50th DAC Global Forum

Taiwan

Formosa and Silicon Island

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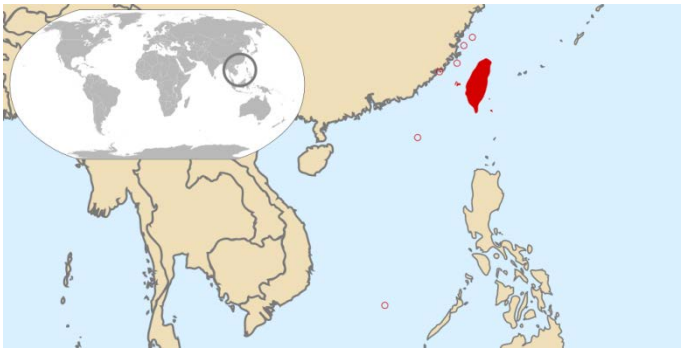
I. INTRODUCTION

Taiwan, officially the Republic of China, lies off the southeastern coast of mainland Asia and on the western edge of the Pacific Ocean. To the west is the People's Republic of China across the Taiwan Strait; to the northeast is Japan; and to the south is the Philippines. Formosa is what the Portuguese called Taiwan in the 16th century because of the verdant beauty of the leaf-shaped island. Taiwan's tropical, sub-tropical, and temperate climates provide clear differentiation between the different seasons with the annual average temperature being 22 degrees Celsius (71 Fahrenheit). Taipei, where the well-known Taipei 101 skyscraper located, is the political capital as well as economic and cultural center in Taiwan.

Taiwan has a population of 23 million. The larger part of the country's inhabitants are the descendants of immigrants from the mainland China, while there are also nearly 500,000 indigenous people in 14 different tribes. The official language in Taiwan is Mandarin Chinese (with Traditional Chinese in writing) and the most popular foreign language is English, making it an ideal place to learn Chinese for friends from Europe and the United States. Dialects like Minnan (the Southern Min dialect or Heluo) and Hakka are also widely spoken.

During the latter half of the 20th century, Taiwan experienced rapid economic growth and industrialization. It is now an advanced industrial economy with nominal GDP Per Capita being USD 20,374 (2012). It has established an excellent infrastructure, convenient transportation system, and high-quality communication services. It is one of the Four Asian Tigers and a member of the WTO and APEC. It has also accomplished a remarkable record of economic development and political

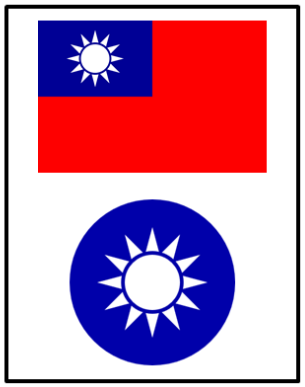


democracy by virtue of the perseverance and unremitting efforts of its people.

Small and medium-sized enterprises, representing 98 percent of all businesses in Taiwan, have been the economy's major driving force. Moreover, the high-tech information and electronics industry, outstanding research effort, and brilliant human resources have further strengthened Taiwan's economic standing worldwide. Today, Taiwan, ranked 13th in the World Economic Forum's Global Competitiveness Report 2011-2012, is transforming into a global innovation center to retain its key role in the global community.

II. CHIP DESIGN AND EDA PRESENCE

Taiwan's semiconductor industry plays a critical role in domestic economics and the global IT industry. In addition to the world's leading foundries and packaging/testing companies such as TSMC, UMC, AES, SPIL, etc., there are also over 300 IC design companies in the high-tech silicon island. World-class EDA companies all base their R&D centers or offices here to



Capital	Taipei
Largest city	New Taipei City
Language	Mandarin / Taiwanese / Hakka / Indigenous Languages
Area	36,000 square kilometers
Population	23 million
Currency	New Taiwan Dollar (NTD)
Time zone	GMT +8
Internet TLD	.tw

maintain tight connection with Taiwan's outstanding IC design companies, such as Mediatek (MTK), Novatek, and Realtek, etc. Taiwan's largest EDA company, Springsoft, was merged by Synopsys in 2012. It refreshes the global market share of EDA industry and also implies that Taiwan's software industry has built global visibility and competitiveness. Cadence and Mentors Graphics also invest CMSC and Mentor Graphics Taiwan respectively. There are also design service companies, which provide Silicon IPs (SIP), IC design and turn-key services without their own products. GUC, FARADAY and CoAsia are the major players in Taiwan and they have close cooperation with foundries. Besides, Taiwan's leading foundries, TSMC and UMC, also run their own design service divisions as well as Design & Technology Platforms (DTP) with reference flows, design PDKs, libraries, SIPs provided to their customers.

III. Academia

Most of Taiwan's universities (currently 162 universities) have electronics engineering (EE) or computer science (CS) departments or institutes. Professors in the EDA/CAD field are in top-ranking universities in Taiwan, including National Taiwan University (NTU), National Tsing Hua University (NTHU), National Chiao Tung University (NCTU), and National Cheng Kung University (NCKU). In the past ten years, the number of Taiwan's publications in the EDA/CAD field has steadily increased. In 2012, there were totally 166 papers in this field with one-tenth of them from Taiwan (regarding the first author only). Taiwan's specialists have contributed to the global EDA/CAD community; moreover, their teams also show remarkable achievements in international EDA/CAD contests. The International Symposium on VLSI Design, Automation and Test (VLSI-DAT) and the VLSI Design/CAD Symposium (VLSI-CAD) are two most important annual meetings in Taiwan that bring together all the EDA/CAD experts sharing their academic results.

IV. Government Programs

To enhance the competitiveness of Taiwan's semiconductor industry and expand its global impact, the Taiwan government commenced the National Program for Intelligent Electronics (NPIE) in 2011 to promote technological innovation of medical electronics, green electronics, vehicular (car) electronics, conventional computer, communication, and consumer electronics, the so-called "MG+4C" applications. The NPIE's ultimate goal is to strengthen Taiwan's IC industry and its value in the global ICT ecosystem. It facilitates technology development, advanced research, talent cultivation, industry promotion, and international collaboration. The NPIE develops an integrated framework of academia and industry in Taiwan by coordinating with government agencies, research institutions, universities, and corporations.

For the EDA sector, NPIE supports the development of 3D IC design processes, platforms, and services in the Industrial Technology Research Institute (ITRI), and advanced design platforms for medical, green, and vehicular electronics in National Chip Implementation Center (CIC). It also conducts innovative courses and labs on IC design and system integration with cross-domain knowledge to cultivate interdisciplinary talents in universities. It also promotes contests in IC design as well as intelligent electronics and application systems. The IC contest has become one of the two major international contests in the IEEE/ACM International Conference on Computer-Aided Design (ICCAD). In addition, Taiwan's teams have won several awards in prestigious international competitions in the EDA/CAD fields.

Based on Taiwan's existing capacity, the NPIE is devoted to maintaining the leading position of Taiwan's IC industry through emerging MG+4C applications. Up to now, it has developed cost-effective medical devices to popularize early stage diagnosis. It has also built Taiwan's self-sustainable green and high voltage industry, moving toward a low-carbon island. Moreover, with the emphasis on minimization, mobilization, personalization, and energy efficiency, the NPIE is creating core technologies in next-generation intelligent products and systems. By linking academic results and skilled talents to the industry, the NPIE is boosting startups and spinoffs toward the blue-ocean market of MG+4C.

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Jeng-Long Chiang is with the Computer and Communication Research Center in National Tsing Hua University (NTHU), Hsinchu, Taiwan, and currently serves as the Special Assistant to the Executive Director of the National Program for Intelligent Electronics. He received his B.S. degree (1999) from the Department of Computer Science and Information Engineering in National Chiao Tung University, and M.S. (2001) and Ph.D. (2010) degrees from the Department of Computer Science in NTHU. Since 2011, he joined the Intelligent Sensing and Networks Laboratory in NTHU, where he conducts research projects on telematics and intelligent healthcare systems. Dr. Chiang's current research focuses on sensing, data fusion, data security, and applications in IoT and online social networks.