



Industrial Technology Research Institute
Mechanical and Mechatronics Systems Research
Laboratories (MMSL), Taiwan

The background of the image is a collage of industrial scenes, including a robotic arm, a lathe machine, and a welding process, all overlaid with a semi-transparent green filter. The logo is centered in the middle of the image.

Σ smart
advanced manufacturing

ORGANISATION PROFILE

Industrial Technology Research Institute (ITRI) is

- An independent non-for-profit innovation institution for Taiwan and the global industry
- Developing technologies for commercialization
- Nurturing open innovation with academia, industry, and global partners
- Incubating and spawning startups for emerging industry

Founded: 1973

Total staff: 5,952 (~2022/7)

- Ph.D.: 1,288
- Master: 3,637
- Bachelor: 1,027
- Alumni: 27,052

Total patents owned (~2022/7)

- 31,382

Startups & Spinoffs (~2022/Q2)

- 290 (Startups: 153)

Industry services (2021)

- Provided services: 18,392
- Transferred technologies: 672
- 140+CEOs in Taiwan high-tech industry

Products/Services: Technology services include:

- Joint Research,
- Technology Transfer,
- Contract Service,
- Testing and Verification,
- Pilot Production and Value-added Services,
- Prototyping & Manufacturing

Collaborations:

- Our branch locations in the **US, Germany, Japan, the Netherlands, Russia** and other parts of the world are crucial



Tainan Campus



Hsinchu HQ



Taichung Campus

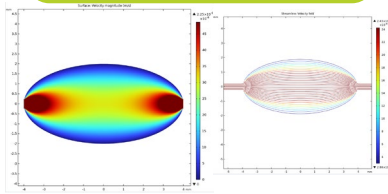
Mechanical and Mechatronics Systems Research Labs (MMSL) Overview

- Core Tech: *Intelligence, Precision and Green*
- Staff: 525 (Ph.D. 17%, MS 52%) / Patents: 2,700

UAV



BioChip Simulation



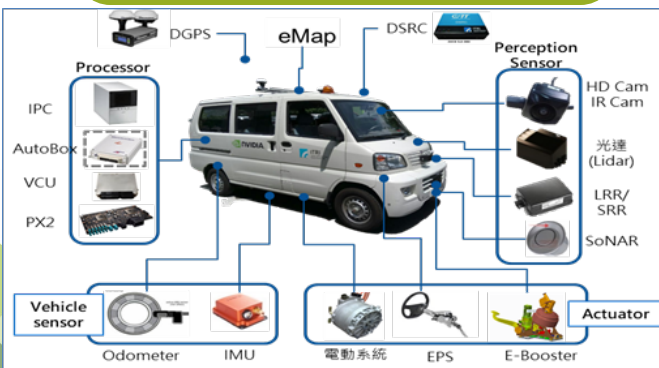
Intelligent Manufacturing



Intelligent Robotics



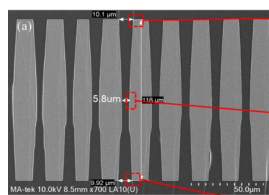
Autonomous and Electric Vehicle



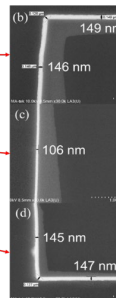
Intelligent Mobility



AR 12 (D=10um)



Intelligent factory



PROPOSAL INTRODUCTION (I)

Vision: Empowering the Future Through Precision

- Revolutionization the efficiency and miniaturization of electronic devices with new standards for precision and reliability.
- Our vision is to pioneer the next frontier in **semiconductor packaging** by seamlessly integrating **laser-assisted Redistribution Layer (RDL)** technologies.
- In envisioning the future of healthcare, we seek to revolutionize drug development, disease modeling, and personalized medicine through the transformative capabilities of **microfluidic organ-on-chip technology**.
- Integrating **sensing technologies** with microfluidic chips , such as biosensors and nanoscale detection methods, for **real-time monitoring** of biological processes and reactions within the chip.

Motivation:

- Taiwan is the largest producer of **semiconductor**.
- **Taiwan Semiconductors Market** Size predicted to reach US\$66.06 billion by the year 2031 (Report by InsightAce Analytic)
- **Laser-assisted bonding (LAB)** have gained significant attention due to its efficiency and effectiveness.
- The current focus on organ-on-chip development to revolutionize preclinical studies by faithfully replicating physiological conditions, enabling high-throughput screening, and accelerating drug discovery.
- Global organ-on-chip market is expected to reach US\$144.3 by 2029 (Report by MAXIMIZE MARKET RESEARCH PVT. LTD.).

PROPOSAL INTRODUCTION (II)

Expected outcome:

- *In the field of semiconductor packaging:* developed technology would be capable of performing **Laser-Assisted Bonding (LAB)** for semiconductor of deferent sizes using same setup.
- *In the field of microfluidic chip technology:* expected enhanced real-time monitoring, improved precision, diverse biosensing applications, automation with feedback control, multiplexed analysis, point-of-care diagnostics, portability, and advanced research tools for studying intricate biological processes.

Impacts:

- *In the field of semiconductor packaging:* **increased production efficiency, cost savings, flexibility in design, optimized resource utilization, scalability, reduced complexity, and shorter time-to-market.**
- *In the field of microfluidic chip technology:* far-reaching, influencing precision medicine, drug discovery, diagnostics, disease modeling, ethical considerations, environmental sustainability, and the overall landscape of biomedical research and healthcare.
- In addition to that, we aim to contribute to a broader spectrum of innovation, pushing the boundaries of what is currently achievable across multiple scientific and technological domains including **fabrication of IC Chip for 5G technology, robotics and laser material processing.**

Schedule: January, 2025 ~ December, 2026

PARTNERS

Current Consortium: ANNTONG INDUSTRIAL CO. LTD., Taiwan

Partner search: All embers of Eureka

CONTACT INFO

Swami Siddharth

Researcher

Ultra-precision mechanical equipment technology department

Industrial Technology Research Institute, Zhudong Township, Hsinchu County, Taiwan

Email: ssid@itri.org.tw

Tel: +88635919171

Ming-Jyh Chang

Senior Engineer

Ultra-precision mechanical equipment technology department

Industrial Technology Research Institute, Zhudong Township, Hsinchu County, Taiwan

Email: mingjyhchang@itri.org.tw

Tel: +88635916562

