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Joan's primary research interest is the application of formal methods to the design of reusable, component based software systems. In particular she works toward the design of mathematical specifications for modular software, including the specification of performance as well as functionality. Her work includes the development of automatable proof rules for checking correctness of software.

Recent work includes the proof that auxiliary variables are not only a convenience, but a necessity in defining correspondences (abstraction functions), a new definition for big O, called OO Big_O for analysis of objected oriented software, a definition of what it means for software to be correct, independent of proof rules.

Joan is also interested in bringing research into the classroom, as well as searching for both the right content and the right pedagogy for presenting CS ideas in a variety of courses.

Joan collaborates with William Ogden at Ohio State University and Murali Sitaraman at Clemson University. She and Ogden are currently working on relational denotational semantics for generic software.