



## NCKU Smart Semiconductor Design Workshop 2023

November 03, 2023 (Taiwan Time GMT+8)

**Theme: Intelligent Computing: Algorithms to Devices and Below..**

### **Motivation:**

Niklaus Emil Wirth introduced the innovative concept of Programming = Algorithm + Data Structure. Inspired by this, we advance the concept to the next level by stating that Design = Algorithm + Architecture. As algorithms with high accuracy become exceedingly more complex and edge or Internet-of-Things generated data become increasingly larger, flexible parallel and reconfigurable processing are crucial in the design of lightweight systems with low complexity and low power. Furthermore, neuromorphic edge with non-von Neumann architectures witness broad applications such as in computing in memory (CIM), requiring energy-efficient design optimizations of the intelligent algorithm at the device level and possibly lower. Therefore, the smart semiconductor designs crossing levels of algorithm, system architecture, VLSI, circuit, device, etc. poses challenges which are key to the development and success of the global semiconductor community.

### **CHALLENGES BRING OPPORTUNITIES!**

With these CHALLENGES amid current vibrant semiconductor environment, this workshop provides a platform for experience sharing of new disruptive OPPORTUNITIES with yet more emphasis on vertical integration methodologies! UIUC, MIT, Berkley, Princeton, etc. has been working on cross-level design, SONIC since 2013. Taiwan's NSTC has recently introduced the new initiative of Emerging IC (新興晶片) project. From NCKU, we would like to take this occasion to interact with old and new friends with anticipation of reaching out to the semiconductor community worldwide!

### **Organizers:**

#### **Darsen Lu**

Associate Professor, National Cheng Kung University, Taiwan

#### **Philex Ming-Yan Fan**

Assistant Professor, National Cheng Kung University, Taiwan

#### **Chris Gwo Giun Lee**

Professor, National Cheng Kung University, Taiwan

### ***Physical Conference in Taiwan & Virtual Connection with US***

**Venue: 靄雲廳 Department of Electrical Engineering, NCKU**

### **Co-sponsors:**

College of Electrical Engineering and Computer Science, NCKU

Academy of Innovative Semiconductor and Sustainable Manufacturing, NCKU

IEEE CASS Society, Tainan Chapter

## Workshop Schedule

### Morning Session (8:00AM ~ 12:15PM)

- **8:00 ~ 8:20:** Registration
- **8:20 ~ 8:50:** Opening Ceremony/Remarks
  - College of EECS, NCKU
  - Academy of Innovative Semiconductor and Sustainable Manufacturing, NCKU
  - **Ching Chi Teng**, CTO, Cadence, USA (Virtual from US)
- **8:50 ~ 9:00:** Photo Session
- **Vertical Integration in SoC Design: Challenges and Opportunities**

**Host: Prof. Ting Jung Chang**

**Keynote (09:00 ~ 09:45): Prof. Shuvra Bhattacharyya**, University of Maryland, College Park, USA, Topic: *Embedded System Design Optimization at the Network Edge*

**Invited Talk (09:45 ~ 10:30): Prof. Chris Gwo Giun Lee**, National Cheng Kung University, Taiwan, Topic: *Machine Learning for Analytics Architecture: AI to Design AI*

*Coffee Break (10:30 ~ 10:45)*

**Invited Talk (10:45 ~ 11:15): Prof. Ting-Jung Chang**, National Cheng Kung University, Taiwan, Topic: *Navigating Heterogeneity: Designing, Prototyping, and Evaluating Two Heterogeneous SoCs*

**Invited Talk (11:15 ~ 11:45): Prof. Darsen Lu**, National Cheng Kung University, Taiwan, Topic: *Compact Device Modeling in the Era of Artificial Intelligence*

**Invited Talk (11:45 ~ 12:15): Prof. Shu-Han Hsu**, National Cheng Kung University, Taiwan, Topic: *On-line Failure Monitoring of SRAMs*

### Lunch (12:15PM ~ 13:30PM)

### Afternoon Session (13:30PM ~ 17:00PM)

- **Cross Level SoC Design: From Algorithm to Architecture, VLSI, Circuit, Device, Material, and Below..**

**Host: Prof. Shu-Han Hsu**

**Invited Talk (13:30 ~ 14:00): Brian Sung**, Country Manager, Cadence, Taiwan

**Invited Talk (14:00 ~ 14:30): Prof. Philex Ming-Yan Fan**, National Cheng Kung University, Taiwan, Topic: *How Analog Circuits Augments IoT SoC, Design Methodology and Testing.*

**Invited Talk (14:30 ~ 15:00): Prof. Prof. Da-Huei Lee**, National Cheng Kung University, Taiwan, Topic: *Data Converter Design: From Architecture to Device*

**IEEE CASS Tainan Chapter, Distinguished Lecture (15:00 ~ 16:00): Prof. Tobi Delbruck**, Inst. Of Neuroinformatics, UZH-ETH Zurich, Topic: *Argo: First Trials of Robot Sailboat*

**Host: Prof. Cheng-Ta Chiang**, Chapter IEEE CAS Society, Tainan Chapter, National Chia Yi University,

*Coffee Break (16:00 ~ 16:15)*

- **Panel Discussion: Emerging trends in SoC Vertical Integration**

**Panel Discussion (16:15 ~ 17:00):**

- **16:15 ~ 16:25 Prof. Philex Ming-Yan Fan**, National Cheng Kung University, Taiwan (confirmed)  
*Moderator, Panel Chair*
- **16:25 ~ 16:35 Julian**, Cadence, Director
- **16:35 ~ 17:00:** Panel Discussion (*Shuvra Bhattacharyya, Chris Gwo Giun Lee, Da-Huei Lee, Shu-Han Hsu, Ting-Jung Chang*)

- **Closing Remarks: (17:00 ~ 17:10)**

- Academy of Innovative Semiconductor and Sustainable Manufacturing, NCKU
- School of Computing, NCKU