

Voice Series: Interview with Professor Dr. Kun Qian, School of Medical Technology, Beijing Institute of Technology, China

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Foreword



Kun Qian received his doctoral degree in electrical engineering and information technology from Technische Universität München [TUM] (Munich, Germany) in 2018 for his study involving automatic general audio signal classification. He was appointed full Professor at the

Beijing Institute of Technology (Beijing, China) in 2021 with the honoured title of “Teli Young Fellow.” He is a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE). He has a strong collaboration connection to prestigious universities in Germany, the UK, Japan, Singapore, and the USA. Dr. Qian serves as an Associate Editor for the *IEEE Transactions on Affective Computing*, *BIO Integration*, and *Frontiers in Digital Health*. He has authored or co-authored more than 100 publications in peer-reviewed journals and conference proceedings, and has more than 1.8K citations (h-index, 24). His research interests include computer audition, affective computing, and digital health.

EE: Thank you Professor Qian for being so gracious in accepting the invitation from *BIOI* to be interviewed. Can you tell us more about your background and your current research?

KQ: Thank you Professor Saw for your invitation. It is my great honour to be interviewed for *Bio-Integration (BIOI)*. I received my doctoral degree under the supervision of Dr.-Ing. from the Technical University of Munich (Germany) in 2018. I then undertook postdoctoral research at The University of Tokyo (Japan) for nearly 3 years. In 2021 I was appointed full Professor at Beijing Institute of Technology (China). My current research interests include, but are not limited to, computer audition, affective computing, brain sciences, digital health, and explainable artificial intelligence (AI).

EE: It is my understanding that you are currently doing ground-breaking research in AI-related fields. How did you become interested in this field?

KQ: I have been studying computer audition for more than 10 years. Specifically, my research has focused on using state-of-the-art computer audition technologies for medical applications. I truly love this young, promising field because my first research project involved snore sound recognition for evaluation of sleep disorders. I have found interdisciplinary subjects to be very challenging and extremely appealing work. To achieve a goal we need to assemble a vast knowledge base—not only the prerequisite fundamental skills, but also cutting-edge technologies. The fusion of exciting and brave ideas from different backgrounds can generate novel solutions for reaching a final goal. The aforementioned experiences piqued my interest, thus I ventured into this exciting field.

EE: Could you share with us some of your major breakthroughs during your years of research in this field?

KQ: Thank you. I would like to share two recently published papers:

1. Kun Qian, Bin Hu, Yoshiharu Yamamoto, and Björn W. Schuller, “The Voice of the Body: Why AI Should Listen to it and an Archive”, *Cyborg and Bionic Systems*, vol.4, no.5, pp.1-3, 2023.

Our body produces sounds that carry valuable information about our physical and psychological health. In the past decade, significant progress has been made in the field of body sound analysis; however, limited access to publicly available databases hinders sustainable research in this area. To address this issue, the Voice of the Body (VoB) archive was introduced in a former paper as a public platform for disseminating, exchanging, and inspiring new ideas on emerging technologies in body sound analysis (**Figure 1**). We aimed to organise a series of challenges to promote the development of audio-driven methods for healthcare using the proposed VoB. In so doing, we hope to break down barriers between different disciplines and pave the way for Medicine 4.0, enriched by audio intelligence.

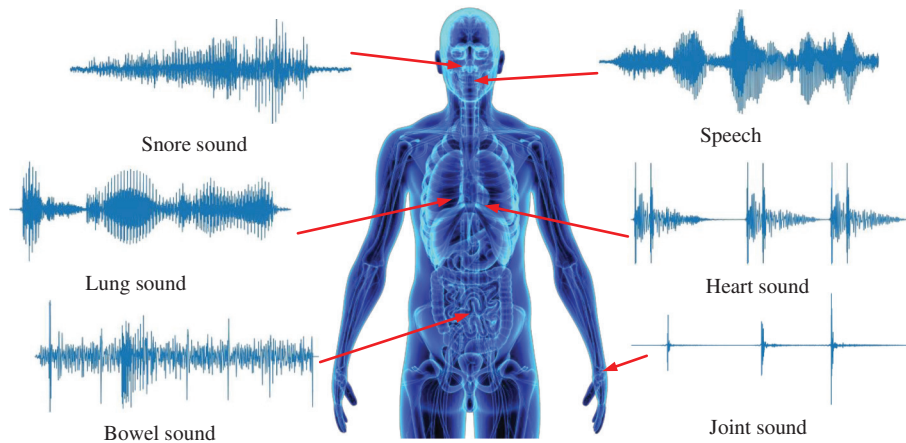


Figure 1 An overview of the body sound analysis. (Qian *et al.* Cyborg and Bionic Systems, 2023).

2. Kun Qian, Ruolan Huang, Zhihao Bao, Yang Tan, Zhonghao Zhao, Mengkai Sun, Bin Hu, Björn W. Schuller, and Yoshiharu Yamamoto, “Detecting Somatisation Disorder via Speech: Introducing the Shenzhen Somatisation Speech Corpus”, *Intelligent Medicine*, in press, pp.1-13, 2023.

In a study involving recognition of depression, speech signals are commonly used due to their convenience and ease of acquisition (**Figure 2**); however, limited research has been conducted on recognising somatization disorder using speech recognition due to the lack of publicly accessible databases of relevant speech and benchmark studies. To address this research gap, the Shenzhen Somatisation Speech Corpus (SSSC) was developed in cooperation with the Shenzhen University General Hospital. The SSSC is a publicly accessible speech database for somatisation disorder recognition. A benchmark for SSSC using classic acoustic features and a machine learning model was also proposed in the latter paper. The best results of our benchmark was achieved by a support vector machine with formants F1-F3 and a 76.0% unweighted average recall. The proposal of SSSC bridges a research gap in somatization disorder recognition and provides researchers with a valuable publicly accessible speech database. The results of the benchmark also demonstrated the scientific validity and feasibility of using computer audition for speech recognition in somatization disorders.

EE: What is the bottleneck in the integration of AI into basic and clinical research? What is the major stumbling block in the path of your research?

KQ: In this era of AI, specifically for deep learning, models are always “hungry for data.” Nevertheless, in almost all areas of medicine, data scarcity is an inevitable challenge. In my research, the lack of sufficient data (particularly the labelled data) is the major hurdle to overcome. In addition, the interdisciplinary subject always needs the efforts from members who share different knowledge and professional

backgrounds. How to make all the members fully understand the common targets and guarantee an efficient team-work environment is another issue.

EE: Has some of your research been applied clinically or are clinical trials currently underway? What preparation is needed for a “bench-to-clinics” transition? Would you advise other scientists to do the same?

KQ: Thank you. We are always pursuing the goal of applying our great ideas into clinical practice. Indeed, we are working diligently towards acceptance and adoption of our findings in the clinical setting; however, the “bench-to-clinics” transition is lengthy. Of note, in the field of AI-related medical applications, ethical issues must be considered. Efforts to promote “bench-to-clinics” findings should not only come from the scientists, but also from policy-makers, clinical experts, and entrepreneurs. Scientists should keep in mind that the “bench-to-clinics” process requires teamwork. We should collaborate with all the people who share the same targets.

EE: What advice do you have for the young generation of scientists today?

KQ: Thank you. I consider myself to be a member of the young generation of scientists today. Like all the young generations of scientist during history, we face many challenges in the early stages of our careers. We must apply for competitive research funds to support our team. We need to balance work and the family. Most importantly, we should never forget the original motivation for doing research. The curiosity of undiscovered fields and the dream to broaden human knowledge frontiers can always encourage us to overcome the difficulties in the road of exploring sciences. Moreover, we should always be open and humble to learn not only from the senior scientists, but also the young and even younger generation of scientists, which can help our minds stay young. Keeping the attitudes of the youth towards the world is very important for scientists.

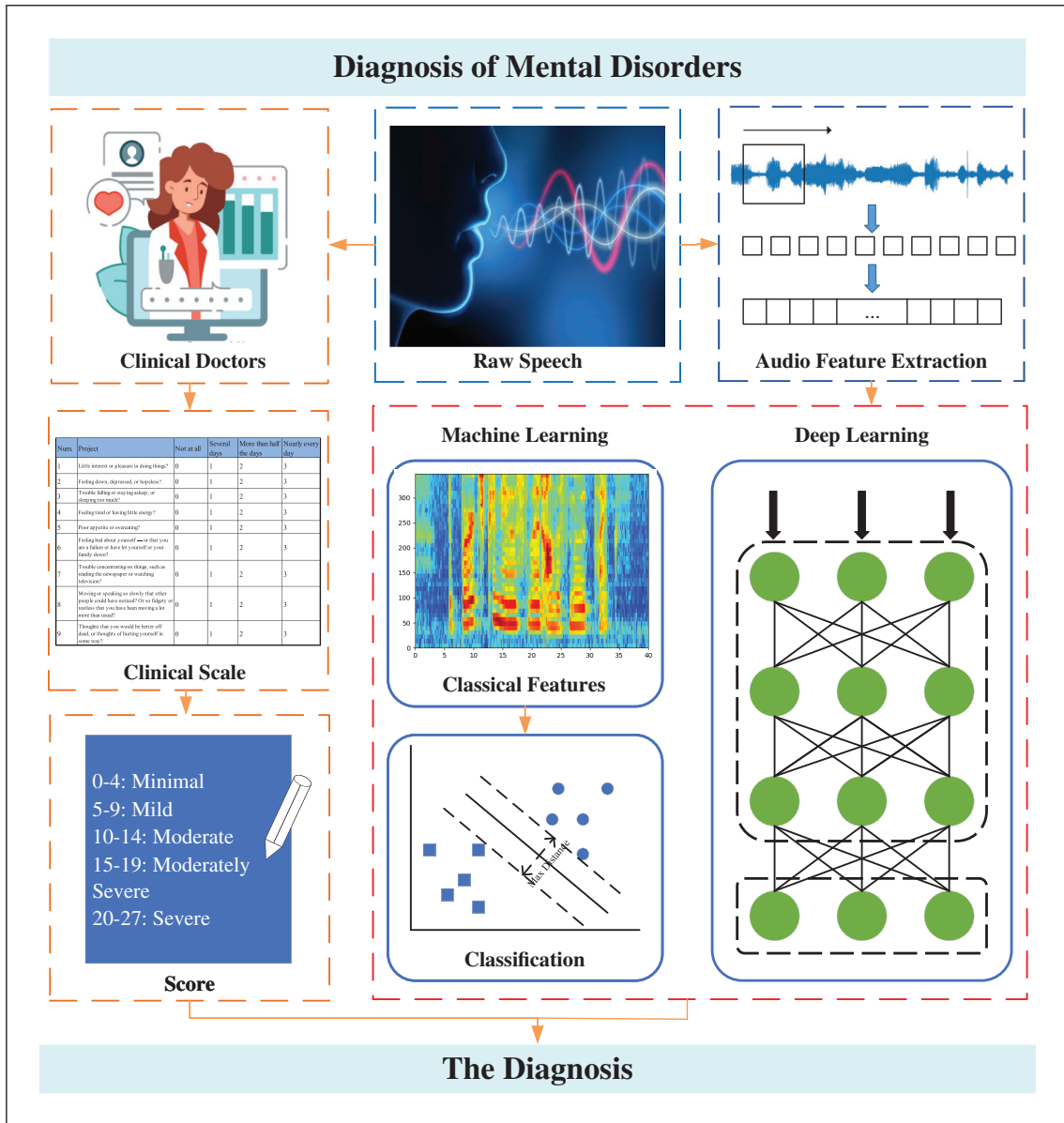


Figure 2 Methods of diagnosing mental disorders. (Qian *et al.* Intelligent Medicine, 2023).

EE: Do you have any advice for *BIO-Integration* as an emerging journal?

KQ: In my opinion, *BIO-Integration* is off to an excellent start. As a newly-launched interdisciplinary academic journal, how to guarantee the high quality of accepted manuscripts should always be the first task. Some suggestions, however, may be considered. First, we may seek opportunities

to collaborate with some prestigious conferences. We hope some of the best papers from these conferences can be extended and recommended to *BIO-Integration* for possible publication. Second, we may ask some top scientists to help organise some special issues to collect the outstanding works in some specific domain. Last but not the least, attracting more editorial members (including the young members) can contribute to the rapid development of this emerging journal.