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Editorial

**FOREWORD TO THE THEMATIC ISSUE:
BIOMEDICAL ENGINEERING - ONE OF THE GREATEST
ENGINEERING CHALLENGES**

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EDITORIAL

This thematic issue of *Facta Universitatis, Series: Mechanical Engineering* is primarily dedicated to a very wide and important topic, Biomedical Engineering (BME), while it also tackles the topic of how nature can provide solutions for engineering challenges. The reason is twofold. Firstly, the Journal receives an increasing number of papers in the field of BME. Secondly, it aims to highlight the importance of BME, as one of the increasingly prominent research areas in Mechanical Engineering.

Biomedical engineering is one of the youngest branches of engineering which deals with the application of engineering methods to solving problems in medicine. BME is used in all healthcare stages, including diagnostics, monitoring and therapy. Today, BME is recognized as a separate engineering discipline although it is based on other engineering disciplines, such as information technologies, mechanical, electrical and chemical engineering. If we take into account that for solving the problems in BME it is necessary to use, in addition to engineering knowledge, that of medicine and biology as well, it can be said that its nature is deeply multidisciplinary.

BME has given a great contribution to the analysis of the state and simulation of different processes in the human body, thus creating a better understanding of the physiological processes, which is important for diagnosis and therapy. Thanks to BME, the medicine today uses many new materials, tools, devices, systems, artificial tissues and organs, methods and processes, which together broaden and improve medical services and ensure a better quality of people's life.

Since the first wood and leather prosthesis dating back from 1069 to 664 B.C, different medical devices have been developed. Still, it can be said that the cornerstone of biomedical engineering was set up by Wilhelm Roentgen who in 1895 made the first X-ray image. The real development of biomedical engineering happened after WW II. The invention of artificial kidneys (1945), artificial heart valve (1952) and the first external cardiac pacemaker (1958) paved the road towards the creation of new engineering disciplines - biomedical engineering.

As a consequence, the first journal dedicated to biomedical engineering, IEEE Transactions on Biomedical Engineering was launched in 1953. The academic community responded quickly, and the John Hopkins University in 1962 opened the Department of Biomedical Engineering. Today, almost all universities have at least one study program in the field of biomedical engineering and there are many biomedical engineering journals. According to the SCImago Journal & Country Rank (<http://www.scimagojr.com>) there were 181 significant journals in 2014 whose subject category is Biomedical Engineering.

The importance of biomedical engineering is perhaps best illustrated by the data on employment. According to United States Department of Labor Statistics the number of biomedical engineers in USA in 2014 was 20080, with an expected rate of growth of 27% until 2022, much faster than the average for all occupations.

In spite of its evident remarkable achievements, biomedical engineering still faces considerable scientific and technical challenges. In order to give floor to researchers to present their achievements, the Editorial Board of *Facta Universitatis, series: Mechanical Engineering* decided to publish this thematic issue. It contains twelve papers from the field of biomedical engineering. It covers a wide spectrum of topic, from biomaterials, through design and manufacturing of osteofixation devices to simulators. In addition, a couple of papers deal with the application of information technologies in the management of data, knowledge and processes in orthopedics, as well as in the simulation of human organs.