# Bulldog Bytes

**University of Minnesota-Duluth**     Department of Computer Science

## Department News

As the 2012-2013 academic year comes to an end, **Hudson Turner** completes his second year as department head. The year also saw the faculty resignation of **Chris Prince** after 12 years of laudable service, for which the department is grateful. To replace him, our faculty search committee brought in three excellent candidates for campus interviews this spring, and we are pleased to announce that **Haiyang Wang** has accepted our offer of a tenure-track assistant professor position, starting this fall. Haiyang is scheduled to complete his Ph.D. at Simon Fraser University early this summer. He has already built an impressive research record in the areas of cloud computing, social networks, multimedia systems, big data, and peer-to-peer networks, and we look forward to him joining us.

**Carolyn Crouch** has been re-elected Director of Graduate Studies, and she was kept busy preparing for the department's graduate program external review in early May, the first in 20 years. Visiting Professor **Andrew Brooks** is completing his two-year McKnight appointment with our department, and we are pleased that he will be hired for another term to fill in during anticipated sabbatical leaves. When not walking all over northern Minnesota (Andrew is an inveterate hiker), he has been kept busy teaching both Software Engineering and Operating Systems for us.

A new course, **Introduction to Programming in Matlab**, has been approved by the university and will be offered beginning in Fall 2013. Developed and taught by **Rich Maclin**, the course will appeal to other departments within

## Alumni Spotlight

### Josh Richard

Start with an engineer's drive to solve problems. Add a street skater's desire to create something new. Throw in some philosophy from the open source software movement. Let this combination set for a while and you may wind up with **Josh Richard**, who graduated with his major in CS and minor in philosophy in 2001. A critical member of UMD ITSS's network team from 2002-2012, Josh moved last summer to Seattle and Amazon Web Services, where he works on the cutting edge of cloud computing and ponders the ethical implications of its future.

## Staff Spotlight

### Clare Ford

When a visitor walks into the Computer Science department office in 320 Heller Hall, the first person they meet is the smiling, helpful, and gregarious assistant secretary **Clare Ford**. More than a receptionist and copy machine operator, Clare's many duties include assisting faculty in all aspects of their jobs, updating the department's website, tracking and contacting alumni, gathering data for reports, and aiding in the production of this newsletter (for which the writer is eternally grateful). Between Clare and executive secretary Lori Lucia, who we profiled in this space last year, the important everyday activities of the department are in warm and capable hands.

## Alumni Spotlight

### Artena Hiebert

Whether teaming with fellow software engineers on projects at Thomson Reuters or mountain biking through Montana, **Artena Hiebert** pursues her interests with passion. A computer science major and electrical/computer engineering minor who graduated in the spring of 2009, Artena combines her passion for learning in computer science with a desire to instill that passion in others, particularly girls and women.

Artena was in 5th grade in Zimmerman, Minnesota, when her older brother was finishing up his college CS degree and starting work at IBM. "I began working on my math skills when I decided I wanted to grow up to be my brother's boss," she laughs. In high school the call of adventure pulled her in another direction, and for a time she wanted to be a journalist for National Geographic. Scholarship opportunities landed her at UMD, where she discovered that journalism courses were not to her liking so she changed her major to physics.

As for how she wound up in computer science, "I was pretty determined that I didn't want to work in a cube the rest of my life," she says, "but eventually my brother persuaded me to try a CS course and I was pleasantly surprised that I really liked the problem solving aspect of it, so I continued for my CS degree." She also explored Duluth ("I love that great lake!"), discovering many hiking trails and developing her "fierce love" for mountain biking.

Artena particularly enjoyed her UMD courses with group projects, including the "never-ending" project in her natural language processing class. "I was proud of my team, because we had something that actually ran! We had a good groove -- late night pizza parties, computer lab till early morning hours," she says wistfully. "Oh the life..." Her college years were not all smooth sailing, however. When asked about the challenges, Artena notes two: learning to work with teachers, and dealing with the anxiety of job

## Faculty News

In early May, **Pete Willemsen** hosted a second grade class from Duluth's Congdon Park Elementary School in his SIVE (Simulation and Interaction in Virtual Environments) Lab. The purpose of the field trip was to expose grade schoolers to what computer science is like and what computer scientists do.

Hands-on stations were set up in the SIVE Lab to engage and educate kids in a variety of topics, including "What Is a Computer?" and "How Does It Work?" Other stations showed how computers are used. In "LEGO Scratch Programming," for example, students built and programmed a biting LEGO alligator. In "Walk on Mars and Haptic Demo," students used the virtual reality setup in the lab to stand on Mars and walk around the Noctis Labrynthis (Night Maze). Following that, they used a haptic device to explore how we can use robots to "feel" objects that are represented in the computer.

There were seven stations altogether, and the process was facilitated by more than a dozen volunteer undergraduate and graduate students representing a diverse mix of cultures and genders. "I wanted to make sure children see a broad spectrum of people being computer scientists," said Pete. Above, undergrad **Steve Jungst** looks on while a child is fitted with VR headgear. At right, graduate student **Maneesha Vejendla** programs the Lego alligator.
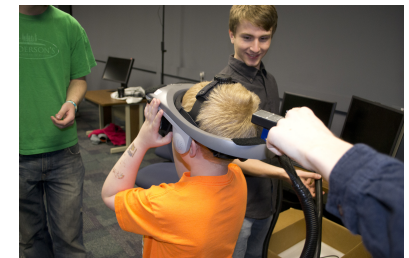
"I could not have made this happen without the help of our students," declared Pete after the event. "They each gave 12-minute interactive, teaching demonstrations to groups of 3-4 second graders, presenting seven times for each of the groups that cycled around the lab. They all did an excellent job, and the field trip went very well." ∎

## Publications & Presentations

**Colburn, T**. and **Shute, G**. "The role of types for programmers," Proceedings of the 2012 AISB/IACAP World Congress.

**Crouch, C**. and **Crouch, D**. et al. "Focused elements and snippets," in Focused retrieval of content and structure, S. Geva et al, eds.

**Crouch, C**. and **Crouch, D**. et al. "The 2012 INEX snippet and tweet contextualization tasks," CLEF 2012.

**Crouch, C**. and **Crouch, D**. et al. "Snippet identification using dynamic element retrieval," MinneWIC 2012.

**Dunham, D**. "A family of butterfly patterns inspired by Escher," Proceedings of the 15th International Conference on Geometry and Graphics.

**Dunham, D**. "Patterned triply periodic polyhedral," Bridges 2012 Conference Proceedings.

**Dunham, D**. "Triply periodic uniform polyhedra," IS-AMA 2012 Conference Proceedings.

**Dunham, D**. "M.C. Escher's use of the Poincaré models of hyperbolic geometry," Mathematics and Modern Art: Proceedings of the First ESMA Conference.

**Pedersen, T**. "Rule-based and lightly supervised methods to predict emotions in suicide notes," Biomedical Informatics Insights.

**Willemsen, P**. et al. "GPUMCDM: A new module of QUIC for urban form optimization," "Impact of green infrastructure on urban microclimate and air quality," and "Radiative heat transfer in urban environments using real-time ray tracing," 8th International Conference on Urban Climate & AMS 10th Symposium on the Urban Environment.

**Willemsen, P**. et al. "Heat transfer ray tracing with OptiX," 2012 GPU Technology Conference.

An example of **Doug Dunham**'s recent work in triply periodic polyhedra in Euclidean 3-space

## Alumni News

In what has become something of a tradition, SCSE sent a delegation to the San Francisco area to gather with CS alumni who live and work there. The delegation included Dean **Jim Riehl,** chief development officer **Carrie Sutherland**, and our own **Rich Maclin.**

Front row, left to right: **Mugdha Choudhari, Bhagyashri Mahule, Ketan Banjara, Dnyaneshwari Chandarand, Aditya Mone, Vivek Kasireddy, Jim Riehl**.

Back row: **Carrie Sutherland, Abhijeet Mahule, Siddharth Deokar, Rich Maclin, Krishna Chengavalli, Jeff Sharkey, Atul Kulkarni**

**Anagha Kulkarni,** a 2006 M.S. graduate in CS, received her Ph.D. in CS from Carnegie Mellon in May. Her research centered on efficient and effective search of large-scale document collections. She will assume an assistant professorship in computer science at San Francisco State University in Fall 2013.

**Kristy Vanhornweder**, who received her undergraduate CS degree in 2000 and her M.S. in 2002, finished her Ph.D. in the summer of 2012 at the University of Tennesee in Knoxville. Her dissertation describes a tool for teaching graph algorithms. She is currently a visiting lecturer at the University of Virginia in Charlottesville.

# Undergraduate News

The following students received their B.S. degrees in CS or CIS in December 2012 or May 2013:

| | |
|---|---|
| Anderson, Christopher | Kano, Makito |
| Baker, Brittany | King, Jacob |
| Beaulier, Jacques | Klemm, Jonathan |
| Biles, Zachary | Lukens, Joshua |
| Breid, Sean | Millard, Timothy |
| Brooks, Christopher | Miller, Amy |
| Carlson, Tyler | Miller, Dylan |
| Chamberland, Joshua | Murphy, Nicholis |
| Chambers, Jason | Mushel, Christopher |
| Ekstrom, James | Oien, Jason |
| Erickson, Andrew | Smith, Ryan |
| Fischer, Matthew | Stagman, Kevin |
| Halaharvi, Krishna | Stumpf, Kyle |
| Hart, Benjamin | Toffanin, Piero |
| Hipple, Andrew | Tran Lam, David |
| HughesCS, Louis | Wen, Ross Shijun |
| | Zhao, Zhe |

## Awards

Academic Achievement: **David Tran Lam**

Outstanding Senior: **Piero Toffanin**
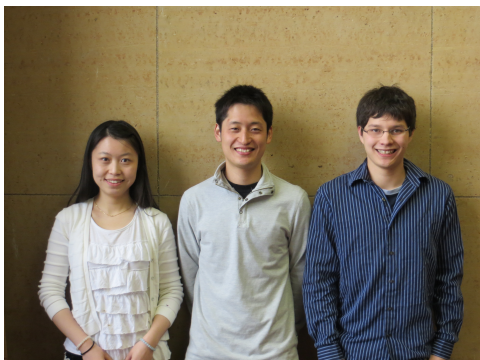
Outstanding Service: **Krishna Halaharvi**

## On to Grad School

Three of our undergraduates are headed to prestigious graduate schools in CS. From left to right:

**Zhe Zhao**, Brown

**Makito Kano**, Utah

**David Tran Lam**, Wisconsin

## German Grammar Guide App Launched on iTunes

Last year we reported on the iPad application for the German Grammar Guide produced collaboratively across colleges by faculty and students including CS faculty member **Pete Willemsen** and CS undergraduate **Sean Breid**. Last February the free app was released on iTunes.

CLA Dean Susan Maher remarked in a press release, "What UMD's Mobile Language Learning Group has created is truly innovative, and it's going to have a big impact on language education. When these developers have presented at national conferences, they have received strong interest and generated excitement. The group is now working on similar apps for Russian, Spanish, and French."

# Graduate Student News

The following students received their M.S. degrees in CS in May 2013:

| | |
|---|---|
| Ashok, Aishwarya | Kulkarni, Sameer |
| Atmakuri, Mihir | Nawale, Swapnil |
| Bushireddy, Kiran | Nelson, Robert |
| Geng, Gai | Tripurneni, Rajesh |
| Gurram, Siva | Vegesna, Aditya |
| Jha, Anand | Vejendla, Maneesha |
| Katta, Praveen | |

## Outstanding GTA Awards

**Swanil Nawale** (left) and **Anand Jha** (right) were voted the CS Department's Outstanding Graduate Teaching Assistants.

# Campus News

1977 UMD graduate Brian Kobilka won the 2012 Nobel Prize in chemistry.

### Graduate School Commencement



Kneeling, left to right: **Kiran Bushireddy, Maneesha Vejendla, Aditya Vegesna, Praveen Katta**

Standing: **Anand Jha, Mihir Atmakuri, Aishwarya Ashok,  Sameer Kulkarni, Swapnil Nawale, Rajesh Tripurneni, Gai Geng, Siva Gurram**



### Diwali Night 2012



### ARTENA HIEBERT CONT'D FROM P. 2

fairs.

When it came to preparing for a career, Artena followed some wise advice. "I was told and found it true: internships are vital to finding and enjoying your full-time job." She landed two internships, one with Minnesota Power/Allete as a sophomore, and the other with 3M as a junior.  "3M practiced a more agile development which made my days full of meetings, whereas Minnesota Power employed a more waterfall development with lots of time by myself." While both experiences were valuable, she found their differences crucial in planning her own career.  Now, Artena is in a position of advice giver for current students. "Don't avoid internships just because you feel you aren't qualified," she counsels. "It will be much harder to market yourself when you get your degree. Just apply and don't lose heart."

Artena first met recruiters from Thomson Reuters when they came to speak to her software engineering class. "They talked about their agile model which I was really keen on," she remembers.  "Because of my internship experience they invited me down for an interview and I had a full-time job lined up by Thanksgiving. I got to enjoy my last semester of college like nobody's business!"

Artena feels she has matured as a programmer (in Javascript, which she seems embarrassed to admit) at Thomson Reuters and so far she is happy with the company.  "I love my job, and there is enough change going on in the company and profession to keep me occupied."  She has also found the company culture amenable to her interests.  "I've found that CS people have interesting hobbies, and I look forward to arranging groups for mountain biking after work this summer."

Traveling and mountain biking take up much of Artena's free time.  She has done Yellowstone to Glacier and been to the top of Angel's Landing in Utah.  She would like to expand to fishing and kayaking in Alaska, as well as touring mountains by motorcyle. "Motorcycling is a different way of experiencing the road, with temperature changes and smelling things as
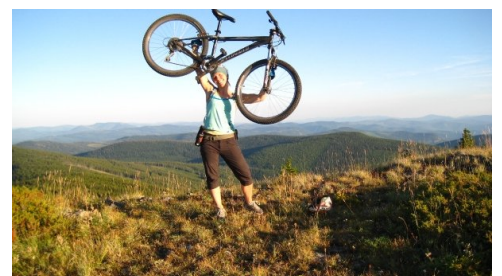
## DEPT NEWS CONT'D FROM P. 1

our college for its focus on numerical computing. Most departments that currently require our course on Visual Basic will switch to Matlab.

The University's Board of Regents has approved a new UMD degree, the **Bachelor of Arts (BA) in Computer Science**. This degree, contrasted with the standard Bachelor of Science degree, is intended to appeal to students seeking a more broad-based undergraduate education. The BA degree requires fewer upper-division computer science electives and fewer lab-based science credits, resulting in more latitude for choosing a minor (beyond the standard choice of mathematics), and perhaps even allowing the inclusion of a second major. We believe the BA degree will both suit the needs of a significant number of students and, since computer science is an inherently interdisciplinary field, prove valuable in today's diverse job market.

Speaking of jobs, the market looks very good for our students. In an informal survey of students graduating in 2012, we found that of six students who received their Master's degree, two have entered Ph.D. programs, three are working in private industry, and one is working at a U.S. national laboratory. Of 18 undergraduate CS/CIS majors responding, one has continued to graduate school, and 17 are working in private industry.

Continuing a practice begun in 2008, in March 2013 the department collected resumés from 59 students, both undergraduate and graduate, interested in either internships or permanent jobs, and produced a UMD **Computer Science Resumé Book**. We sent the book to 170 interested company recruiters, whose response was immediate and positive. Many companies thanked us and informed us of new hires resulting directly from the resumé book. If you think your company could benefit from the book please contact **Tim Colburn** who will add you to our list.

Please stay in touch with us. One way to do so is through LinkedIn, where you can join our contact list at http://www.linkedin.com/pub/umd-computer-science/19/a02/178. Or search LinkedIn using "UMD Computer Science" under search group People.

We hope you have a productive and relaxing summer. ∎

### Reminder

With this mailing you should have received a gift donation envelope. Just a reminder.

## JOSH RICHARD CONT'D FROM P. 1

Josh was born in Maine where his father worked in a paper mill. A union strike forced his family to relocate to Duluth, and Josh spent his teen years in Hermantown schools. His engineering provenance preceded him to UMD, where you can see the evidence in the hallway of the Engineering Building. "My dad was part of the process that produced the model of the paper mill there," Josh says with some pride.

Growing up, Josh's creativity expressed itself through the saxophone, which he played throughout high school, and skate and snowboarding, in which he developed some amateur skill and was invited to national competitions in half pipe and slopestyle. Snowboarding remains a passion today as he heads toward his fifth decade. "By my account I am as good as a modern-day 15 year-old," he says, whether proudfully, we're not sure. He also showed an entrepreneurial bent in 7th grade when he needed money to build a skateboard ramp in the yard. "I raised about $2500 in a week with a sales pitch I gave to friends' parents: 'Give me $50 and I will occupy your teenager for the summer.' Instant ramp!"

Josh credits the skating community for providing support and outlet during a family divorce, and by the time he was 17 he worked for a local snowboard manufacturing company. "We ended up building thousands of snowboards over a few years and I was supervising key parts of the manufacturing process," he recalls. Josh's early history of leadership would come as no surprise years later to his colleagues at ITSS, where he would lead critical projects in network security and system architecture. As the snowboard market grew more competitive, the company folded and he decided to become a full-time student at UMD, after realizing that "it was OK for me to be left handed and non-linear and still navigate academia."

Josh began as an ECE major but switched to a CS/Philosophy combination for its wider potential impact across disciplines. "I started to see a lot of compatibility in my experiences within a skateboarding community and the open source community. I found CS to have interesting problems and cool people, and it prompted questions about how we interact with the world. I like Richard Stallman, Ray Kurzweil, Marvin Minsky and Rene Descartes and recall taking Artificial Intelligence and Philosophy of Language at the same time. In one class I had a lab and learned Lisp, while in the other I struggled

## STAFF SPOTLIGHT CONT'D FROM P. 1

A native Californian, Clare values diversity in many forms, whether it's people, food, or culture.  She grew up with four siblings in a civilian family on a military research facility, surrounded by scientists "in the middle of the California desert," she remembers.  She regards herself as lucky to be surrounded by eclectic, "even eccentric," people.  (In her words; we won't ask her who the most eccentric CS person is, but we're very curious.)

As an adult Clare started working for a start-up software company in the Berkeley/San Francisco area.  Compared to the desert, "it was a huge change culturally, demographically, socially -- and it was expensive," she admits, but it paid off when she met her future husband at a Victorian Grand Ball.  Jason Ford is now a professor in the UMD Philosophy department.

Clare relocated to Orange County California where Jason attended graduate school and she worked for the University of California-Irvine Chemistry department for eight years. "The department was large and diverse, and lucky to have a lot of wonderful faculty, employees and students. I really enjoyed working in an educational environment. The research was amazing. Even more amazing were the students."  Clare's warm regard for students continues at UMD, where she not only greets and assists them daily, but she actively participates in their cultural and international events.

Clare has successfully made the transition to life in Minnesota, aided in part by gifts given her by California friends before their family moved.  "They gave us hats, gloves, ice melt, a can of WD40, books of Sven and Ole jokes and how to speak Minnesotan.  Also a book on the state bird of Minnesota, the mosquito," Clare recalls with a laugh.

When she, Jason, and their daughter Kathryne moved to Duluth in 2005, Clare wanted to continue working in an academic environment, particularly UMD, which according to her is "by far the most diverse place to work in Duluth."  Her first job, with the UMD Social Work program, was eventually cut for lack of funding, and she started with Computer Science in May of 2009.  "I was very happy to continue working on campus," she says. "My family and I have had the pleasure of attending a wide range of campus events, lectures, celebrations, and demonstrations. Something must be working right because my daughter can't wait to go to college!"

Outside of work, her household has grown to include a niece who moved in while attending UMD.  Clare enjoys her home, "a large fixer-upper with a huge yard and great view of Lake Superior. I spent last summer designing gingerbread trim for the porch," she says proudly.



She is also civic-minded, having served on the Board of Neighborhood Housing Services, the Duluth Arts and Armory Board, and related projects including the Music Resource Center and the Armory Arts Annex.  If you ask her about the latter, she will happily regale you with tales of tenant acquisition, sheet-rocking, and flood clean-ups.

Despite her full work and volunteer schedule, Clare and her family enjoy exploring Duluth and its diverse offerings.  "We've had a chance to patronize the local art and music scenes, independent theatre, various playhouses, ballet and even Nerd Night."  For Clare, the more diverse, the better. ∎

## ARTENA HIEBERT CONT'D FROM P. 5

you pass, like flowers -- though this can be a disadvantage when passing something rank!"

Artena's extra-curricular passions do not end with enjoying nature.  "For two years I've worked with an after-school mentoring program in Minneapolis that has really shaped me." She started out tutoring and now leads the junior high school girls part of the program. She meets with girls weekly to talk, learn, eat, and play games. "It's rewarding to pour life into those kids and see how they change throughout the years," she says.

Pondering the shortage of women in computer science, Artena thinks there is a misperception among girls, most of whom are social in nature and repulsed by the thought of working in a cube 40 hours a week.  "I definitely don't live in a cube. There's so much more to my job as far as team interactions go.  CS is a profession just like accounting, but I think it's more interesting because of the diversity of problems and languages to solve them."

## JOSH RICHARD CONT'D FROM P. 6

with questions about language instinct. Both courses were grounded in the same ideals and I knew if I could align the two approaches, I would thrive."

After graduation Josh started with ITSS, which had a need for systems programmers. Although overwhelmed at first -- "I thought I would never know enough" -- Josh was instrumental in eventually putting in place something unusual in the networking enterprise: using software as a tool to support higher quality work through automation and process controls. He credits ITSS for both embracing this vision and supporting him while he pursued an M.S. in Software Engineering degree at UM-Twin Cities, which he received in 2007, and from which both he and ITSS benefited. "I loved the program as it gave me the tools to drive the correct behavior out of my own work."

The network environment changed dramatically at UMD during Josh's decade with ITSS, and he was at the center of it. "The biggest challenge was iterating the network architecture in place," he says. "We moved 50% of the brains of the network across campus without anyone knowing it happened." (But if you want a laugh, ask Josh about the time he forgot to check the power source first.) Josh was involved from the beginning with campus wireless, built a new network architecture to support the campus datacenter, and coordinated the still-in-progress broadband improvement project. All along, he wrote a lot of software to support the networking effort.

Meanwhile Josh was watching the burgeoning cloud computing phenomenon with interest. "This is a critical time in the evolution of the Internet," he asserts. "The scale necessary to provide computing capacity large enough for everyone requires change. When Amazon started offering virtualized servers as a service, I was blown away. It seemed to me to be game-changing, so I interviewed with them, they offered me a position, and I could not turn it down."

Still, it was a difficult decision. "My family decided to relocate to somewhere we have never lived, leaving somewhere we love. My wife Ramona put a ballet teaching career on hold to support this adventure and for that I am humbled." Despite the uprooting, Josh, Ramona, and their three children are thriving in Seattle. "I love my family and friends, sailing, windsurfing, snowboarding. It has been great fun transferring knowledge to my kids."

Josh is currently working in Amazon Web Services as a network systems engineer, with most of his development

in Python on GNU/Linux. With the company in constant growth mode, the pace of work is frenetic, but he enjoys the problems and finds the organization a humane place to work. He enjoys his team and has been empowered to grow it across multiple locations. More importantly, he finds AWS technologies "amazing" to interact with daily.

As for the future, Josh's heart is in Duluth and the Midwest. "Eventually I would like to take this experience back in a capacity where I could direct engineering and teach," Josh hopes. His ability as an educator is already clear. While at ITSS he taught the FMIS course IT in Business to 70 students with varying backgrounds, and he was recruited by some CS professors (this writer included) to work with their classes in both speaking and system support roles.

Educator or not, Josh wants to evolve legacy architectures to fit into the emerging paradigm of cloud computing, the impact of which "has huge implications on everything we do in ways we have yet to understand," he insists. He has been known to ruminate late into the night with other philosophers on this impact, particularly the meaning of privacy and security in a hyper-networked world. If we know Josh, he will discover this meaning while ollying down the stairs to work. ∎
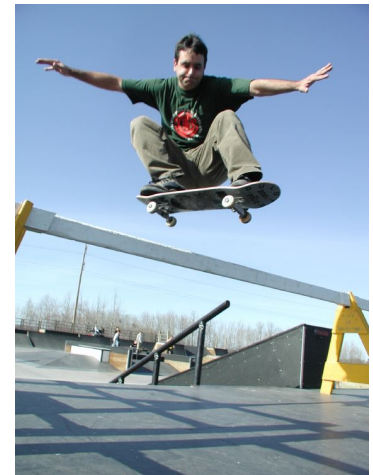


## ARTENA HIEBERT CONT'D FROM P. 7

Artena admits that without her brother she would not have known about computer science growing up. "Many of my women friends wish they had been able to try computer science during their college days -- they just didn't know about it." The solution? Artena has a wealth of ideas. "Programmers should talk about their jobs to younger students. More CS classes should be available in high schools, which should highlight CS as a career path. Programming should be more fun -- maybe do games in HTML 5. Companies should invest in making future generations of programmers by working with neighborhood kids."

Perhaps the best marketing strategy is Artena herself. With role models like her, the future of women in computer science looks bright. ∎