2012 IFToMM SEMINAR

TIME&DATE: 11:00-12:00, Friday, September 28h, 2012
PLACE: Room 31A(3F), Engineering #2
Hongo Campus, The University of Tokyo
HOST: Yoshihiko Nakamura (nakamura@ynl.t.u-tokyo.ac.jp)

Reconstruction Designs of Lost Ancient Mechanisms

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Abstract

This work presents a methodology, developed by the author and his group since 1990, for synthesizing the mechanisms of lost and/or incomplete ancient machines systematically. Based on author's approach for the conceptual design of mechanisms proposed in 1980, this methodology converges and transforms specific knowledge obtained and divergent ideas initiated from the study of various ancient literature into design specifications, structural characteristics and design constraints in modern mechanism design to generate complete atlases of generalized chains and specialized chains. Then, it applies the mechanical evolution and variation method to have all possible reconstruction design concepts that meet the records of ancient literature and technological standards of the subjects' time period. This methodology has been successfully applied for the reconstruction synthesis of the lost mechanisms of ancient Chinese south-pointing chariots in various dynasties, seismoscope (AD 132), escapement regulator (AD 1088) and walking machines (~500 BC), and ancient Greece's Antikythera mechanism (~100 BC). Before new proven historical archives are available, this methodology provides a logical and innovative tool for historians to target the long term idling problem regarding reconstruction synthesis of lost mechanisms in ancient machines and to further identify the possible original designs.

Biography

Professor Hong-Sen Yan received his PhD in Mechanical Engineering from Purdue University (Lafayette, Indiana, USA) in 1980. Currently, Dr. Yan is a University Chair Professor and Executive Vice President of the National Cheng Kung University (Tainan, Taiwan). His major areas of interest are conceptual design of modern mechanisms and reconstruction designs of lost ancient machinery. He is the (co-)author more than 300 academic papers and 10 books/05 book-chapters. Dr. Yan received many honors and awards inside and outside Taiwan, and he collects ancient Chinese padlocks as a hobby.