

I. Policy:

To reflect the public nature of higher education and fulfill the university's social responsibility, NCUE's Innovation Incubation Center of the Research and Development Department actively promotes innovative businesses and assists traditional industries.

(4) Consistent with the national strategy, we build a diversified platform with precision machinery, smart electric vehicles, and green energy industries as core technologies to form a refined incubation network and develop local competitive industries. Using the expertise and resources of the university, we help enterprises that are pursuing sustainable development goals to start up and grow. By providing long-term assistance in improving industrial technology and helping manufacturers to obtain government R&D subsidies, we cultivate industrial cooperation and expand the benefits of the guidance provided by the university in the Taichung-Changhua-Nantou Region.

In recent years, NCUE has gathered diverse resources from several of its departments, academic and research institutions in neighboring areas, the Changhua County Industrial Advancement Association, public associations, and the service centers of industrial parks and has integrated the resources of teams formed by full-time teachers with practical experience. Through the guidance of experts in various professional fields, we provide manufacturers with extensive, thorough proposals and strive to implement them. Jointly with a neighboring university (Dayeh University), we set up the "Changhua County Local Innovative Organization Alliance" and undertook cross-discipline and cross-university cooperation in order to promote R&D among small and medium-sized enterprises, as well as industry-university cooperation in innovation in the Taichung-Changhua area. Faculty members with relevant expertise are sent to cooperate in R&D with manufacturers facing a problem or otherwise in need. We also encourage enterprises to apply for government R&D subsidies (such as SBIR and CITD) to reduce their R&D costs, enhance their innovation and R&D capabilities, and increase their innovation momentum.

While the experts and scholars guide the manufacturers, they also pass on their experience and enhance the effects of their teaching by leading master's students and undergraduate research students in their work. The students deepen their understanding of enterprise operations by verifying theories in the practical world and engaging in real work, which enhances their global knowledge and ability to work professionally in preparation for their future careers.

With the help of universities and research institutes in neighboring areas, the manufacture of precision machinery has been revitalized, while the power of process technology, innovation, and R&D has increased. We also focus on expanding sales to maintain industrial development momentum, driving the connected development of

industrial chains to achieve economic prosperity, creating job opportunities, planning marketing strategies, and expanding international business opportunities.

II. Achievements:

In the 2022 academic year, NCUE implemented the “Science and Technology Care Project to Support Small and Medium-sized Enterprises” and the “Industry Guidance for Innovation in Industrial Parks Project” while guiding local small and medium-sized enterprises toward industrial upgrades. The results of the guidance are as follows:

(I) Science and Technology Care Project to Support Small and Medium-sized Enterprises

1. Participating enterprises/experts and scholars/students: 9/15/15
2. New products/technology development: 3 cases
3. Technical and talent training courses: 2 sessions
4. Applications for government subsidies: 2 applications (2 approved) for a total of 1.02 million NTD
5. Patent applications and utilisation: 6 cases
6. National contests on special topics: 6 cases

(II) Industry Guidance for Innovation in Industrial Parks Project

1. Participating enterprises: 109; experts and scholars: 16
2. Technical coaching: 15 cases
3. Technical and talent training courses: 9 sessions
4. Applications for government subsidies: 2 applications (1 approved) for a total subsidy of 3.041 million NTD
5. Student productions on special topics and national contests on special topics: 7 cases
6. Student internships: 37 people

(III) Utilizing the power of local public associations, we have cooperated with local industrial zones in Taichung and Changhua (Fuxing, Tianzhong, Pitou, and Taichung Industrial Parks), Changhua County Industrial-University Advancement Association, the Plumbing Association of Taiwan, and the Taiwan Sheet Metal Management Association to enhance the momentum in the value chains of cluster industries, and have used NCUE’s academic and research resources to assist the industries to develop according to their unique characteristics.

(IV) The joint projects that guide industries in their R&D and innovation promote information exchange between the industries and universities. The industries are guided to achieve intelligent manufacturing and design, while the short-term guidance offered to manufacturers on technology and various kinds of talent and practical training

courses helps them improve their techniques and meet the requirements of current trends. As a result, production efficiency can be improved, while the manufacturers can increase their industrial competitiveness. Below is a list of the manufacturers that successfully applied for government subsidies with our help in 2022:



Guided manufacturer	Subsidy program	Amount of subsidy	Instructor
Jia Jun Apparel Development Co., Ltd.	Changhua County SBIR	780,000 NTD	Professor CheiChang Chiou 、 Professor Yufang Cheng

(V) Through industry–university cooperation and internships, students are encouraged to participate in the national college-level competitions that focus on industry–university innovation practices, so that the students can be guided to discuss the issues in their disciplines in depth and apply what they have learned. The industry–university research cooperation strategy allows the university to strengthen its integration with industry, promote the assimilation between academics and industry practices, and cultivate talents with the practical skills industries require. Verifying theories in the real world and engaging in practical work enables the students to deepen their understanding of enterprise operations and prepare them for their future careers.

Competition the students joined	Instructor	Entry	Award
National Colleges and Universities IndustryUniversity Innovation Practice Competition	Professor MingFei Chen	Establish an intelligent hardware grinding and polishing detection system based on the TCP/IP communication protocol.	Practical Award
National Colleges and Universities IndustryUniversity Innovation Practice Competition	Professor MingFei Chen	Application of an object detection model based on a small number of samples for online inspection and classification of bicycle frame defects.	Honorable Mention
National Colleges and Universities IndustryUniversity Innovation	Professor ChihHsiung Shen	Using deep learning and computer vision to position a robotic arm for	—

Practice Competition		object manipulation.	
National Colleges and Universities IndustryUniversity Innovation Practice Competition	Professor ChihHsiung Shen	Smart Automated Water Circulation System	—
National Colleges and Universities IndustryUniversity Innovation Practice Competition	Professor Yeong-Lin Lai	Ultra High Frequency Antenna Design	—
National Colleges and Universities IndustryUniversity Innovation Practice Competition	Professor Yeong-Lin Lai	Ultra High Frequency Near-Field Internet of Things Antenna	—

案例1：乃興企業股份有限公司—人機協作之智慧製造於自行車杯架連續裝訂與取疵檢測整合研發

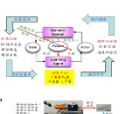
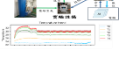
廠商需求	解決產品出貨過程中人工耗時、成本過高問題。提升更好的製程，整合與不良情形達成，開發自動化送料與加工程序。		輔導重點 1) 整合人機協作連續裝訂與取疵檢測生產之自動化技術 2) 開發快速建立人員辨識與肢體動作之神經網路模型，開發錄影模式之影像擷取程式，建立辨識的資料庫 3) 機械視覺技術與嵌入式系統整合 4) 智慧製造的延伸性與相容性
	輔導前	輔導後	
輔導成果	1. 機台上料作業平均5.84秒，按鈕平均0.99秒，接著是下料是1.28秒，作業時間要8.1秒。 2. 原作業需要左右兩個人力，左右上下料件以及半自動的作業方式，或是作業需要一個人力，但需要左右往返上下料件。	1. 上料作業平均 5.28秒 ，由於改善之後為自動下料而且上料作業和裝訂作業都同時進行， 提升生產力估計30% 2. 作業人員在同一側上料與動作辨識，減少下料，避免左右往返人力減輕體力負擔， 節省1名人力 。	 聯動視角與取疵自動化不易  與廠設計師共同開發
衍生效益			

Caption: Key guidance case –Nuvo Enterprise Co., Ltd.



Caption: Group photo of the County Executive, principals, and guests at the 2022 National Colleges and Universities Industry-University Innovation Practice Competition

案例1：協鴻工業股份有限公司—智慧螺桿研發

廠商需求	針對螺桿因熱漲升變位問題，以即時監控智慧補償方式，達到螺桿定位精度穩定控制		輔導重點 1) 螺桿會隨著運動而產生熱，累積的熱量造成尺寸伸長，造成加工誤差，一般會以中空螺桿搭配油冷機去改善，但無法做到即時的回饋修正，只能有限度的改善。 2) 智慧螺桿最佳化流道設計冷卻迴路，即時監控熱伸長及調整油冷機流量，可對螺桿進行動態即時熱補償，達到螺桿定位精度穩定控制在0.01mm以內。 3) 此功能應用在工具機進給軸，達到長時間加工，工件精度穩定的目標。
	輔導前	輔導後	
輔導成果	在朝向智慧機械發展的過程中，工具機智慧熱穩定控制已成為不可或缺的關鍵功能，經本計畫輔導，廠商對建構工具機智慧螺桿已有相關研發規劃，協助廠商縮短研發初期於相關技術評估應用或導入之時間。	1) 智慧螺桿最佳化流道設計冷卻迴路，即時監控熱伸長及調整油冷機流量，可對螺桿進行動態即時熱補償，達到螺桿定位精度穩定控制在0.01mm以內。 2) 此功能應用在工具機進給軸，達到長時間加工，工件精度穩定的目標。	 
衍生效益	在朝向智慧機械發展的過程中，工具機智慧熱穩定控制已成為不可或缺的關鍵功能，經本計畫輔導，廠商對建構工具機智慧螺桿已有相關研發規劃，協助廠商縮短研發初期於相關技術評估應用或導入之時間。		

Caption: Key guidance case –SHE HONG INDUSTRIAL CO. LTD.



Caption: Committee members review at the 2022 National Colleges and Universities Industry-University Innovation Practice Competition

