

# APAIE 2024



PERTH, AUSTRALIA 4-8 MARCH 2024

#APAIE24

APAIE 2024



PERTH, AUSTRALIA 4-8 MARCH 2024

*Collaborating for sustainable impact: partnerships across the Asia Pacific*

APAIE Perth 4 - 8 March 2024

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Session 15A: Thurs 7<sup>th</sup> March, 11:15 – 11:45

## **Cross-Border Talent Cultivation: An Industry-Academic Cooperation Model in Semiconductor Technology**

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Western Sydney University, Australia

### **Chair**

Kuo-Wei Liu

Minghsin University of Science and Technology, Taiwan

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# **Cross-Border Talent Cultivation: An Industry-Academic Cooperation Model in Semiconductor Technology**



**APAIE 2024**  
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Perth, Australia | 4-8 March 2024

# Presenters



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**Dr. Kuo-Wei Liu**

**President**

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**Steven**

**McDonald**

**Manager of Learning Abroad**  
(Short Programs)  
Western Sydney University



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**WESTERN SYDNEY**  
UNIVERSITY





# NEW COLOMBO PLAN

*Connect to Australia's future - study in the region*



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## NEW COLOMBO PLAN

*Connect to Australia's future - study in the region*



Australian Government

# OS-HELP

**Seed Funding**

Not guaranteed

**Ongoing**

# CHALLENGE

July 1969



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Vacuum tubes, large,  
slow, expensive, fragile

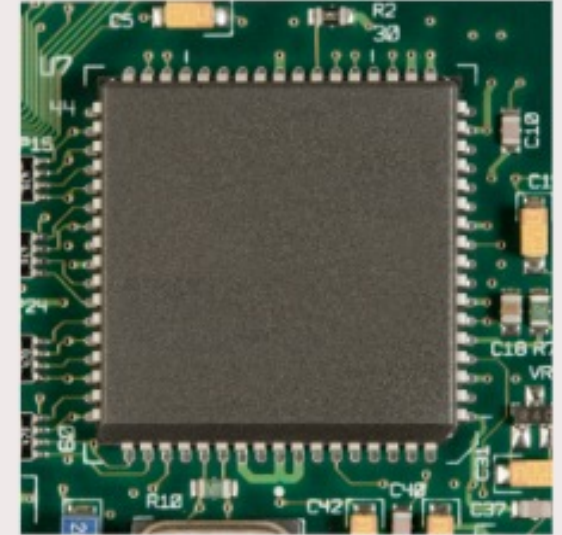
**MID 20TH CENTURY**



Transistor, smaller, no  
warmup, much faster,  
cheaper



Transistor, integrated  
into circuits (IC). 1971  
Intel 4004 had 2300  
transistors



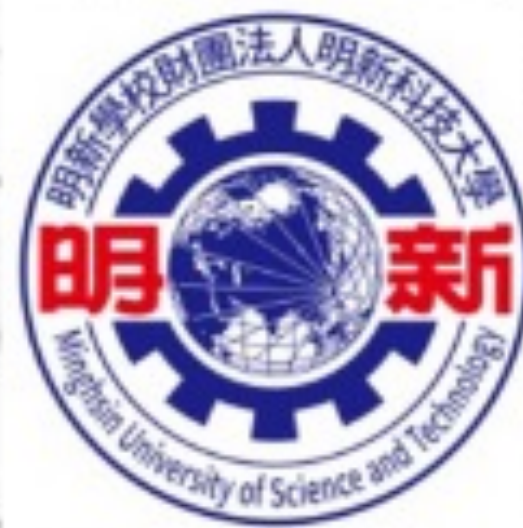
Computer chips, Apple  
M2 Ultra contains 134  
billion transistors.

**TODAY**



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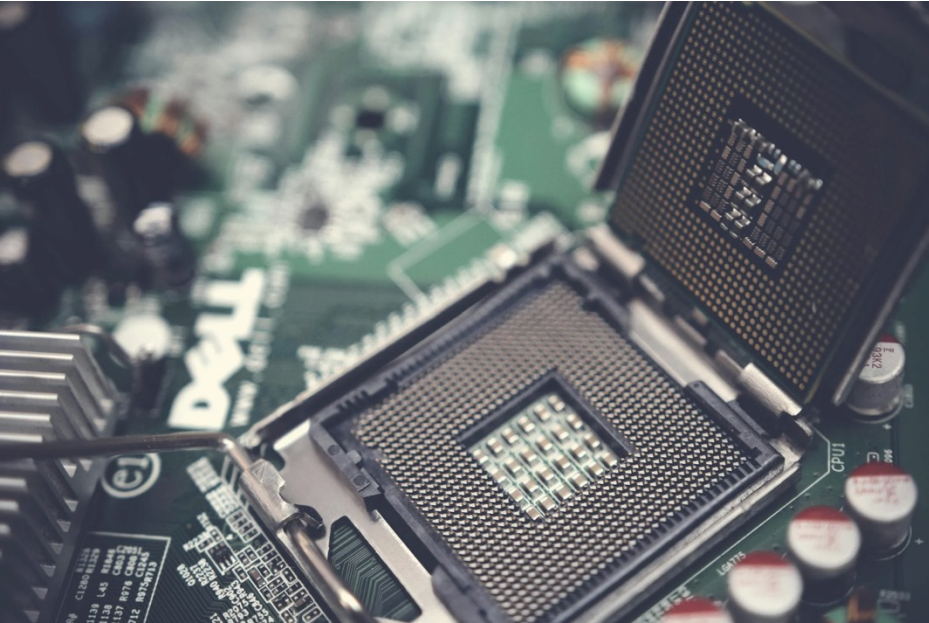
## NEW COLOMBO PLAN

*Connect to Australia's future - study in the region*

- New Colombo Plan (NCP) initiated by the Australian in 2014
- Approximately 10,000 students participate in the program annually
- Immersive study tours are very popular



# Introduction



The semiconductor industry in Taiwan has consistently maintained a leading position in process technology, process integration, and wafer manufacturing.

Due to the impact of the pandemic, it has highlighted the issue of excessive concentration of the global semiconductor supply chain in Asia, particularly Taiwan.

In recent years, countries and economies worldwide have actively pursued risk-sharing measures and compelling Taiwanese businesses to expedite the progress of establishing overseas manufacturing facilities.



# Introduction



However, the industry is simultaneously confronted with two major challenges: **talent shortage** and **the impact of management culture**.

Taking TSMC (Taiwan Semiconductor Manufacturing Company) as an example:

1. Kumamoto, Japan Plant: Completed construction within two years but **faced a significant talent shortage**. (Note 1)
2. Arizona, USA Plant: Progress delayed due to **clashes in management culture**. (Note 2)

Note 1:  
THE JAPAN NEWS : Water, Electricity Helped TSMC Pick Kumamoto as Japan Base; But Semiconductor Maker May Face Labor Supply Issues  
<https://japannews.yomiuri.co.jp/business/companies/20240224-170896/>

Note 2:  
The New York Times : Inside Taiwanese Chip Giant, a U.S. Expansion Stokes Tensions  
<https://www.nytimes.com/2023/02/22/technology/tsmc-arizona-factory-tensions.html>

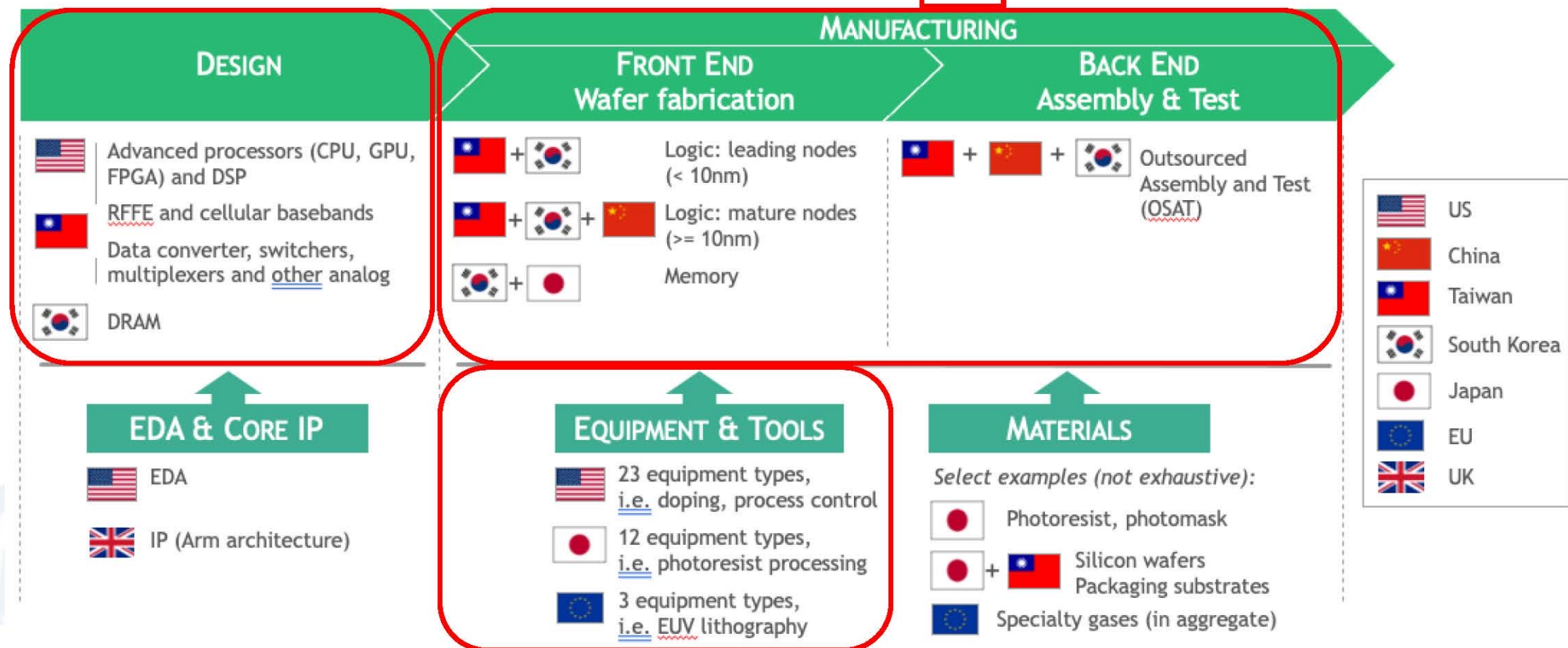
# Semiconductor Industry Information

Meeting Customer Quality Service Requirements in the New Normal  
Strength • Versatility • Dedication



## Introduction of Semiconductor Market – Semiconductor Supplier Chain

VALUE CHAIN ACTIVITIES WHERE ONE SINGLE REGION ACCOUNTS FOR **~65%** OR MORE OF GLOBAL SHARE<sup>1</sup>



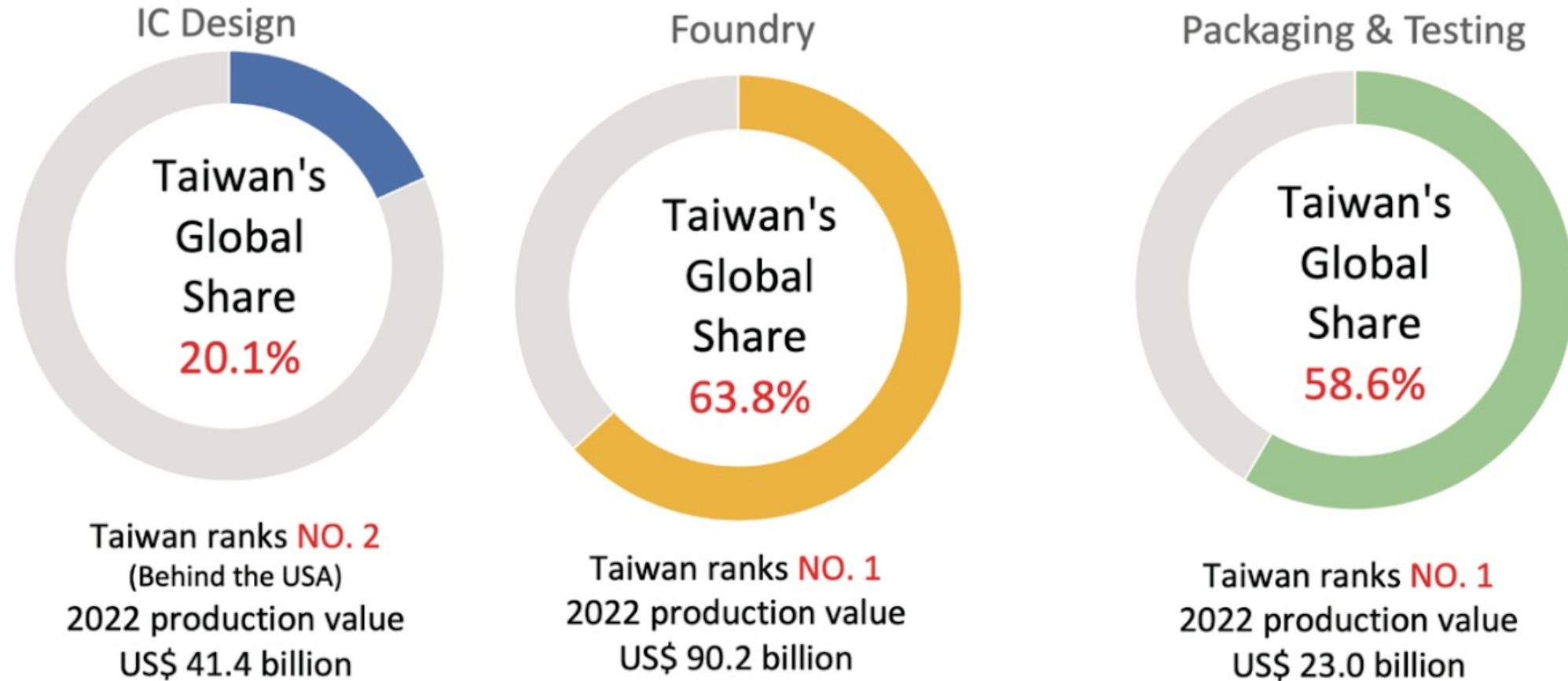
1. For Design, EDA & Core IP, Equipment & Tools and Raw Materials: global share measured as % of revenues, based on company headquarter location. For Manufacturing (both Front End and Back End) measured as % of installed capacity, based on location of the facility

Sources: BCG analysis with data from Gartner, SEMI, UBS; SPEEDA



# Semiconductor Industry Information

**Figure 4: Taiwan's Global Share in the Semiconductor Industry**



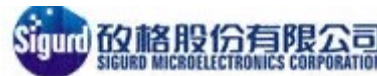
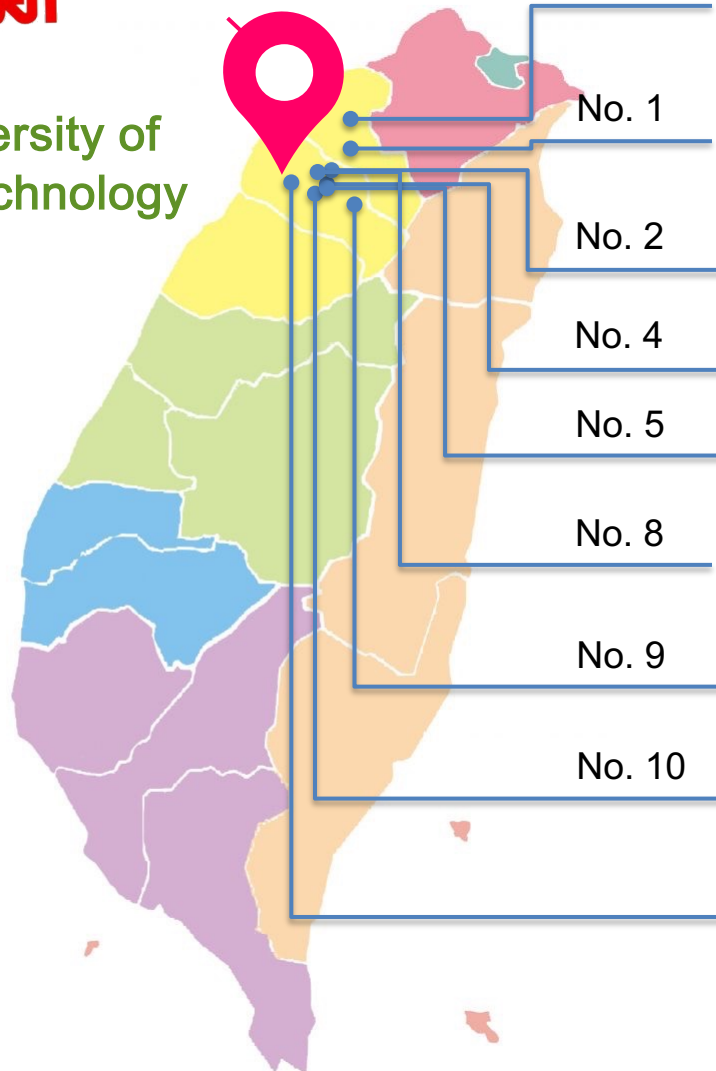
Source: IEK Consulting, ITRI, Industrial Development Bureau (IDB), Ministry of Economic Affairs (MoEA), R.O.C. (Taiwan), July 2023.

# Minghsin University of Science and Technology (MUST) in Semiconductor



Minghsin University of  
Science and Technology

## World's Outsourced Semiconductor Assembly and Test (OSAT) Companies



MUST locates at the core area of Hsinchu Science Park and industry park, it is also surrounded by many world leading semiconductor package and testing companies.

Hsinchu Science Park, known as "Taiwan Silicon Valley", 60% of the world's IT products are produced here.





The 1<sup>st</sup> Semiconductor packaging and testing production line



The 1<sup>st</sup> Semiconductor School



Unique Semiconductor packaging and testing engineer identification test place



The 1<sup>st</sup> "2+2N" Semiconductor Packaging and Testing Elite Class





**Wafer Cutting Machine Operation**



**Wire Bonding Machine Operation**



**Die Bonding Machine Operation**





**Photolithography Area**



**Human-Machine Interface  
Control Learning Environment**



**Thin Film and Device Measurement**



**Inspection Center**



**Inspection Center**



**Thin Film Process Area**



# CERTIFICATE OF ACHIEVEMENT

THIS CERTIFICATE IS PROUDLY PRESENTED TO

李 X X

LI, X X

ID : p123456789

has successfully met the requirements and completed

智慧電子人才應用發展推動計畫  
半導體封裝工程師能力鑑定合格證書

Issue Date:

2023年10月26日

Certificate ID:

DTRI-IEI-112-0040



財團法人資訊工業策進會  
INSTITUTE FOR INFORMATION INDUSTRY



數位轉型研究院  
Digital Transformation Research Institute



智慧電子學院  
Intelligent Electronics Institute

Offering certificates in conjunction with the Industrial Development Bureau (IDB) and Institute for Information Industry (III).

Certified students easily get internship opportunities in the IC packaging and testing industry and are typically employed at the engineer level.



The **NCP Mobility Program** provides funding to Australian universities to deliver mobility projects that enable Australian university students to participate in **study, internships**, mentorships, practicums and research in eligible Indo-Pacific host locations.

The subsidy standards set by the Australian government are outlined below.

1. At least 2 weeks : up to \$3,000
2. **At least 4 weeks : up to \$4,000 (USD\$ 2,600)**
3. At least 6 weeks : up to \$5,000
4. At least one semester : up to \$10,000
5. At least two semester : up to \$20,000



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2023~2024

## Taiwan Experience Education Program

Internship in Taiwan

### **Internship + Chinese :**

The wide range of programs under TEEP provides students opportunities to immerse in the operations of key Taiwan companies and industries.

TEEP also helps students find relevant and useful job placements. Taiwan is an ideal place for international students to learn Mandarin Chinese, and Chinese traditions and culture.

Each participant is eligible to receive a monthly stipend (**maximum 500 USD**) based on MOE regulations and program rules.



## Semiconductor Rising Star Program

- Topic: Semiconductor Training and Internship
- Partner university: Western Sydney University (WSU)
- Project schedule: 1 month
- Scholarship: TEEP USD\$500 + NCP AUD\$4,000

### Two tracks:

1. Professional Certification : Upon passing the exam, a Semiconductor Packaging Engineer certificate will be awarded.
2. Training Program: In addition to becoming familiar with semiconductor theory and hands-on machine operations, there is also an opportunity to participate in internships with companies.



V101



JTRON will donate eight V101 (a semiconductor testing equipment), and MUST will deliver training programs to assist WSU in the training of seed teachers and the establishment of a local talent development center.

Leveraging the aforementioned hardware and software, WSU will be able to provide introductory intermediate-level semiconductor training courses and certifications.

Following this, WSU students can engage in advanced semiconductor training courses and internship at MUST and Taiwan, utilizing TEEP and NCP. Upon successful completion, they will be eligible to obtain advanced certifications.





**The WSU delegation visiting MUST**





## Trilateral Discussion





**Checking in V101 that will be donated by JTRON**



## Conclusion



- In response to the trend of global risk-sharing, it is necessary for a university evolving into an international talent cultivation hub, especially in the semiconductor manufacturing field.
- Through participation in educational programs and internships within Taiwan, international students will gain insights into corporate culture.
- This transnational model of industry-university cooperation can be reciprocally applied to Australia's key industries, establishing opportunities for mutual talent exchange.

A nighttime photograph of a city skyline, featuring the Taipei 101 skyscraper prominently in the center. The city is illuminated with various lights, and mountains are visible in the background under a twilight sky. A semi-transparent white box on the left side contains the text.

**Thank you for your attention  
and look forward to future  
collaborations!**

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