

BOOK REVIEW: NONFICTION

The 'new oil' transforming the world

Review of 'Chip War' (Scriber, 2022) by Chris Miller

The rise of Silicon Valley and the collaboration with Stanford University academics, California, helped establish a number of tech firms like Fairchild Semiconductors, Qualcomm, AMD, Nvidia, and others. The world's most brilliant minds at the time were all drawn to California, Texas, and Massachusetts to work in the various semiconductor industries located there.

MOHAMMED MUNIRUZZAMAN

Chip War, a highly praised book written by Chris Miller who teaches International history at Tuft University's Fletcher School, USA, is a *New York Times* bestseller. I was waiting anxiously to read the book but couldn't quite get my hands on it until my eldest son, who is an electrical engineer at Intel in Oregon, sent it to me. It is a large book of more than 400 pages and divided into eight headings with a conclusion at the end. The book also provides a glossary of the various scientific terms used and a huge list of references at the end.

The small chip or semiconductor that houses billions of transistors in a space smaller than a square inch of the silicon wafer is a fascinating technological brilliance. The chip is believed to be the "new oil" and now the most critical technology in existence. From space crafts, cruises, and precision guided missiles to computers, mobile phones, cars, microwave ovens, and washing machines, all rely on the chip to function. Miller's extensively researched book paints a canvas of more than 50 years of the semiconductors invention, its development over the years, and the race by different stakeholders like Intel (USA), Taiwan's Semiconductor Manufacturing Company (TSMC), SAMSUNG (Korea) and Semiconductor International Corporation (SMIC) China, to dominate the highly lucrative and advanced semiconductor landscape. With the dropping of the atomic bomb on Hiroshima and Nagasaki in Japan towards the end of World War II, the Atomic Age was ushered in and brought forth the awesome power of nuclear energy, thus transforming the world of coal and steel.

The engaging narrative in *Chip War* begins with the workings of a semiconductor and its invention by scientific geniuses and Nobel Prize winners like Walter Houser Brattain,



DESIGN: AMREETA LETHE

John Bardeen, and William Bradford Shockley. Subsequently, the book unfolds the revolution created by the invention of the Integrated Circuit (IC) by Robert Noyce and Jack Kilby that transformed the whole semiconductor scenario, making it a very interesting read.

The rise of Silicon Valley and the collaboration with Stanford University academics, California, helped establish a number of tech firms like Fairchild Semiconductors, Qualcomm, AMD, Nvidia, and others. The world's most brilliant minds at the time were all drawn to California, Texas, and Massachusetts to work in the various semiconductor industries located there. Physicists and engineers like Gordon Moore and Caltech Professor Carver Meade envisaged a changing scenario in the very near future where miniaturising transistors would play a

significant role. National Aeronautics and Space Administration (NASA) and the USA Defense establishment's requirements provided almost unlimited funds in research to improve the chips' performance and utility in these facilities. Meanwhile, Gordon Moore, (of the famous Moore's Law), and Robert Noyce (often known as the Mayor of Silicon Valley) established Intel in 1968 and started producing the most advanced chips in the USA at the time. The mind boggling and staggering complexity involved in making chips forced many firms to focus their attention on chip architecture rather than establish highly expensive manufacturing laboratories or foundries. These firms often outsourced their manufacturing to TSMC and SAMSUNG. The making of a chip may involve hundreds of operations and months of painstaking

work. Intel, however, had their own research, manufacturing, and fabrication facilities known as fabs.

Morris Chang who studied at Harvard, MIT, and Stanford is an American-Taiwanese electric engineer. He worked at Texas Instruments and General Instrument Corporation, USA until Taiwan Government recruited him. He is credited with founding and building TSMC in 1987, making it one of the leading chip manufacturing foundries in the world. By 1960, China had also established its first semiconductor research institute in Beijing. Five years later, they had produced their first Integrated Circuit (IC) that Bob Noyce and Jack Kilby did about five years earlier. However, at about the same time TSMC was founded, Ren Zhengfei established Huawei as one of China's leading electronic industries. The miniaturisation of transistors,

led many to believe that Moore's law was dead. However, Jim Keller's pioneering work on chips at Apple, Tesla, AMD and Intel changed all that. Keller believes 50 times more in the density of transistors is achievable. That can be made possible in tube shaped transistors called "gate-all-around". The laws of physics, like the quantum effects will, however, make it impossible to shrink transistors further. Interestingly, the most advanced photolithographic machines essential in the manufacture of state-of-the-art chips in the Extreme Ultra Violet (EUV) radiation (wavelength about 10-20 nanometer) range are only made in the Netherlands by the Advanced Semiconductor Materials Lithography (ASML) Company. A single photolithographic machine can cost anything up to \$200 million or more. Components for EUV machines are procured from the USA, Germany, and Japan.

Startup companies nowadays design chips optimised for specific applications. Big tech firms like Google, Amazon, Microsoft, Apple, Facebook, Alibaba, and many others are investing heavily in research to design their own chips for specific purposes, like for instance, Artificial Intelligence (AI). It is estimated China spends more money importing chips than oil. It is now investing heavily both in research and manufacturing to be self-sufficient in chip production.

Chip War recounts the fascinating story of how the chip was invented by scientific geniuses, how it was developed by pioneers in the Silicon Valley, and how it came to dominate our everyday life and now also playing a pivotal role in all defence establishments.

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BOOK REVIEW: NON FICTION

Designing our past and for our future

Review of 'Architect Tanwir Nawaz Selected Works: Exploring the World of Architecture and Design' (UPL, 2023) by Tanwir Nawaz

SHAMSUL WARES

The author, architect Tanwir Nawaz, besides expressing his thoughts, ideas, and artistic struggles within a body of professional works, has poured his emotions and nostalgic memories into *Exploring the World of Architecture and Design*. The book contains a total of 40 built and unbuilt projects and proposals designed by him, mainly for Canada and Bangladesh. Published by TARA and distributed by The University Press Limited, it was launched at the IAB Centre, Agargaon, the premises of the Institute of Architects Bangladesh (IAB), on January 27, 2024 in the presence of eminent architects, planners, and dignitaries.

One of the earlier projects produced by Tanwir Nawaz as the design architect for a Toronto-based consulting firm, Annau Architects, was Bedford Glen Terraced Housing Condominiums (1976-79) on a 5.6 acre land in Toronto. This project, consisting of 49 townhouses and 154 terraced houses of various sizes and types, came with cathedral ceilings for living rooms, wood-burning fireplaces for dining spaces, and sun decks and penthouses at the top which contributed to creating a homogenous community, satisfying the social and cultural aspirations of the dwellers.

The project consisted of complex rectangular buildings sitting parallel to and at 90 degree angles to each other, organised harmoniously on the naturally sloped site. This formed an enclosed open space at the centre in the shape of a loop, offering uninterrupted and continuous vehicular movement, all of which successfully created a wonderful civic scale for domesticity. This project was extensively showcased for its unique quality in the architectural magazine *Canadian Architect* in 1977. Annau Architects has also won the prestigious

Canadian Architect Award of Excellence for this housing project, immediately establishing Tanwir Nawaz as a noteworthy, young, and promising expatriate architect in Canada.

In 1989, as the senior architect of an Ottawa-based firm, Grainger Boyle Architects, Tanwir Nawaz designed a remarkable low-rise, modernist office building for Mastercraft Corporate Headquarters in Ottawa Business Park. The square plan form of the building had been intelligently split diagonally, with a glazed spine, into two well proportioned triangular parts. Under the glazing of the spine sat a beautifully articulated landscape garden incorporating plants, trees, water, terraces, seating arrangements, and a reception, all beautifully illuminated by the sun.

This wonderful ambience was created by the linear landscaping that both separated and united the two office parts, successfully upholding the spirit of the corporate office. The split level with a part basement within the office proper has dramatised the interior spaces, in addition to conveying an intimate domestic scale to the corporate image. It's no wonder that a tantalising exterior image of this building was selected to be the front cover of this book.

Tanwir Nawaz was born in Jessore and he became a student of the first batch of the Department of Architecture in 1962, and graduated (B.Arch) with a first class in 1967. In 1969, he obtained an M.Arch. from Texas A&M University as a Rockefeller Scholar. From there, Tanwir Nawaz went on to work as an architect for Consulting Engineers (1969-70), as an assistant professor of Architecture at BUET (1972), and later as the deputy chief of physical planning in the first Bangladesh Planning Commission (1972-73). In 1973, he went to Canada and worked for different organisations in varied capacities. There, he also practised independently as



PHOTO: ORCHID CHAKMA

Tanwir Nawaz Architect Ltd. in Regina Saskatchewan (1981-87), as Tanwir Nawaz Architect in Ottawa (1991-present), as Tanwir Nawaz Architect in Dhaka (1995-present), as the managing director of Urban Habitat Ltd. (1995-2007), and now as the chairman of Urban Habitat Consultants (2007-present).

Besides designing buildings in Canada and Bangladesh, Tanwir Nawaz prepared a number of development studies and reports for the government of Bangladesh. He also prepared proposals for urban mass transit projects, including elevated expressways, the BRT Line 2, and the Bus Rehabilitation Programme. Additionally, over the last 30 years, he has written extensively on urbanisation, sustainability, urban transportation, low income housing, waste management, water

and energy supply, and more.

In the early 1980s, Tanwir Nawaz commenced his independent solo professional practice, Tanwir Nawaz Architects Ltd. in Regina, Saskatchewan. Until 1987, his solo practice designed about five community-friendly nursing homes requiring new development, expansion, upgradation, and renovation for different municipal urban centres in Saskatchewan.

Tanwir Nawaz undertook these projects with great enthusiasm and social commitment. He placed the nursing station in the centre of the Lockwood Lodge—a new 30-bed, single-storey, special care nursing home, from where rectangular bedroom blocks with double-loaded corridors radiated outwards in order to facilitate a clear view of movement of the people from the station. Various

facilities such as kitchenettes, living areas, sun rooms, activity rooms, etc. were provided, tailored with great attention to the needs of the residents. Common areas with lofts and soothing colour schemes were used to create an identity, and with a clear view of the lake nearby, it ensured a homely atmosphere for the elderly residents. Modern facilities, wheelchair access and exit points, fire protection, and all other compliances were met within a vibrantly built environment with attractive traditional roofing. Tanwir developed all the nursing homes with similar concepts and attitudes. These nursing home projects clearly manifest his high level of design proficiency, management skill, humanism, and professional resilience.

Between 2002 and 2004, Tanwir Nawaz designed and built

an outstanding project that held great importance to both Canada and Bangladesh: the Canadian High Commission Complex in the Baridhara Diplomatic Zone, Dhaka. He designed the Phase-1 components for the club and accommodated all the facilities of the recreation club in an L-shaped, two-storey, light-weight building. Although the building is almost closed from the outside, it opens to face the swimming pool and the tennis courts. The building has been successfully tropicalised with the innovative use of metal columns with bow-arch metal frames. The transparency and openness of the club building, the glazed and inclined skylights above the corridors and gazebo, and the open staircases against the blue swimming pool and green tennis courts are quite inviting and refreshing.

Finally, this is a unique book because, although this book is primarily about the author's selected works, Tanwir Nawaz's memories of his alma maters (Dhaka and Texas), his biographical accounts, the reverence he had for his teachers, his photographs, student projects, etc. all come together to make it much more informative than it may have initially been intended to be. Much of this information, which is fundamentally personal, has not only enriched the book but also portrayed him as an authentic and unpretentious person. Many of the details in this book have profound historical significance as well.

This book is a powerful testimony of his passion for architecture, love for people, and dedication to the land to which he belongs. This book will, no doubt, remain an evocative source of inspiration for the architects and planners of today, and for many generations to come.

Shamsul Wares is an architect and a professor of architecture.