Eric Allman: The man who made email go

CEE Ph.D. candidate Kofi Inkabi has been selected a National Academies Christine Mirzayan Science and Technology Policy Graduate Fellow for Fall 2007. As a fellow, Inkabi will participate with the National Academy of Engineering Board on Infrastructure and the Constructed Environment in the Division on Engineering and Physical Sciences.

It was 1980. Soda Hall hadn't even been built. Personal computers hadn't yet been commercialized.

Eric Allman (B.S.'77 EECS, M.S.'80 CS) was pursuing his master's degree and working on Berkeley's INGRES project, one of the world's most influential relational database management systems. INGRES staff like Allman had access to the powerful Arpanet network, the nascent form of the Internet developed by the U.S. Department of Defense (DOD). Access—limited to academics working on defense projects—was a luxury coveted by anyone else who knew about this powerful networking system.

Fights erupted, Allman says, among faculty and graduate students wanting accounts on the machine. Allman, the only one who knew anything about email, took action.

"At one point I figured, OK, I can write some software that glues this one software to this other software. It was a quick hack, but it worked."

From that simple exercise evolved one of the first implementations of SMTP (Simple Mail Transfer Protocol). Allman perfected his quick hack on his own time and distributed the program to Berkeley's Computer Systems Research Group (CSRG), which contracted with the DOD for developing an operating system that would facilitate collaboration among researchers.

The product, better known as sendmail, now delivers more than 70 percent of the world's email.

Now chief science officer of Emeryville's Sendmail, Inc., Allman focuses on developing authentication and encryption tools like DKIM (DomainKeys Identified Mail) and milter (mail filter) to better protect our electronic mail from interlopers. Allman founded Sendmail in 1998, after email became too "mission critical" for him to handle alone; until then, he had been distributing and supporting the software free.

Allman, an El Cerrito native, was 14 when he first got his hands on a computer, an IBM 1401, and one of the first things he did was to recode the operating system. A self-described "social outcast" who was gay but still in the closet, Allman says computers allowed him to escape from the world.

"When I came to Berkeley in 1973, it was a truly exceptional time," he remembers. He learned from Ken Thompson [B.S.'65, M.S.'66 EECS], one of the original authors of UNIX who was on sabbatical from Bell Labs, and he rubbed shoulders with some of the most famous names in the business, including Bill Joy (M.S.'79 EECS) and Eric Schmidt (M.S.'79, Ph.D.'82 EECS). While Allman's name may not be as famous as these, he prefers it that way.

"It requires a different ego to write this kind of software," he says. "A lot of people want to code video games; they want you to know it's *their* software. But with a mail transfer agent, you want it to be invisible. The only time people even know it exists is when it's broken. And you never want it to be broken."

By Patti Meagher

INNOVATOR: Eric Allman developed sendmail, the program that moves 70 percent of the world's email.
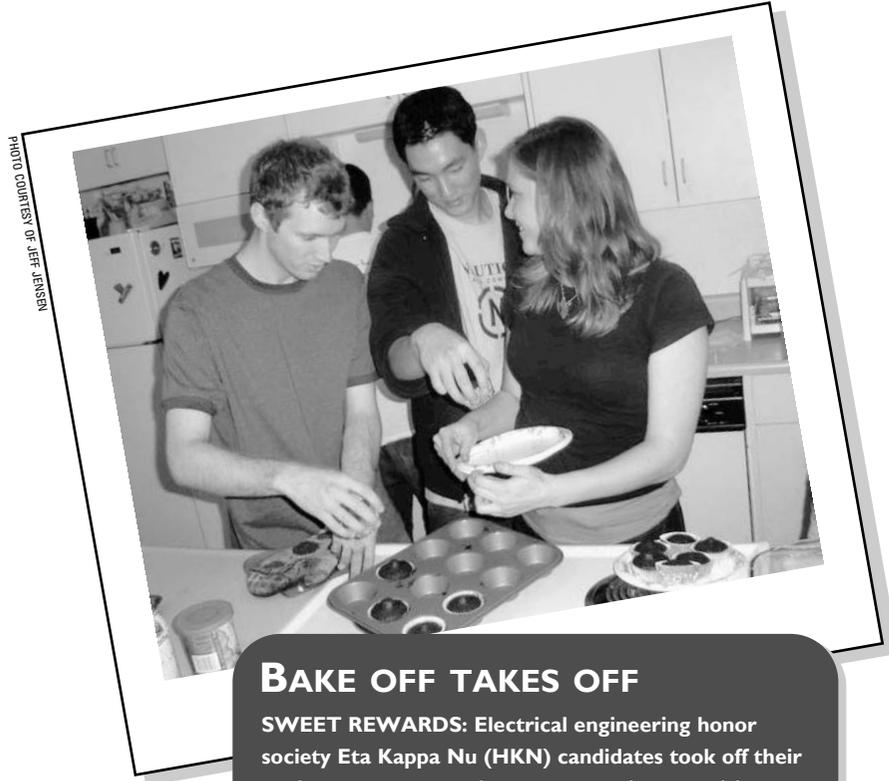
www.sendmail.com

PHOTO COURTESY OF JEFF JENSEN

BAKE OFF TAKES OFF

SWEET REWARDS: Electrical engineering honor society Eta Kappa Nu (HKN) candidates took off their pocket protectors and spent an evening exercising their chemistry skills for a Staff Appreciation Bakeoff. HKN hosts the baking event each semester to treat the EECS staff. In four hours, candidates prepared dozens of cookies, cakes, brownies and cupcakes, though one batch of cookies was lost to a microwave experiment.

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Play it Again, IRENE

Research project preserves old record-

ABBY COHN PHOTO

RESTORATION: Henry Wang is restoring valuable recordings for Project IRENE.

Henry Wang had never heard of Enrico Caruso until last year, but the 21-year-old EECS senior now spends hours studying the famed Italian tenor's rendition of *La Donna è Mobile.*

Wang is lending his engineering know-how to a project dedicated to preserving collections of music, speeches and other audio recordings dating back to the earliest days of recorded sound. Known as IRENE, the ambitious effort is led by Lawrence Berkeley National Laboratory physicist Carl Haber, who has enlisted the help of UC Berkeley engineering and physics students like Wang through the campus's Undergraduate Research Apprentice Program.

IRENE owes its start to a serendipitous moment. In 2000, Haber heard a National Public

What's the best pizza in Berkeley?

Kevin Hsu
BioE senior
"That's a hard one. There are so many choices. I have to say Cheese Board."

Morad Alvarez
ME sophomore
"Zachary's. Hands down. It's not as greasy as Blondie's."

Hillary Green
ME/MSE sophomore
"Pie in the Sky; it's really good. Either that or La Val's."

Tiffany Vukasinovich
CE sophomore
"It's Blondie's. I like their specials. I don't know… I'm old school."

Play it Again, IRENE

Radio report describing the fragile condition of archival recordings in the Library of Congress collection. Many old phonograph records, wax cylinders and dictation belts are broken or too delicate to be played. Haber wondered if the recordings could be saved with an optical scanning device similar to the ones he was building for high-energy physics research.

"It sounded like an interesting problem, the idea of reaching out from the physical sciences to preserve and recreate access to these collections," says Haber. He and colleague Vitaliy Fadeyev eventually restored a 1950 Weavers recording of "Goodnight Irene" with a system they named in honor of the folk song. IRENE emits a tiny beam of light to "read" sound from a record's grooves and uses a computer to convert that information into a digital file. It has no needle and can correct for scratches and some other flaws.

Library of Congress officials began testing IRENE last year. The project recently got a $500,000 grant from the U.S. Institute of Museum and Library Services to develop a 3-D version of the system, which, using a confocal microscope, could potentially recover recordings from wax cylinders, the precursors to flat records. One important beneficiary would be Berkeley's Phoebe A. Hearst Museum of Anthropology, which houses some 2,700 wax cylinder recordings of Native American speech and song from the early 1900s, including anthropologist Alfred Kroeber's recordings of the famed California Indian Ishi.

The new system might also produce higher quality recordings from old phonographic discs, which is where Wang comes in. Taking raw data gathered by the optical system of the 1933 Caruso record, he tries to pinpoint the needle's exact path. This will reveal where the sound is embedded in the disc's grooves. The goal is to write a code capable of extracting sound from any flat record.

"This project draws on a lot of skills I learned in engineering," says Wang.

By Abby Cohn

Immigrants a "driving force" in U.S. companies

A study released earlier this year by the UC Berkeley School of Information and Pratt School of Engineering at Duke University tracked the educational backgrounds of immigrant entrepreneurs who were key founders of technology and engineering companies from 1995 to 2005. The report, *Education, Entrepreneurship and Immigration*, shows a strong correlation between educational attainment—particularly in the fields of science, technology, engineering and math—and entrepreneurship. It concludes that immigrants are an increasingly significant driving force in creating new U.S. businesses and intellectual property. Among the findings:

25.3% There was at least one immigrant key founder in 25.3% of all engineering and technology companies established in the U.S. between 1995 and 2005.

$52 billion. The study estimated that, nationwide, immigrant-founded companies generated more than $52 billion in 2005 sales and created nearly 450,000 jobs as of 2005. The majority of these immigrant entrepreneurs came from India, United Kingdom, China, Taiwan, Japan and Germany.

96% Of the immigrant founders, 96 percent held bachelor's degrees and 74 percent held graduate or postgraduate degrees, including 26.8 percent with Ph.D.s and 47.2 percent with master's.

1.6% Only 1.6 percent of these immigrants came to the United States to start a business. Most, 52.3 percent, came for higher education, and 39.8 percent came for jobs.

53% Of immigrant founders of tech and engineering firms, 53 percent completed their highest degrees at U.S. universities, and about 72 percent of those degrees were in three fields: engineering (43.5 percent), computer science/information technology (18.5 percent) and applied sciences (10 percent).

31% Of the engineering and technology companies founded between 1995 and 2005 in the 11 technology centers surveyed, 31 percent had an immigrant as a key founder, compared to the national average of 25.3 percent.

CITRIS Research Exchange

"Safe Drinking Water for Developing Countries," a lecture by Ashok Gadgil, senior staff scientist at Lawrence Berkeley National Laboratory, will take place at 12 p.m. Wednesday, December 5, at 290 Hearst Memorial Mining Building, the Maria & Dado Banatao Conference Room. The talk is free and broadcast live online at the time of the event at *mms://media.citris.berkeley.edu/webcast.*

Become a geek with cash

The reality show "Beauty & the Geek" will be casting in the Bay Area soon and is seeking contestants from Cal. If you are a shy, intellectual "geek" who can turn a beauty into a scholar, or a beautiful, sociable woman who can turn a geek into a stud, email your name, age, city, phone number, picture and an explanation of why you are auditioning to casting director D.J. Feldman at *Beauty_Geek_Casting@yahoo.com.* The deadline is Saturday, December 1. Last season's champions took home $250,000.

E-Week comes but once a year

The 2008 Engineers Week is scheduled for February 19 through February 22. All engineering student societies are encouraged to get involved and help host events throughout the week to make it one of Cal's best E-Weeks ever! Anyone wanting to help out should contact Q.J. Flores at *vp@ejc.berkeley.edu.* Remember, E-Week comes only once a year, so don't miss out!

Reception for December grads

Congratulations on your upcoming graduation from Berkeley Engineering, and welcome to the alumni community! We'd like to honor your success at a festive chocolate fondue and champagne reception. Join your classmates, faculty and College staff in the Betty and Gordon Moore Lobby of the Hearst Memorial Mining Building at 5 p.m. Wednesday, December 5. Send an email to *bears@berkeley.edu* before Friday, December 1, to RSVP and reserve your special gift.

‹professor minute›

PEG SKORPINSKI PHOTO

WITH EECS PROFESSOR DOUG TYGAR

Tygar received his Ph.D. from Harvard University in 1986. He joined the Berkeley faculty in 1998. His research interests include computer security, privacy and electronic commerce. His current research involves security issues in sensor webs, digital rights management and usable computer security. He has won a National Science Foundation Presidential Young Investigator Award, an Okawa Foundation Fellowship and a teaching award from Carnegie Mellon. Tygar has written three books.

What first inspired you to get into engineering?
Engineering has been a lifelong love affair for me. I grew up before the days of PCs, but I was fascinated by computers. I used to check out books on computer programming and would write out code in longhand. I had to wait until junior high before I was actually allowed to use a computer, a mainframe! One big influence on me was the magazine *Scientific American.* I would read every issue religiously.

If you had a few extra hours, what would you do?
I enjoy learning foreign languages and reading in my spare time. One of my more unusual interests is Chinese opera. I'm crazy about it and have a small library of Chinese opera DVDs at home.

What should students do to ensure a successful career?
There are three things I recommend: (1) Get to know your professors, graduate students, and undergraduate students in your area of interest. (2) If you are interested in going to graduate school (and certainly if you are in graduate school), get involved in research. (3) Get some industry (or government) experi-

ence through summer jobs or internships. It will provide you with priceless experience and help you focus on what you want you want to do after you receive your degree.

What is one thing you would like to learn how to do?
I wish I had the chance to learn how to play the piano!

If you would like us to feature your favorite professor, please email his or her name to *engnews@coe.berkeley.edu.*