

Developing Representations to Scaffold Capstone Design

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This presentation discusses how representations—methods for how ideas are expressed—have been incorporated into a capstone design project in Electrical and Computer Engineering. Over the past several years the authors have been developing methods that effectively represent the design process. This work discusses how four different representations were implemented in the first semester of a one year capstone design course to allow student teams to self-manage a project in the second semester. The four representations are:

- 1) A functional abstraction that represents the problem space as a set of functional requirements that need to be abstracted to the context and constraints of the problem.
- 2) A conceptual problem description that decomposes the project into a set of related functions or tasks.
- 3) A technical block diagram that expresses the functions in terms of interconnected hardware and software elements.
- 4) A logistics model that grounds the project in time, budget, and personnel constraints.

The development of each representation will be discussed in the context of the overarching course goals, and examples of in-class exercises that students undertake to become functionally literate in each representation are also introduced. We discuss rubric evaluation for earlier versions of these representations and alignment with ABET outcomes. We acknowledge the assistance of Philip Asare in this work.