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Research methodology in mechanical systems and bionics from Plato to contemporary science

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Statement of the Problem: During the process of scientific creation, innovators can apply creativity techniques either intuitively or by using the most appropriate research methodology. A research methodology can use present or historical knowledge. Many scientific matters of current interest are described in Plato's work, and some contradictory topics from his work are still debated. A short overview referring to the methodological rules from Plato's work which has not been exceeded is considered to be necessary.

Aim: The aim of this paper is to promote the utilization of the appropriate research methodology in the process of scientific creation in the field of mechanical systems and bionics, to present some applications, as well as focusing our attention on new historical research with useful results in the present.

Methodology & Theoretical Orientation: Some of the streams used in solving difficult problems are: Experimental analysis, thought experiments, visual analogy, inventive principles recommended by TRIZ method (the theory of inventive problem solving), and maintenance of the idea in long-term-memory.

Results: The paper presents the author's point of view referring to the interpretations of Plato's books. Some new applications of Plato's ideas in mechanical systems are included. The author's strategy utilized in the process of scientific creation in bionics was applied to obtain several biological robots and models of mechanical systems inspired from nature, e.g., viruses. The applications of TRIZ method in the field of mechanisms and robots, even for the calculus, e.g., global mobility, are obtained.

Conclusion & Significance: The author aims for the paper to be useful to other young researchers who strive to improve their strategy in the process of scientific creation. In addition to that, the paper encourages researchers from different fields to collaborate together for solving the contradictions from Plato's work.

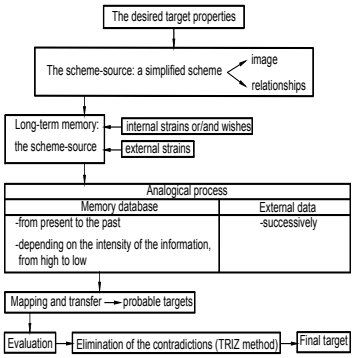

Figure 1: Algorithm for creative thinking

Biography

Simona-Mariana Cretu completed her BSc in Mechanical Engineering in 1984, and PhD in Mechanisms in 1999 at University of Craiova. From 1984 to 1992, she was a Research Engineer at Research Laboratory for CAD Systems, ICMET and Craiova. Since 1992, she has been working in Department of Applied Mechanics and Civil Engineering, Faculty of Mechanics, Craiova, where she is currently a Professor. She wrote scientific papers and books in the fields of "Mechanisms, biological robots, creative techniques, philosophy and history of science". She realized new models for legged robots and viruses inspired from nature, and proposed a new interpretation of Plato's books.

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