

BIOMETRIC PIONEERS: Tieniu Tan

Interview conducted by Thomas Swearingen, Graduate Research Assistant, Michigan State University, Lansing, Michigan, USA



Tieniu Tan is Academician of the Chinese Academy of Sciences Institute for Automation, and a Professor, at Nanjing University. His research interests include image processing, computer vision, and pattern recognition, and he has authored more than 600 research papers in mainstream refereed journals and conferences on these and other topics. Tan obtained his B.Sc. degree in 1984 from Xi’an Jiaotong University, China, and his MSc and PhD degrees from Imperial College London, UK, in 1986 and 1989, respectively. He served on the faculty of the University of Reading, UK, for a number of years before returning to China to join CASIA in 1998. At the 2024 IJBC, Tan was honored with the *2024 Biometrics Council Leadership Award*.

SWEARINGEN: What initially sparked your interest in biometrics, and how did your academic journey at Xi'an Jiaotong University and Imperial College London shape your future research directions?

Tan: I did my bachelor’s work at Xi’an Jiaotong University in China and my MSc and PhD at Imperial College London. Both institutions are well known for their engineering programs, and all my degrees were in electrical and electronic engineering. Such training clearly gives me an engineering mentality. When it comes to research, I am always interested in topics that have clear practical values. The very inconvenience of passwords and other traditional means of personal identification made me firmly believe in the value of

biometrics. So, I started to look into biometrics in the late 1980s and early 1990s.

SWEARINGEN: In 1998, you decided to return to China and join the National Laboratory of Pattern Recognition (NLPR). What motivated this decision, and how did you envision the future of biometrics and pattern recognition in China?

Tan: I attended Imperial College London in the 1980s for my postgraduate studies on a government scholarship. Chinese parents at that time could hardly afford to support their children to study abroad. I feel very grateful to the central government for giving me the opportunity to study in the UK, and also felt obliged to contribute to the wellbeing of my motherland. Therefore, after a rewarding decade in the UK, I

returned to China to join the National Laboratory of Pattern Recognition (NLPR) at the Chinese Academy of Sciences' Institute of Automation (CASIA).

China is a country with a huge population and the amount of human traffic often presents a real challenge for social governance, especially during holiday seasons like the Chinese New Year. The amount of people traveling during such seasons is typically on the order of billions. This clearly calls for more efficient and accurate ways of doing identity checks, so, when I returned, I thought there would be a great future for biometrics and related fields, such as pattern recognition in China. Looking back, I think such predictions have proven to be accurate.



SWEARINGEN: During your tenure as Director General of CASIA from 2000-2007, what were some of the most challenging and rewarding experiences of leading such a prestigious institute? And, how did you balance administrative responsibilities with your research?

Tan: CASIA is one of the 100-odd research institutes of the Chinese Academy of

Sciences. It was established in the same year (1956) as when the term “Artificial Intelligence” (AI) was publicly coined. It is a leading research institution in the field of pattern recognition, with a couple of thousand researchers. Managing a research institute of such a scale is clearly a big challenge, especially for someone who did not have much prior experience in managing such a research organization. Research infrastructure and funding were clearly not ideal during that time, and recruiting and the ability to retain good people was a real challenge, given what the Institute could offer. Nevertheless, we managed to attract some talented researchers from around the world, and the Institute was thought to be more visible internationally after the seven years of my directorship.

Balancing administrative work with research is another challenge I had to cope with. Building a strong and responsible team is a must. Fortunately, I had a very collaborative, responsible and hardworking team. Everyone has the same 24 hours a day, so efficient time management is essential to making the best use of every single minute.

SWEARINGEN: As the founding chair of the IAPR Technical Committee on Biometrics and the IAPR/IEEE International Conference on Biometrics, how have you seen the field of biometrics evolve over the years? What do you consider your most significant contributions to this field?

Tan: I had the pleasure and honor to serve the international biometrics community on several occasions, first as the founding chair of the IAPR Technical Committee on Biometrics and then as president of the IEEE Biometrics Council. In the early years of this century, there were quite a few international and regional conferences on biometrics and I thought this was rather distracting for a relatively small community. With support from other leading figures in the community, I managed to convince people that we should merge these biometrics conferences and establish a single brand new conference with a simple but clear name, that is International Conference on Biometrics or ICB. With the subsequent merger with IEEE Biometrics: Theory, Applications and Systems (BTAS), ICB is now known as International Joint Conference on Biometrics or IJCB.



IJCB is now the premier conference on biometrics. The success of ICB/IJCB makes me feel a great sense of achievement.

The field of biometrics has seen significant progress over the past couple of decades and the need for reliable and accurate identification of individuals is even more apparent. Many open issues remain to be resolved, including user experience and security of biometrics systems. The widespread use of generative AI (GenAI) has clearly presented fresh challenges to biometrics.

SWEARINGEN: Your work spans various domains, including image processing, computer vision, and information forensics and security. How do you approach interdisciplinary research, and what advice would you give to researchers looking to explore multiple areas of expertise?

Tan: Over the years my research interest began with signal processing and gradually moved to computer vision and pattern recognition. The research scope of my current team at the New Laboratory of Pattern Recognition—the successor organization of the National Laboratory of Pattern Recognition—is of course much wider. I am keen on interdisciplinary research and always look for inspirations from other scientific domains because I believe if there are short-cuts to scientific discoveries, the answer is in interdisciplinary research. Therefore, one should read the latest research not only in his/her own research field but also other related fields (that is read as widely as possible).

SWEARINGEN: As a Fellow of IEEE and IAPR, and in your roles within international committees and societies, how do you view the importance of global collaboration in advancing biometrics, computer vision, and AI?

Tan: I am an ardent supporter and promoter of international collaboration as I firmly believe that international cooperation is an enterprise for the common well-being of all humanity, and for the advancement of science. We are all living on this small planet and face many common challenges, and these challenges can only be effectively

resolved through international collaboration. This is also true for our field. In the early days, when interest just started to build on iris recognition, there was basically no iris image database for the community to share and use, which presented a clear hindrance to the advancement of iris recognition. Therefore, I decided to compile an iris image database, and made it freely available to researchers from across the globe. Over the years, and through international collaboration, we have released multiple versions of the database that cover a wide range of application scenarios and various ethnic groups. Our databases have been downloaded by numerous research groups worldwide, and have remained as one of the most popular test datasets in the field. I truly believe that global collaboration not only promotes the sustainable innovation and fast development of science, but also helps to build mutual understanding and trust of the international science community.

SWEARINGEN: Looking ahead, what are the emerging trends and challenges in biometrics and related fields that you find most exciting? How do you see your research and contributions evolving in the coming years?

Tan: Biometrics remains one of my major research interests, and a focus of my research group as the need for biometrics is ever growing and many challenges (old and new) remain to be resolved. As mentioned

earlier, the possible abuse of generative AI is a clear and present threat to the security of biometrics systems. Cases where personal losses and security alerts occur due to identity forgery by GenAI deep fakes are continually reported. Much more attention should be paid to liveness detection and other security issues of biometrics systems. User experience of biometrics systems is another bottleneck for its widespread deployment, especially for modalities like iris recognition. This hinges on the user-friendliness of biometric sensors. With the growing popularity of embodied intelligence and mobile devices, mobile and embedded biometrics calls for more research. Multi-biometrics has received due attention from the community and good progress has been made, but more needs to be done, especially for practical applications. The cross-fertilization between biometrics and forensics is also an interesting area to explore.

SWEARINGEN: What advice do you have for early-career researchers?

Tan: A new scientific and technological revolution is on the horizon. We are probably experiencing an ideal time for scientific research. There is an abundance of opportunities for scientific breakthroughs. So, stay curious, stay open-minded, stay abreast of the latest developments and of course stay hard-working!