Editorial

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"*Give me a lever long enough and a fulcrum on which to place it, and I shall move the world*," is an aphorism attributed to Archimedes. A kinematician might hasten to modify it as '*give me a crank and enough mechanical parts, and I shall make them all follow my orders*'. A kinematician deals with geometry of pure motion. Ampere defined *kinematics* as study of "*geometry in motion*". Imagine a cylindrical rod put into a machine coming out as a threaded bolt with a hexagonal head at the turn of a single crank. The mechanical elements in that machine follow the turning crank in such a coordinated manner to make all the necessary modifications to transform the rod into a bolt. We need many parts assembled with joints to achieve coordinated deterministic motion. Mechanical engineers use the terms 'mechanisms' or 'linkages' to describe assemblies of movable bodies. We see simple mechanisms all around us from a potato peeler to landing gear of an aircraft. Complex mechanisms are used in machinery. Toys have mechanisms that appeal to the young and the old alike. Mechanisms and kinematics equally fascinated the minds of great inventors and mathematicians: Watt, Babbage, Cayley, Chebychev, Kelvin, and Kempe, to mention a few.

This issue of *Resonance* celebrates the work of a modern American kinematician, Ferdinand Freudenstein. Simple and efficient calculating mechanisms, which in Charles Babbage's time consisted of mostly gears, apparently motivated Freudenstein to develop his methods for linkages. Machine design, manufacturing equipment and robotics benefitted from his work and those of the others who were inspired by him. Some of the charm of kinematics in mechanisms has faded because of electronically controlled mechanical motion. But this is something that we have been hearing for a long time. When cost and energy are in focus, mechanisms still rule. Kinematics remains relevant today in other ways. Analysis of motion and conformational changes of proteins and other biological molecules, and design of micromachined sensors and actuators are two examples.

Two articles written by Bernard Roth and Ashitava Ghosal and a reprint of a seminal paper by Ferdinand Freudenstein are included in this issue. They not only describe the life and work of Freudenstein but also uncover the significance of the science of kinematics. Another article by Joseph Samuel (Mirrors and Merry-Go-Rounds) too brings out the beauty of kinematics. When you read Vasant Natarajan's article on 2009 Nobel Prize in Physics, you can muse about the role of kinematics in optics.