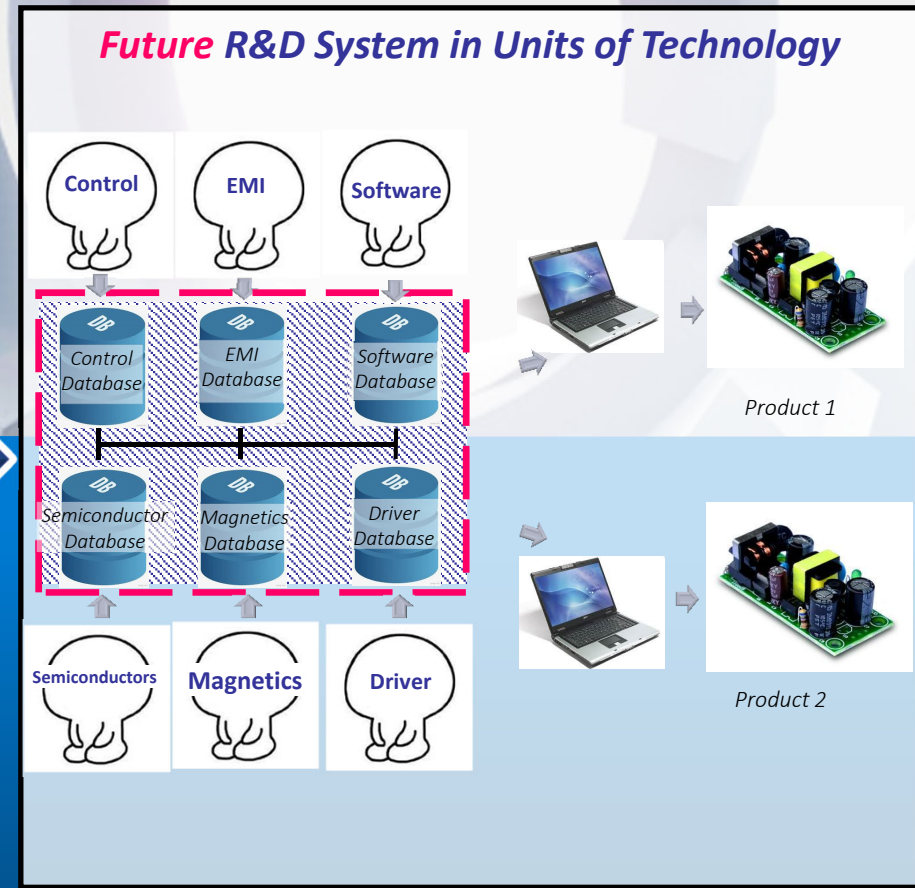
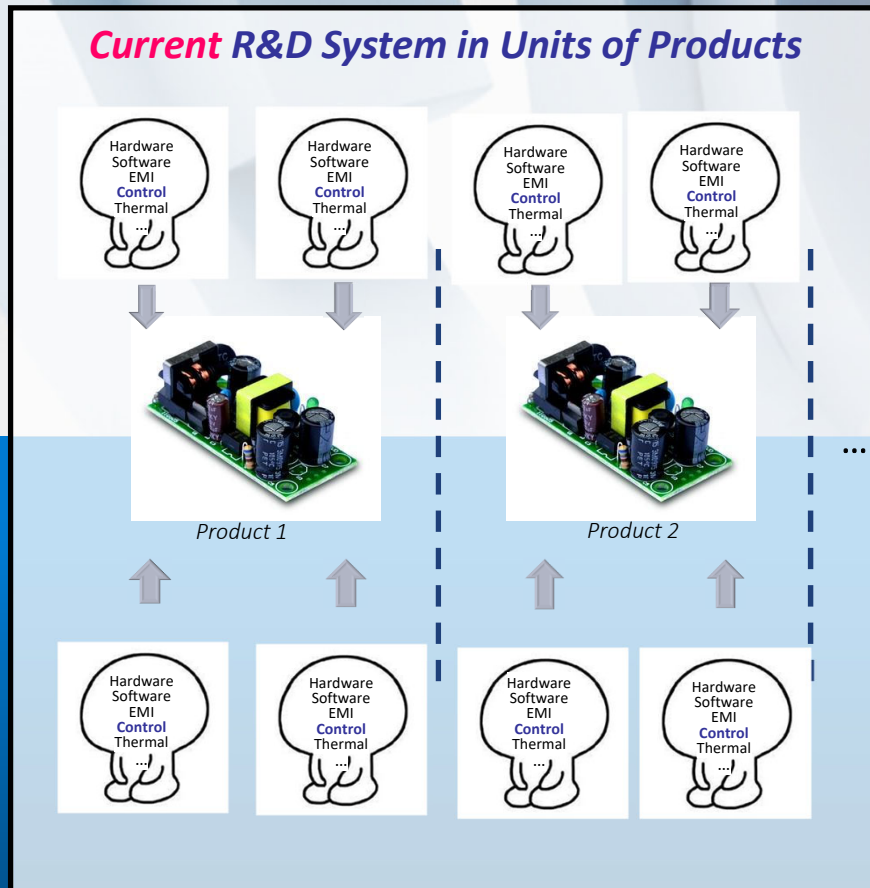
MPS

Development Plan



Our Vision

Leading the **R&D Revolution** in Hardware Design



Founders



Reto Bonetti

CEO



Swiss Federal Institute of Technology in Zurich



Neha Nain

CTO



Swiss Federal Institute of Technology in Zurich

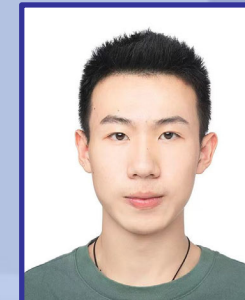


Zheyuan Yu

COO



Xi'an Jiaotong University



He Yan

CMO



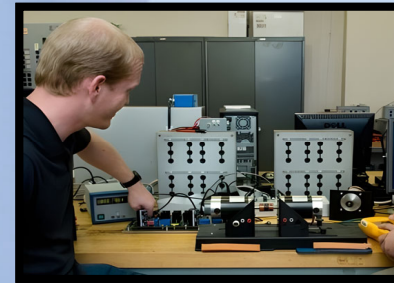
The University of Liverpool

Social And Educational Value



- 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

Reto Bonetti

Founder & CEO

Email: bonetti@lem.ee.ethz.ch