# Seminar Title: Cognitive and Computational Studies in Design

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## Abstract

Design is a unique human activity. It is neither fully a science, nor quite an art, nor is it a craft, although it draws from all three and more. It is the process of conceiving, defining, and realizing new objects and ideas for the first time, in response to the needs of the society in which the creators live. It is a creative activity that concurrently relies on our cognitive faculties, our understanding of the society and the world, and technology. Studying design, therefore, involves studying the products, the processes, and the people of design.

In this seminar, Dr. Sen will present his research examining the cognitive processes of designers, which produced the first empirical evidence of cognitive chunking during sketching and evidence for multi-dimensional analogy during ideation. He will also present his work on creating a formal language of technical functions, which enables computer modeling of design concepts in the early stages of systems engineering, when form-related information is unavailable. He will present this language’s ability to automatically generate system configurations from its overall functional description using semantic reasoning, qualitative physics, and evolutionary algorithms. Dr. Sen will also present some of his industry-funded design automation projects.

## Biographical Sketch

Dr. Chiradeep Sen is an Associate Professor of Mechanical Design at Florida Institute of Technology, where he leads the Research in Information Science for Engineering lab (RiSE). His research interests include design theory and methodology, formal languages and reasoning in design, design automation, and design education. His research has been sponsored by the U.S. National Science Foundation, General Motors, the U.S. Council for Automotive Research, and the Kern Family Foundation. Dr. Sen received the American Society of Mechanical Engineers’ (ASME) Best Dissertation Award for his doctoral research, where he proposed a formal language of technical functions for computer modeling of engineering systems in terms of their functionality. Dr. Sen received his M.S. and Ph.D. from Clemson University’s CEDAR lab and was a post-doctoral scholar at the Design Engineering Lab at Oregon State University. He has over thirteen years of industry experience in design, manufacturing, and design automation in heavy engineering, automotiv, tools and dies, and consumer products companies.