

Stefan: Friday December 7th, 2012. This is the CSE News Network's Headline news with Hovav Shacham.

Hovav: Good evening. [pause] In the aftermath of the recent election, political tensions continue to run raw in the Department of Computer Science and Engineering. Students behind the "Occupy CSE" movement are protesting that faculty only do one percent of the work on their research projects.

[George/Stefan/Kirill marking in Guy Fawks masks]

George: We are the 99 percent!

Kirill: Research is a crime! Forced Labor is not Science!

George: 1% of the papers get 99% of the citations! The h-index is tool of Capitalism!

Hovav: However, the conflict is not only from grass roots activities, but recent events have also exposed deep divisions within the political establishment as well. Perhaps most acrimonious of these fights comes from the theory group. To explain, we turn to our Theory Correspondent, Russell Impagliazzo. Russell?

Russell: Thank you Hovav. We are witnessing major soul searching within the theory group about the best path for them going forward. [Put up t-party slide]

Russell: On the one hand, the T-party wing of the group espouses the-so called *strict reductionalist* interpretation of theory. Roughly speaking, they argue that computer science is defined by its foundational problems (3SAT, Vertex Cover, Travelling Salesman and so on). They argue that problems that cannot be reduced to these foundations as over-reaching, vague and insufficiently principled. Members of the T-party ask their members, "what would the founding fathers do?" [Slide animation] They argue that Turing and Church would not recognize modern computer science departments with their application-oriented areas such as HCI and computer architecture and that such activities are best left to the private sector.

Russell: On the other hand, the pragmatic wing of the theory group argues that this slavish dedication to principals threatens the future of theory itself. Group spokesperson Sanjoy Dasgupta points to the underlying demographics and says quote, "We can't afford to ignore reality. Areas such as systems, architecture, programming languages, embedded, and so on are growing like weeds. Even if we get all the AI students, we'll remain a minority area unless we can appeal to students in application-oriented areas. We need to broaden our message, but we need to do so without compromising our principles".

Russell: It remains to be seen how this will all shake out and we've yet to see a proposal of what, for example, "principled systems" would look like. Back to you Hovav.

Hovav: Thank you Russell. We'll now take a short commercial break. When we come back, we'll look at what the computer science department is doing to address these challenging times.

[Put up first Geoff slide. Geoff should have old dongle and dongle bundle for props]

Geoff: Do you have a Mac or use any Apple product at all? Have you ever wanted to connect to a projector, to a USB device, to power, to anything at all? Ever since the first Dongle was created by Xerox PARC in 1985 [**holds up old dongle**] and then copied by Steve Jobs, Apple users have lived in terror. Do I have the right dongle? you worry. How embarrassing to be unable to connect.

Geoff: We at Geoff's House of Dongles feel your pain and we're here to help.

Geoff: At Geoff's House of dongles, we carry every dongle you could think of. [**showing Dongle bundle**] Big dongles, small dongles, thin dongles and fat dongles. We've got the new iPhone, the old iPhone, the old iPhone before that, the old iMac, the iMac after that, and the one after that. Did you buy a March or April 2009 iMac with the special limited edition connector? Well, we currently have in stock the special limited edition dongle for using it. We even have dongles for your dongles. So when you're trying to connect your Apple product to.... anything... don't fret, just come on down to Geoff's house of dongles.

Hovav. Ok, welcome back. In response to these many and varied challenges, CSE Chair Rajesh Gupta today convened an emergency faculty meeting. We now joint that meeting live and in progress:

Rajesh: Ok everyone, you know what's going on here. Our field is changing and we need to change with it. We can't stay stuck in our area stovepipes. We can't stay stuck in our traditional ways of teaching and educating students. We need to innovate and branch out even if it's uncomfortable for us to do so. To this end, earlier in the year I commissioned several pilot projects to chart the course for CSE 2.0. I'd first like to ask Steve Swanson to talk about his experience doing interdisciplinary research.

Steve: Thanks Rajesh. I'll be honest, I was very skeptical when Rajesh approached me. I've always been a computer architect and when Rajesh says that "pure architecture is dead" I naturally got defensive. Moreover, I was skeptical about the trendiness of the new drive towards so-called interdisciplinary. That said, I took Rajesh's charge to innovate seriously and thus Michael Taylor and I started meeting with Pavel Pevzner and Vinet Bafna to explore whether we could create a new disciplinary of Genomic Computer Architecture.

Steve: I'm happy to report today that our short pilot project has been a huge success. Our first collaboration in the context of our Green Droid Project. [**put up Green Droid slide**].

Steve: For those of you who don't remember, the Green Droid effort was focused on building a microprocessor that would consume much less energy than a conventional design – what we call a “green” chip. However, in talking to Vineet we realized that we had constrained ourselves artificially to using less power. Vineet points out that plants generate their own energy, so why not processors? [**Put up Really Green Droid slide**] Our newly taped out chip combines splices in chlorophyll genes to convert light to power via photosynthesis. We call it “Really Green Droid”. [**Animation to Gundam Topiary**] Not only do our new system produce more power than they use, but they also consume carbon dioxide and hence reduce global warming. [**lifecycle management slide**] Finally, unlike Silicon-based chips, we've eliminated major pollution sources. Traditional chip wafer production pollutes the air and water, but Really Green Droid chips can be manufactured using only soil and water. Moreover, when a system reaches its end of life, there's no waste problem since our chips are fundamentally biodegradable and make high-quality compost.

Steve: We've had similar luck in our non-volatile RAM research. [**NVRAM slides**] By splicing genes from Elephant brains we've been able to design new memory systems that indeed never forget. This work is close to being commercialized with only a few bugs left, primarily around the interaction with Mice.

George Porter: This is great Steve. I also want to comment that the networking group has had some similar experience. We recently started working with on bio-inspired data-center networks. [**Fat tree slides**] Traditionally, we've built fat-tree style interconnects, which in turn creates massive cabling problems. [**animation**] But it was Pavel Pevzner who saw the similarities between this design and those that emerge naturally in the plant kingdom. Based on his input, we started to literally look at FAT TREES. [**animation**] Using Banyan tree DNA, we've built a new data center forest that can scale organically to meet demand. In fact, Amazon has just licensed our technology to deploy its new data center in the Amazon.

Rajesh: Thank you Steve. This is great work. I'd like us to all take this to heart and think about how we can redesign our research efforts in this inter-disciplinary fashion. To be concrete, by the end of the year, I expect all of you to be working in new areas that no one has heard of and that have no natural publication venues. Here's my rule of thumb, if you are competing with anyone – anyone at all – then your research isn't sufficiently inter-disciplinary.

Rajesh: Ok, but now let's turn to teaching. Research is not our only challenge. We have significant challenges to our fundamental system of education. We've been caught flat-footed in response to the growth of Massive Open Online Courses or MOOCs. Stanford has them, Berkeley has them, MIT has them, but we're still using last generation human interaction for our students. And it's hurting us.

Rajesh: [**Put up student competition slide**] In past years, when we lose prospective students its typically to Berkeley, MIT or CMU. This year, for the first time, several hundred students declined admission saying that they were going to use Coursera or Udacity.

Rajesh: Even more students wrote us that they were just going to browse YouTube instead of enrolling in **any** program. I've asked Geoff Voelker, as special next-generation education liaison, to see how we can get ahead of this front. Geoff?

Geoff: Thanks Rajesh. We looked at the issue of MOOCs, but rather than just play catch up, we decided to look further... what comes after MOOCs. There are two aspects to this: graduate education and undergraduate education and we think we've made great progress on both.

Geoff: Now while MOOCs can scale the classroom experience, they fall short for scaling graduate education. While I've heard that some grad students take some courses, we've never taken this seriously. We all know that their real education comes from doing research. Traditionally, the way we teach research is through weekly meetings with their advisors – a much harder experience to scale. But... after considerable thought and consultation with our colleagues in AI and HCI, we believe we have a solution – a personalized digital advising assistant.

Geoff: Advising? There's an app for that. Let me show you the first generation of Siri Advisor.

[Siri slides, Geoff drives]

Siri: Hello, good to see you again. How is your research going?

Ding: Good actually. Here are my latest results. [Siri bloop]

Siri: I don't understand "your latest results". How about I do a Web search for it?

Ding: No, that's ok. I really just want some career advice. Am I on the right path to graduation?
[Siri bloop]

Siri. Sorry, I couldn't find a path to Graduation in San Diego. Would you like a directions to Graduation Drive in Virginia?

Ding: Uh.... [Siri bloop]

Siri: Ok. Please work on this for next week.

Geoff: Early reviews from students is very good, they report that using SiriAdvisor the quality of feedback they receive meets, and sometimes exceeds, what they get from their human advisors. However, our faculty were concerned that while the quality of the advising is indeed high, its homogeneous and doesn't capture the range of advising styles adopted by different faculty members. And that's why for version 2.0 of SiriAdvisor we have added the Affect Slider... which can customize the apps behavior to capture the full range of advising experiences. For example, when I move the slider all the way to "Sycophant", here's what you get:

Siri: Hello, good to see you again. How is your research going?

Ding: Well, I didn't get much done. [**Siri bloop**]

Siri: Ok. That's just fine. I think you're doing great.

Ding: Well, I'm just not really sure how to do this next analysis. [**Siri bloop**]

Siri: Ok. Don't worry about it. I know you'll get it... and if you don't that's fine too.

Ding: But how will I get our paper done in time? [**Siri bloop**]

Siri: Ok. You just relax, I'll write the paper. You should spend more time having fun.

Geoff: On the other hand, when I move the slider to the other end – “Tyrant” – SiriAdvisor can capture the other end of the advising experience.

Siri: Hello, good to see you again. How is your research going?

Ding: I did everything you asked last week. Here is the analysis you asked for, with a proof of correctness and I made a prototype implementation, tested and deployed it and started work on the paper. [**Siri bloop**]

Siri: Ok. I'm disappointed to hear that you haven't finished the paper. I expect better.

Ding: I'm sorry its just been a hard week and you never really explained what the paper is supposed to be about. [**Siri bloop**]

Siri: Ok. I'm sorry it has been a hard week. Now that empathy is over, I have more work for you. Please make a presentation on your work for my sponsor, please grade these midterms, please teach my class and please write a paper for the deadline on Monday. Oh, and I need you to write a grant to fund my summer salary and conference travel to the Mediterranean.

[**Siri bloop**] **Ding** I'm not sure I can do all that.

Siri: Good, please let me know when it's done.

Geoff: As you can see, incredibly lifelike and at 99 cents per meeting advising can both scale and become an important revenue source for the department.

Geoff: However, graduate education is only half of the problem so I'd like to ask Stefan Savage to present the work we've done on undergraduate education as well.

Stefan: Thanks Geoff. I want to say that this is something we took incredibly seriously. It's clear that that train has left the station for online education and just playing catchup is going to leave us as a second-rate institution. We can't just walk in the footsteps of those online educators who've gone before us but figure out how to take MOOCs to the next level.

Stefan: In reflecting on the problem, we realized that while yes MOOC can scale they are still mired in a 16th century assumption.... that students want education. Thus, every MOOC today is fundamentally limited to the set of students who are actually interested in its content. Once we realized this blind spot in the MOOC agenda, we started to look at alternate involuntary vectors for delivering high-quality education. We considered addictive drugs. We considered embedding education in mass-market advertising. We considered malware and mind control. We looked at everything. However, in the end, we reached the conclusion that viral videos offered the best platform for delivering our education content to the broadest possible message. Top viral videos can be watched by millions of people every day – more than all existing MOOCs and universities achieve per year – combined. However, we weren't sure how to create viral education... no one had done it yet. Our scientists worked tirelessly to understand the nature of viral videos, looking at which videos succeeded and which failed, experimenting with transplanting our educational message into the structure of existing memes. This was unexplored territory, bordering on forbidden science and we didn't know what we might happen. One brave soul, Ranjit Jhala, volunteered to be our guinea pig and, through the power of technology, to have his CSE130 Programming Languages course transformed into an educational weapon of untold power. (pause) Let me say this... years from now.. your children will still tell the story of what Ranjit did this day... because the result is nothing short of revolutionary.

Stefan: I give you.... Lambda Style.

[Play video]

Stefan: I think you all realize that education has been changed tonight. Nothing will ever be the same. Before I conclude though, I really need to thank the National Science Foundation, whose generous support allowed us to perform the fundamental science that allowed this video to be created. The NSF could not send a representative here tonight, but they send a brief message of support.

[Play keith video]

Hovav: And that concludes our live coverage of the CSE faculty meeting on December 7th, 2012. And now for a final word from our sponsor.

[Queue MIMITW music and slide]

Siri: He once designed a type system.... that did not require typing.

Siri: He can see the pixels in a Retina display.

Siri: When he asks me a question, I always know the answer.

Siri: He is.... The most interesting computer scientist in the world.

[Kirill, do you have a preference?]

Kirill: I do not always film skits, but when I do, I film Ranjit. Style Lambda my friends.

Kirill: I do not always program, but when I do its Lambda Style. Stay pure my friends.

Happy holidays.

[Go back to lambda style music...]