I believe that an engineering education of merely a practical technical background is no longer sufficient in the United States. In fact I am firmly convinced that the cost of an engineer in the urban United States will soon grow past the point where companies find it profitable to do straightforward commercial engineering work. Instead, companies have and will continue to farm out this work to technically capable engineering firms in areas where the cost of living is less expensive. While this may include cheaper areas of the country (e.g., rural states), it most certainly means that some tasks will be outsourced to other countries.

An engineering education has historically allowed people from all sorts of initial conditions (e.g., single parent families, low-income households) to create a good life for themselves after reaching a level of professional competence. This has made engineering an attractive major for years, but in the long term the engineering discipline must continue to separate itself from the idea of technical competency and move toward its roots: training people how to make something work.

In my research statement, I outline how model based systems engineering is emerging as a rich field for exploration. In order to provide support for this kind of task, a technical competence is certainly required, but is not a sufficient condition. In addition, competency in innovation is needed in order to think outside the box, and this competency is really only achieved with experience in performing abstractions, building systems that are nontrivial to implement, and reasoning about problems which are not straightforward to solve.

**Teaching Agenda**

5 years
I will be regularly teaching a graduate and advanced undergraduate course on Model-Integrated Computing, which will help students learn how to create systems via scalable formal methods through code generation and domain mapping. This course provides theory and application in the realm of modeling and metamodeling, which will provide students with a deep understanding of the purpose of abstraction in domain-specific modeling.

Industry trends and academic interests indicate that courses like this one—pioneered at Vanderbilt University while I was there as a graduate student—will soon be taught in universities across the US. I expect that the textbook I am writing now (along with the two original designers of the course) will be used in many of these classrooms.

20 years
My goals in the long term involve growing departmental and college-level strategies to further increase multidisciplinary studies—not only between engineering disciplines, but also those of medicine and biology. On a macro scale, this involves changing degree requirements, to include interdisciplinary project classes between technical fields as a requirement in the curriculum (if it is not already done so), and to continue to emphasize projects with low-tech goals but highly-technical completion requirements.
Pedagogy and Style

My basic teaching philosophy is that students should discover knowledge on their own; thus my teaching plan revolves around their interest—and understanding—of the subject I am teaching. This requires that I be engaged during every lecture, and also available outside of class for individual student questions.

In a lecture style class, especially, a wealth of material to cover means that I can only occasionally afford to review information discussed previously in class. Thus, an integral part of my teaching plan is defined office hour availability, in addition to a general open door policy.

Successfully teaching a complicated subject to a group of students also requires that I have an understanding of my students. Using classroom assessment techniques (CATs) helps me to better understand where students stand in the syllabus in relation to where I want them to be. In this way, I can be confident with the pace of the course and can better create examination questions, or more appropriately assign projects and deadlines.

Most importantly, my teaching plan revolves around a passion and resonance with teaching as a profession. As a research assistant at Vanderbilt University, I was not presented with opportunities for teaching. Instead, knowing that my lifelong goal was to teach, I sought out teaching assignments in my research group (serving as a TA one term when there was a shortage of available TAs), and serving as a Master Teaching Fellow in the Center for Teaching. I also managed to serve on a team of instructors for courses on both a graduate and undergraduate level. At Berkeley, I took on a teaching responsibility in addition to a 100% research schedule, and additionally served as a mentor to minority undergraduates over the summer term, to give them first hand research experience and encourage them to investigate graduate school. In short, my passion for teaching is exemplified by my persistence in finding teaching and mentoring opportunities.

Graduate Student Supervision

When supervising graduate students, I prefer a personal, rather than remote, relationship. This is modeled on the relationships I have had with my own advisors and postdoctoral sponsors, and I find it important to spend significant time in both professional and social settings. A major reason for this is to help students discern that a criticism of their work is not the same as a personal criticism. While serving as a counselor in the Vanderbilt University Center for Teaching, I had long discussions with students who were convinced that their advisors did not like them because of how they gave feedback on technical writing. In my experience, this insecurity is less common when the interaction extends past giving feedback and assignments.

Methods to ensure this interaction include going to lunch regularly with my students, social events such as backyard barbecues and card/strategy games, and extending invitations to enjoy hobbies such as photography, music/musical instruments, and outdoors activities.

Teaching Experience

I have taught or team taught several courses since my undergraduate days, which are listed and briefly described in my curriculum vita.