

Keynote Address 3

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THINGS DO THINGS: WHY, WHAT AND HOW?

There is one major driving force behind all the engineering marvels. That is the power of curiosity. The never ending inquisition of engineers on, why things do things the way they do, what will be the reaction of a particular thing for an action, and more importantly, how can that reaction be controlled the way they desire, can be attributed to the advancements of technology that the human nation is enjoying. This is achieved by investigating the physics of the thing (system) and then deriving a mathematical model, which is used for further analysis and control. However, the non-linear and time-varying complex nature of the most of the natural systems makes the physical modeling practically difficult if not impossible. The focus of this paper is to investigate techniques which are based on reverse engineering approaches to model systems. The applications of reverse engineering techniques are illustrated using few case studies and compared with the traditional physical modeling techniques. Further, the need for research into more advanced modeling techniques is highlighted, stressing the need of a sound mathematical background for future engineers.