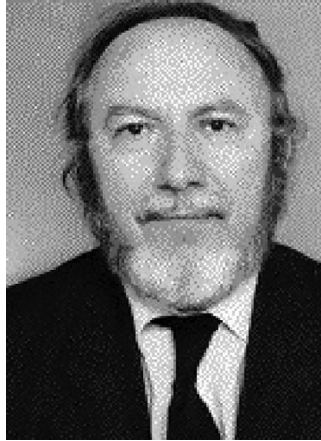


In Memoriam



Professor Miomir Vukobratović
(1931–2012)

Professor Miomir Vukobratović passed away on March 11, 2012 at the age of 81. However, his achievements in robotics will remain with us always.

Miomir Vukobratović was born in 1931. He graduated in 1957 from the Faculty of Mechanical Engineering, University of Belgrade, where he also obtained his first PhD in 1964. In January 1958 he joined the Aeronautical Institute in Belgrade. At the beginning of 1965 he moved to the Mihajlo Pupin Institute in Belgrade, where he became director of the Robotics Laboratory. In 1980, he became professor at the Production Engineering Department of the Faculty of Mechanical Engineering, University of Belgrade.

The professional and scientific activities of Prof. Vukobratović can be classified into three basic areas. The first one is his professional and research work in aeronautics, the second one belongs to the sensitivity analysis and dynamic control synthesis of large-scale dynamic systems, and the third (the longest and the most productive one) belongs to the field of theoretical and applied robotics.

His work in this last area was dedicated to robotics and to control of large-scale mechanical systems, and began with activity in the field of robot dynamics and active spatial mechanisms. Together with Prof. D. Juričić, he published seminal journal papers on the dynamics of anthropomorphic mechanisms (1968–1972).

The period of 1971–1972 was marked by the design and realization of a first in the world exoskeleton for restoring basic locomotor activity of severely handicapped persons (in collaboration with D. Hristić) at the Mihajlo Pupin Institute. Later (1971–1974), a new type of electrically driven exoskeleton was developed and further transformed into the first active orthotic devices of modular-type for dystrophic subjects.

During 1971–1974, in collaboration with his closest associates, Prof. Vukobratović introduced a complete dynamic approach to study anthropomorphic locomotion robots, which he extended (together with D. Stokić) onto dynamic control of manipulation robots, where he applied many of the approaches he had already introduced.

The first Yugoslav industrial robot UMS-1 was developed in 1978, and during 1979–1985, several other industrial robots (UMS2 in 1980, UMS3 in 1981, UMS4 in 1983, and UMS8 in 1985) were designed, manufactured, and applied. In 1982, a project headed by Prof. Vukobratović resulted in the first active arm orthosis for rehabilitation of advanced cases of dystrophy, which was used in Yugoslavia and abroad. During 1992–1996 (together with Y. Ekalo, Russia) he introduced a new approach to the dynamic control of robots interacting with dynamic environment. During 1995–2004 he published with his close associates further results in the domain of constrained robot motion interacting with dynamic environment.

Over the whole period of his activity, publishing was the focus of Prof. Vukobratović's attention. In the field of mechanics and control of robots and manipulators, he published with coauthors 15 basic research monographs and several advanced textbooks in English, and some of the monographs have been translated into Japanese (3), Russian (4), and Chinese (4). Perhaps, the most outstanding of the writings authored/coauthored by him is the series of monographs in seven volumes, entitled *Scientific Fundamentals of Robotics*, published by Springer-Verlag (1982–1990), which is a unique example in the scientific world. In addition to 14 chapters in international monographs, he also published about 250 papers in scientific journals and more than 400 proceeding papers of international meetings. For many years he acted as a member of editorial boards of 12 leading scientific journals in robotics, as well as a coeditor of the book series *New Frontiers in Robotics*, World Scientific Publishing. He was a leader of all national and several international research projects in robotics, and a member of

more than 100 of program/scientific committees of international scientific meetings. Finally, he supervised 30 MSc and 25 PhD theses and lectured at more than 150 seminars in the United States, Japan, Russia, China, and Europe.

Prof. Vukobratović received many signs of recognition for his achievements. Let us mention just some of those of international significance: Foreign member of the Russian (former Soviet) Academy of Sciences; member of the European Academy of Sciences; holder of the “Joseph Engelberger” award for outstanding results in applied research and education in Robotics; and member of the Serbian Academy of Sciences and Arts. These are but a few of his many honors, including multiple honorary doctorates and professorial positions.

The pioneering work done by Prof. Vukobratović and his associates initiated in the late 1960s and 1970s is among the most extensive contributions to the field to date. The work started with exoskeletons (which quickly evolved to “complete” and powered) and active hand-orthosis, spreads over the area of walk modeling (recursive formulation of robot dynamics), synthesis (semi-inverse method), and control, covering industrial robotics (introduction of robot dynamic control and force feedback in dynamic control of robots), and in the late period, to come again back to biped locomotion.

I believe that any person who reviews the long career of Prof. Vukobratović is left impressed by his outstanding accomplishments in science and technology. Those who had the privilege of knowing this great man and having been his friend will keep him in lasting memory.

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