**科技部中部科學工業園區管理局**

**高科技產業設備技術暨智能化研發計畫─先期階段**

**智能化製造業創新創業專題演講**

**講題：Cyber-Physical Service Systems for Custom Orthoses**

**演講者：**

**Albert J Shih Ph.D.**

**Professor, Mechanical Engineering; Professor, Biomedical Engineering; Associate Chair, Integrative Systems and Design**

**University of Michigan at Ann Arbor, USA**

**ABSTRACT**

This seminar presents a cyber-physical service system (CPSS) for custom orthoses and prostheses. Orthoses, also known as braces, are assistive devices for structural support of the neuromuscular and musculoskeletal systems to help people with impairments to regain their mobility and independent living.  Custom orthoses has personalized fit, better comfort, and superior efficacy in treatment than pre-fabricated ones for users.  CPSS has the digital scanning, cyber-design center, and 3D-printing that aim to improve the quality of patient care and service of custom orthoses.  Unlike many small companies in Taiwan, hospitals do not have high-tech engineers on-site and the digital design and manufacturing are challenges.  This CPSS will be implemented at the University of Michigan Orthotic and Prosthetic Center (UMOPC) for custom ankle-foot orthosis (AFO).  The fabrication time and material cost for 3D-printing are critical to provide advantages over the conventional methods for fabrication.  This system targets to achieve the one-day visit for patients who need AFO.  Key elements of CPSS presented in this talk include the: (1) 3D scanning of the foot and leg, (2) computer aided design for clinicians, (3) cyber- and model-based design, (4) wavy structure tool path planning for AFO, (5) fused deposition modeling (FDM) for hard structure and soft silicone for wearable assistive devices, (6) quality control using the nano-CT technology, and (7) inertia measurement unit (IMU) for gait analysis, evaluation, and monitoring of users.  Expansion of CPSS for prosthetic socket, foot orthoses, and other assistive devices are elaborated.  Altogether, CPSS features the one-day delivery, passive dynamics for personal needs, long-term monitoring using the IMU for custom assistive devices and demonstrate the potential societal impacts enabled by the virtual (digital twin) and physical manufacturing of personalized products.

**舉辦時間：105年10月04日（星期二）上午10：30 – 12：00**

**舉辦地點: 中興大學中科園區育成中心2F國際會議廳（台中市西屯區科園路19號）**

**報名時間：即日起至 105 年 10 月 03 日下午 15:30 前 (額滿為主)**

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**演講者介紹：**



**Albert J. Shih Ph.D**.

Fellow of ASME, SME, Associated member of CIRP

Professor, Mechanical Engineering, Professor, Biomedical Engineering, Associate Chair, Integrative Systems + Design, Director, Global Automotive and Manufacturing Engineering, Univ. of Michigan at Ann Arbor

## Research Interests

Design and manufacturing; biomedical device design; biomedical manufacturing; medical innovation; surgical thermal management; machining of advanced engineering materials; micro manufacturing; precision engineering; optical metrology.

**智能化製造業創新創業專題演講**

**報名表**

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| **姓 名** | **單 位** | **職 稱** | **Email** | **聯絡電話** |
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**※報名時間：即日起至 105 年 10 月 03 日下午 15:30 前 (額滿為主)**

**※填妥此表後，請mail回傳至：吳湞伊 pingi86wu@gmail.com 或傳真至：04-36068995報名**

**※本表個人資料僅供受理報名使用。**

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