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Statement of Teaching Interest

In teaching at the university level, I have always been convinced that the crux is to entrust students with the tools for obtaining knowledge, and to show them the relevance of such knowledge, so that they are inspired to actively seek out further insight themselves. To this end, I believe that only through hands-on experience can theory be grounded and its relevance understood. It is this belief that has guided me through my past teaching and research.

Undergraduate Teaching Experience: Throughout my College and Graduate careers, I chose to TA in 10 courses and tutor in 3 more, all of which featured a significant project portion. It is in these courses that I often heard students commenting that they finally learned the purpose of the required EE or CS courses. While these courses often consumed a majority of the students' time, it is also in them that they showed the most excitement or even pride.

In my sophomore year, I took several project courses that really motivated me to learn. At that time, mp3 chips had just been introduced, so we built a hard-drive based mp3 player and programmed its interface. Everyone, including the teacher, was discovering the possibilities of this new project. Through many sleepless nights, I not only learned the theory but also implemented this embedded system. In recognition of my evident passion, during my junior year at Caltech, I was selected as the only undergraduate TA for Senior EE project courses (EE90, 91a, 91b). In these courses, each student was required to complete an independent project, from idea to packaging, in an 11-week period. As students had complete freedom over their own project, there was a wide range of them, making it difficult for TAs to help the students when needed. In order to curb the complaint that "the TAs know nothing", I started to meet with each student every other week to learn about their projects. The students not only began to appreciate such input but also learned to better communicate their ideas. As a result, more students were able to complete their project than in previous years, and I was appointed the head TA and remained the only undergraduate TA for these courses during my senior year. On top of that, I was also asked to TA two other courses: digital circuit design (EE4) and the graduate level, VLSI design (CS105). More rewardingly, with the reputation of TAs improved, students started to undertake even more ambitious projects, from 1kW switching power supplies to a TIVO-like recording device. I felt they were better able to apply what they had learned in analog/digital circuit classes, and motivated to challenge themselves, which simply could not have been duplicated by a theory course alone. While debugging with students a design centered around a specialized chip only days before the deadline was still taxing, the students' "ah-ha" moment was worth every single sleep-deprived hour. It is with this experience that I entered into Princeton University's graduate program.

Graduate Teaching Experience: Teaching Students to "Fish": I often find an answer given to the students' questions a disservice to them, while it is more important to guide them to find their own answers. In Princeton University's Electrical Engineering program, there is one course that nearly everyone knows: ELE 302, or the "car lab". The course requires each student to design a car that follows a line laid out on the floor. Having been established for some years, this course is notoriously difficult both to take and to teach, because it requires knowledge of both hardware/software design and control theory. When TAing this course in my second and third years, I often answered questions with questions, with which I tried to guide the students to their own answers. To meet the increasing interest in my hours, I added one office hour starting midnight everyday. Soon my session became a must-go; even the students without questions would come to the lab and work during that hour. Many simply came to chat about their ideas for ELE302, other classes, their research, or even their future plans, some even brought in their own electronic devices to dissect and hack. In particular, one student disassembled his new iPod to discuss with me what he thought each part did. I later received the *Outstanding Teaching Assistant Award* for this course. When a class can invoke enough interest for a student to take apart his iPod, you know you are doing something right!

Future Teaching Plans: I would like to continue to provide the students an opportunity to understand the relevance of their studies, and to inspire them to engage research for their own curiosities. I am capable of teaching a variety of courses, including but not restricted to

- general analog\digital electronics;
- embedded electronics, systems, and computer architecture;
- introductory project courses for embedded or microprocessor systems;
- independent analog/digital projects.

In the general courses, I will infuse a strong hands-on portion so that students can obtain a good understanding of the material. Introductory project courses would assign each student a pre-defined, competitive project, similar in spirit to the car lab, where they are offered an opportunity to program and design toward a common goal while mutually motivated by the course's competitive nature. The more advanced project courses will give students an opportunity to conjure, design, implement, and eventually present their *own* projects, for which complete freedom is granted for the students to explore whatever strikes their fancy, and grades given based on both the ambition and completeness of the project. It is my hope that, through their time in these courses, the students would also appreciate the need for ideas to be grounded and their relevance understood, regardless of their final careers.

Interweaving Research and Teaching: This overall philosophy has not only guided my teaching, but also my research experience. I sincerely believe that the ZebraNet Project would not have achieved as great an impact but for the hardware implementation and subsequent real-world deployments. All my research has had both a theory part and an implementation part to ground the theory into the realm of reality. For example, my work on low-density collaborative localization in DTN is theoretical, in the sense that it employs probabilistic density models and distributed Markov decision making to combine and locate DTN nodes. However, validation was carried out via implementation in real hardware, as well as large-scale simulations with parameters collected in those implementations. This validation is more convincing, if only for me to note the potential of my research in real deployments. It is this feeling that I wish to pass onto my future students.

On commencement day last year, a former 302 student came into my office to thank me and told me that I was “the best TA” that he had ever had, who taught him “how to fish”. It was the greatest moment in my life so far, a moment that I hope to repeat.