Service *accelerates* research and teaching.

A researcher's job is to find and actualize good ideas. Many paths to good ideas exist, but all require the help of our peers to point the way with their conversation, critique, and debate. Service accelerates research because it is a ***peer-generating process***. Indeed, in my experience, service offers *the fastest of all possible paths to good ideas*. I've organized much of my professional life around service both because it's the right thing to do *and* because it increases my productivity as a teacher, engineer, and researcher. I maximize the mutual benefit shared between me, my students, and the broader community by strictly adhering to three principles.

The first of these principles is ***radical transparency***. Radical transparency means making everything that you generate public. Every line of code, every slide, every page of course materials, every lecture, every schematic, and every printed circuit board. *Everything*, without exception. My website is a testament to my devotion to this principle. Radical transparency is to the mutual benefit of me, my students, and my community. For me, it enforces a quality control on all that I do. Because I know that everyone can see and pass judgement on everything that I build and generate, I am inclined to generate these things with the utmost seriousness. For the students and community, radical transparency allows for others to benefit from my mistakes, and to use my work as a starting point for their own. My microcontrollers git repository has over 200 stars and 60 forks, and my lecture and project videos have over half a million views, evidencing that this is indeed occurring. I generate all of these materials according to my second principle: ***document for the community***.

I assemble all my documentation to be of maximum-possible utility *to the most-possible people*. Many of the projects described on my webpage could have been documented as technical notes or other varieties of peer-reviewed academic publications. I consciously elect not to do this. Instead, I assemble documentation that makes it as easy as possible for as many people as possible to use my work. My documentation always includes example code, demonstration videos, getting-started guides, and simplified examples for folks to use as starting points. By working and talking with my students, I've learned that this is the set of materials that minimize the activation energy required for them and others to build upon my work. Maximizing the utility of my documentation means that I don't accumulate as many citations, papers, or other personal academic success metrics as others, but that's not my goal! My goal is to find and actualize good ideas. By optimizing my documentation for the students and community, I'm able to serve the largest-possible group of peers with which I can converse and debate. Strict adherence to my third principle helps facilitate these conversations.

My third principle of service is to ***engage in outreach with total humility***. I deliver outreach and cross-department talks at every opportunity. These include multiple annual talks to mechanical engineering students here at Cornell, and have included talks at the Museum of Science and Technology in Syracuse, a Public Works talk in downtown Ithaca, and talks at the Johnson Business School. I also participate in outreach events including the annual diversity in engineering fair, the engineering majors fair, and frequent visitor tours of the engineering buildings and Maker spaces. I don't just want to serve my community, I want to grow it! My operating assumption with any audience, be it students or community members, is that everyone I'm speaking with is of equivalent or greater intelligence to me, though they may lack

knowledge in the particular topics being discussed. I speak to folks in precisely the same way that I speak to colleagues in other fields. And at the end of the talk or conversation, I always ask for their *thoughts* rather than their *questions*. I explicitly ask them what they think.

Strict adherence to these three principles of service has paid dividends. Almost weekly, I receive an email from someone that has used my online materials. They either thank me for publishing them, or offer their thoughts on something I posted or said in a video. Each message is a nudge toward a good idea. Folks frequently reach out via GitHub and email to point out *incredibly* clever ways to optimize my programs. The precision of these optimizations suggest that these people spent hours or days going over this code. And the students teach me new things *constantly*. By sticking to these three principles of service, I've been able to contribute to a community of peers that, in return, help guide me to good ideas. I've received way more feedback via this "peer review by public exposure" than I ever received through journals. Give genuinely, and folks give back.

Altruism is reason-enough to do anything. This is not an argument against doing the right thing for right-things-sake, it is instead an argument that service is both the right thing to do *and* incredibly productive for research, teaching, and engineering! In exchange for publishing everything I do, assembling those publications for maximum community utility, and engaging in outreach events with total humility, a huge community of people help light the path to good ideas.

Addendum: The principles outlined above are, in my view, the fastest way to good ideas. But they are not without their drawbacks! Because this strategy does not lead to the accumulation of citations, papers, and other academic performance metrics, it can be hard to get funding (by conventional strategies) to do big projects. In other words, the principles above will lead you to a good idea but they won't pay for its actualization. I am lucky that my interests are in very low-cost systems, and so this hasn't yet been a major hindrance to me. I'd just like to acknowledge that it may be for other folks in other fields, or that occupy different incentive structures.