

Obituary

# A Tribute to José António Tenreiro Machado (1957–2021): Life and Work

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José António Tenreiro Machado (Figure 1) left us unexpectedly on 6 October, the day of his 64th birthday. Prof. Machado was born the 6 October 1957 in Pinhel, Portugal. His parents were soon separated after his birth. Divorce was forbidden at the time in Portugal. His father denied him any kind of support, financial or otherwise. At the age of two, he and his mother went to live with his maternal grandparents. His grandparents were his family pillars. At the age of fifteen, his grandmother died of cancer and, two years later, his grandfather remarried. He and his mother lived on the first floor of the family's house, while the ground floor was rented. At the time, this income became the only financial support for both him and his mother, since his mother never worked. While in high school, he was an excellent student, and started giving private lessons to other high school students, while continuing his studies. As an university student, he carried on tutoring his university peers. With this income, he paid his studies and helped his mother financially. During the same period, he was a chess player and won many trophies. He finished his Electrical Engineering degree with the highest classification and received the Eng<sup>o</sup> Cristiano P. Spratley award from the University of Porto.



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**Figure 1.** Prof. Tenreiro Machado (2020) at the Dept. of Electrical Engineering, Institute of Engineering, Polytechnic Institute of Porto.

His academic career started in 1980 as an assistant professor at the Faculty of Engineering of the University of Porto (FEUP). I met him there, as a colleague. Soon afterwards, we married on 12 December 1982. Moreover, at the beginning of his professional career, he worked in industry, more specifically in fluid-power hydraulics and electronics, in 1983. In 1984, his first son was born.

From 1985 to 1988, Tenreiro Machado took a leave of absence to establish a new engineering college at the Polytechnic Institute of Viseu (Viseu, Portugal). He defended, in 1989, his PhD thesis entitled “Structural Resource Management in the Control of Robot Manipulators” and, in 1995, the “Habilitation”, in which he presented the overview lesson “Computational Problems in Robot Control”, at the University of Porto. In the same year, his second son was born.

His work at the Dept. of Electrical and Computer Engineering of the University of Porto ended in 1998, carrying on his academic career at the Dept. of Electrical Engineering, at the Institute of Engineering of the Polytechnic Institute of Porto, as a Coordinator Professor. He was assigned as Principal Coordinator Professor at the Institute of Engineering of the Polytechnic Institute of Porto, Dept. of Electrical Engineering, in 2016. In that capacity, he became the dean of both the Institute of Engineering and of the Polytechnic Institute of Porto.

Throughout his academic activity, he was director of several 1st and 2nd degree (*licenciatura* and master’s degrees) university courses on Automation and Control, Management, Electrical and Computer Engineering. He also held roles such as Head of Dept. of Electrical Engineering, President of the Scientific Committee of the Institute of Engineering, Member of the General Council of the Polytechnic Institute of Porto and Scientific Coordinator of Interdisciplinary Studies Research Center, also at the Polytechnic Institute of Porto. He was supervisor of 16 concluded and 3 ongoing PhD theses, and was a member of the PhD jury in Portugal, Brazil, Spain, France, Belgium, Finland, Poland, and the Czech Republic.

From the very beginning, he was a dedicated and helpful professor. He was a wonderful communicator, always seasoning his classes with a touch of humor that hooked his students and drew them into the subjects that he taught. He taught students of all levels and participated in courses in other Portuguese universities, as well as abroad. He was a supervisor and lecturer of the Doctoral School of Applied Informatics at Óbuda University, Budapest, Hungary, since 2013. He was a visiting professor at the Institute of Applied Computer Science, Lodz University of Technology, Poland since 2014. In 2016, he received the Appointment Certificate “Guest Outstanding Professor at Sichuan University of Science and Engineering”, from university President Tuo Xiang-guo, Zigong, Sichuan, China.

His research interests spanned a very wide range of topics, including electrical machine control, electronics and fluid-power hydraulics, robotics (position and force control, legged locomotion, modeling, computational architectures, biomechanics and education), nonlinear dynamics, complex systems, fractional order systems, time series analysis, genetic algorithms, evolutionary computing, intelligent transportation systems, vibration control, analysis of mechanical systems with friction and backlash, electromagnetism, bioinformatics, genomics, computational cybernetics, financial analysis, economy dynamics, music, paintings, and entropy.

He authored over 1160 publications, including 11 books, 575 archival papers, 118 book chapters, 382 presentations and 60 plenary lectures at national and international meetings and conferences, 74 courses in national and international universities, and was the editor of 22 books, advisory editor of 3 book series, and editor-in-chief of 1 book series, scientific director of journal “Robotics and Automation” (in Portuguese), guest editor of 55 Special Issues in journals, member of the editorial board, associate editor in several scientific journals, and editor-in-chief of 3 scientific journals. He was a highly cited researcher in the category “Cross-Field of Clarivate Analytics”. His scientific achievements are broad, profound, and overarching. His impact on the literature is truly remarkable.

His most prolific scientific production is associated with fractional calculus (FC). His first FC paper [1] was published in 1997. Since then, he worked and wrote several

papers on the topic; 51 as a single author. Moreover, his most cited work [2] is on FC. In 2019, he published a multi-volume book series entitled *Handbook of Fractional Calculus with Applications*, with a total of 8 volumes [3].

He applied several computational techniques to a wide variety of topics, from mathematics and physics, to economic and financial analysis, to earthquakes, forest fires, music, and paintings, to name a few. Among his scientific production, we can find works of extreme beauty [4].

Tenreiro Machado was always an exemplary, devoted and caring father and husband, even when engrossed in the multiple scientific and academic tasks of his life. We will always miss him.

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