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Shengzhao Long · Balbir S. Dhillon
Editors

Man–Machine–Environment System Engineering

Proceedings of the 17th International
Conference on MMESE



 Springer

The Springer logo, which consists of a stylized chess knight piece on a pedestal, followed by the word "Springer" in a serif font.

Editors

Shengzhao Long
Astronaut Research and Training Center of
China
Beijing
China

Balbir S. Dhillon
University of Ottawa
Ottawa, ON
Canada

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Xuesen Qian's Sky-High Estimation



Grandness Scientist Xuesen Qian's Sky-high Estimation for the Man-Machine-Environment System Engineering

龙升照同志:

我收到您主编的《人机环境系统工程研究进展(第一卷)》,翻看了之后,感到非常高兴,1985年秋提出的一个想法,现在8年之后已赫然成书,500多页的巨卷!而且研究范围已大大超出原来航天,内容涉及航空、航天、航海、兵器、电子、能源、交通、电力、煤炭、冶金、体育、康复、管理……等领域!你们是在社会主义中国开创了这门重要现代科学技术!

此致

敬礼!

钱学森

1993.10.22

Xuesen Qian's Congratulatory Letter



Grandness Scientist Xuesen Qian's Congratulatory Letter to the 20th Anniversary Commemorative Conference of Man-Machine-Environment System Engineering Foundation

龙升照同志：

你的来信已收到。欣悉人-机-环境系统工程创立 20 周年纪念大会暨第五届全国人-机-环境系统工程学术会议即将召开，我向你们表示最热烈的祝贺！

20 年来，你们在人-机-环境系统工程这一新兴科学领域进行了积极的开拓和探索，并取得了非常可喜的成绩，我感到由衷的高兴。

希望你们今后再接再厉，大力推动人-机-环境系统工程理论及应用的蓬勃发展，为中国乃至世界科学技术的进步作出积极贡献！

祝

工作顺利！

钱学森
2001年6月26日

Preface

In 1981, under the direction of the great scientist Xuesen Qian, an integrated frontier science—Man–Machine–Environment System Engineering (MMESE)—came into being in China. Xuesen Qian gave high praise to this emerging science. In the letter to Shengzhao Long, he pointed out, **“You are creating this very important modern science and technology in China!”** in October 22, 1993.

In the congratulation letter to the commemoration meeting of 20th anniversary of establishing the Man–Machine–Environment System Engineering, the great scientist Xuesen Qian stated, “You have made active development and exploration in this new emerging science of MMESE, and obtained encouraging achievements. I am sincerely pleased and hope you can do even more to make prosper development in the theory and application of MMESE, and **make positive contribution to the progress of science and technology in China, and even in the whole world**” in June 26, 2001.

October 22, which is the day that the great scientist Xuesen Qian gave high praise to MMESE, was determined to be Foundation Commemoration Day of MMESE by the 2nd conference of the 5th MMESE Committee on October 22, 2010. On this very special day, the great scientist Xuesen Qian pointed out in the letter to Shengzhao Long, **“You are creating this very important modern science and technology in China!”** And the conference also determined that the Annual Conference on MMESE would be held from October 21–23 to cherish the memory of the great contributions that the great scientist Xuesen Qian had made to the MMESE!

The 17th International Conference on MMESE will be held in Jinggangshan, China, on October 21–23 of this year; hence, we will dedicate *Man–Machine–Environment System Engineering: Proceedings of the 17th International Conference on MMESE* to our readers.

Man–Machine–Environment System Engineering: Proceedings of the 17th International Conference on MMESE is the academic showcases of the 17th International Conference on MMESE joint held by MMESE Committee of China and Beijing KeCui Academe of MMESE in Jinggangshan, China. The *Man–Machine–Environment System Engineering: Proceedings of the 17th International*

Conference on MMESE is consisted of 99 more excellent papers selected from more than 500 papers. Due to limitations on space, some excellent papers have been left out, and we feel deeply sorry for that. Crudeness in contents and possible incorrectness are inevitable due to the somewhat pressing editing time and we hope you kindly point them out promptly, and your valuable comments and suggestions are also welcomed.

Man–Machine–Environment System Engineering: Proceedings of the 17th International Conference on MMESE will be published by Springer-Verlag, Germany. Springer-Verlag is also responsible for the related matters on index of Index to EI, so that the world can know the research quality and development trend of MMESE theory and application. Therefore, the publication of *Man–Machine–Environment System Engineering: Proceedings of the 17th International Conference on MMESE* will greatly promote the vigorous development of MMESE in the world, and realize the grand object of “**making positive contribution to the progress of science and technology in China, and even in the whole world**” proposed by Xuesen Qian.

We would like to express our sincere thanks to Springer-Verlag, Germany, for their full support and help during the publishing process.

Beijing, China
July 2017

Prof. Shengzhao Long

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About the Editors

Prof. Shengzhao Long is the Founder of the Man–Machine–Environment System Engineering (MMESE), the Chairman of the Man–Machine–Environment System Engineering (MMESE) Committee of China, the Chairman of the Beijing KeCui Academy of Man–Machine–Environment System Engineering (MMESE), and the Former Director of Ergonomics Lab of Astronaut Research and Training Center of China. In October 1992, he is honored by the National Government Specific Allowance.

He graduated from the Shanghai Science and Technology University in 1965, China. In 1981, directing under famous Scientist Xuesen Qian, he founded MMESE theory. In 1982, he proposed and developed Human Fuzzy Control Model using fuzzy mathematics. From August of 1986 to August of 1987, he conducted research in Man–Machine System as a visiting scholar at Tufts University, Massachusetts, USA. In 1993, he organized Man–Machine–Environment System Engineering (MMESE) Committee of China. He published “Foundation of theory and application of Man–Machine–Environment System Engineering” (2004) and “Man–Machine–Environment System Engineering” (1987). He edited “Proceedings of the 1st–16th Conference on Man–Machine–Environment System Engineering” (1993–2016). E-mail: shzhlng@sina.com

Dr. Balbir S. Dhillon is a Professor of Engineering Management in the Department of Mechanical Engineering at the University of Ottawa, Canada. He has served as a Chairman/Director of Mechanical Engineering Department/Engineering Management Program for over 10 years at the same institution. He has published over 345 (i.e., 201 journal + 144 conference proceedings) articles on reliability, safety, engineering management, etc. He is or has been on the editorial boards of nine international scientific journals. In addition, Dr. Dhillon has written 34 books on various aspects of reliability, design, safety, quality, and engineering management published by Wiley (1981), Van Nostrand (1982), Butterworth (1983), Marcel Dekker (1984), Pergamon (1986), etc. His books are being used in over 85 countries, and many of them are translated into

languages such as German, Russian, and Chinese. He has served as general chairman of two international conferences on reliability and quality control held in Los Angeles and Paris in 1987.

Professor Dhillon has served as a consultant to various organizations and bodies and has many years of experience in the industrial sector. At the University of Ottawa, he has been teaching reliability, quality, engineering management, design, and related areas for over 29 years and he has also lectured in over 50 countries, including keynote addresses at various international scientific conferences held in North America, Europe, Asia, and Africa. In March 2004, Dr. Dhillon was a distinguished speaker at the Conf./Workshop on Surgical Errors (sponsored by White House Health and Safety Committee and Pentagon), held at the Capitol Hill (One Constitution Avenue, Washington, D.C.).

Professor Dhillon attended the University of Wales, where he received a BS in electrical and electronic engineering and an MS in mechanical engineering. He received a Ph.D. in industrial engineering from the University of Windsor. E-mail: dhillon@genie.uottawa.ca