The University of Texas at Austin Department of Computer Sciences

Turing Scholars Honors Program

newsletter fall 2004

Letter from the Director

Dear Students, Relatives, and Friends,

We've created this newsletter as a way to let you know what's happening in the Turing Scholars Honors Program. As time goes by, we hope that this newsletter will allow us to stay in touch with our many alumni of the future.

This first newsletter gives me the chance to reflect upon the remarkable development of our program. A few short years ago, this program was just a glimmer in its founders' eyes. Since that time, an enormous amount of work has gone into the program, both from our faculty—particularly Elaine Rich, Alan Cline, Mike Scott, J Moore, and myself—and from our excellent staff—Judith Quinney, Paulette Plail, and Helen Crane. As our inaugural class begins their junior year, the program is almost in full swing. The juniors are just beginning to embark on research, which will be a great challenge for our department, because while our faculty has always supported undergraduate research, we've never had to do so in such large numbers. Stay tuned to see how this works out.

As we get older, there's a tendency to reminisce about the good old days. So in reflecting on the past year, I can't help but compare the experience of our students with my own college experience. I'm happy to say that my "good old days" pale in comparison. Back then, I was thrilled, after my freshman year at Princeton, to land a job at Atari as a program manager for their software publishing arm, the Atari Program Exchange. My job was not very technical. I evaluated computer software that people had submitted, and I worked with the authors to improve their products. In other words, I got paid to play computer games—and not very sophisticated games, either, since the Ataris only had 16KB of RAM. In retrospect, I'm not sure why I was hired, since I knew almost nothing about

Letter *continued on page 2.*

Turing Tidbits

The Turing Scholars Honors Program is named after Alan Turing (1912-1954), one of the seminal figures in the history of computer science.

Turing made fundamental contributions to the theory of computing. In developing the Turing Machine, a simple model of a computer that is as powerful as any computer that we can ever build, he helped define the limits of computability.

Alan Turing

Turing's work also had great practical impact. His codebreaking work at Bletchley Park was instrumental to the Allied victory in World War II. For this he was awarded the prestigious Order of the British Empire. Turing was also a visionary, although his predictions about the future of artificial intellicence have yet to come true.

You may have known that Turing was a great computer scientist, but did you know that Turing was also a world class distance runner? His best marathon time was two hours, 46 minutes, three seconds, which was world class for the time. Marathon times have improved considerably in the past 50 years; the current record is 2:04:55. Turing's best time is only 15 minutes faster than our CS department's own Prof. Doug Burger has run! ■

Meet the Turing Scholars

The following is a brief look at the students in the first three classes of Turing Scholars students.

Demographics:

- 90 percent of the Turing Scholars are Texans. Other students are from as far away as India, Nigeria, and Vietnam. The applicant pool for the Turing Scholars Honors Progam is broad, including applications from sixteen states such as California, Oregon, Massachusetts, New York, New Jersey, New Hampshire, and Pennsylvania.
- Turing Scholars arrive with strong qualifications and an average SAT score of about 1440. Nearly half of the students ranked first through tenth in their graduating high school class (excluding students whose schools do not rank their students).
- The average cumulative GPA of Turing Scholars is 3.65. The average cumulative GPA of the top 50 percent of Turing Scholars is 3.91.
- Turing Scholars are well employed in the summer.

A poll with 60 respondents revealed that over half of Turing Scholars found summer employment or internships in the high-tech industry. This is quite impressive considering these students just completed their freshman or sophomore years.

The Scholars *continued on page 3.*

Letter: *(continued from page 1)* computers or software, and I had taken only one CS course my freshman year, an introduction to programming.

It's remarkable how things have changed. Laptops now typically have 500GB of RAM. More importantly, our honors students are much better prepared than I ever was. Last year's freshmen took four rigorous CS courses—Logic, Data Structures (which serves as their introduction to programming), Computer Organization, and Analysis of Algorithms, and the sophomores progressed to more advanced courses such as Operating Systems and multi-agent systems. Many of our students spent the summer working at well-known software companies, and they were not just playing games! As just two examples, Ikrima Elhassan, '06, spent his first summer as a software developer at Microsoft; this past summer he was at Intel Research Labs working on high performance graphics ray tracing; Jan Ulrich, '06, worked his first summer at the Goddard Space Flight Center; this past summer he split time doing research at the famed Arecibo Observatory in Puerto Rico and documenting human rights abuses in Guatemala. Ikrima and Jan have completed just two years at UT, so you can see that our honors students are well trained, our students are talented and ambitious, and our students are already making a difference in the world.

We have many other impressive students to tell you about in future newsletters. For now, I hope you enjoy this glimpse at our program, and I hope you stay in touch. Your participation is important to us.

Sincerely,
Calvin Lin
Director, Turing Scholars Program
Associate Professor

Sophomores Survive Killer OS Course: A Chat with Mike Dahlin

Prof. Mike Dahlin recently taught an Honors Operating System course, cited by several of our students as their greatest accomplishment at UT. To find out what was special about this course, join us in our chat with Mike Dahlin.

TS: What makes your Operating Systems course (cs3272h) unique and challenging?

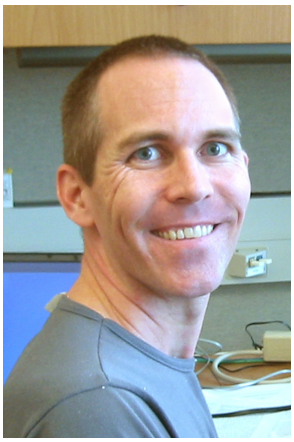
MD: This year's project for cs372h was to build an operating system that was simple but also sufficiently real that it could be booted on x86 hardware. The students started by building a bootloader. They then built a virtual memory system, a process abstraction, interrupt handlers, a user-level page-fault handler, and (optionally) a simple shell.

TS: What is the rationale for making a class project so central to the course organization?

MD: There is a saying attributed to Confucius, "I hear and I forget. I see and I remember. I do and I understand." This class project allowed students to build parts of an operating system and understand them more deeply than they ever could from just reading about them. I did the project before assigning it to the class, and I certainly learned a lot.

TS: How does cs372h differ from the non-honors 372 courses that you've taught?

MD: All sections of 372 have a significant project component. But the project for 372h was more demanding in terms of its overall scope and depth, and also because each part built on the previous one. So, students in 372h were performing "without a net" – if one part of the project was broken, the next part would be much more difficult. For most 372 sections, we still have challenging projects, but to accommodate the broader range of abilities and commitments of different students, we generally try to design each subproject to be more self-contained. This 372 approach is safer, but when the more ambitious 372h approach works, it may be more satisfying.



Professor Mike Dahlin

TS: In thinking back on the course, were you surprised by how things turned out?

MD: As you can tell from the description, this project is extremely challenging. I never doubted that it was a great project, but there was a risk in assigning to a class of mostly sophomores a project designed to challenge junior/senior-level MIT students. I predicted that it would either go very well or be an absolute train wreck. The results exceeded my wildest expectations – everyone in the class was inspired by the challenge and did well on the project. In my years of teaching, I have never seen such a uniformly high level of pride by the students in the work they had done, and this pride was wholly justified. I was incredibly impressed by the class.

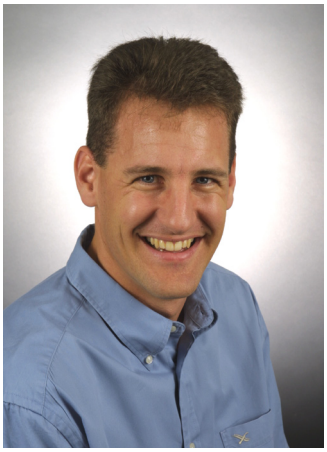
TS: Do you have any opinions about the Turing Scholars Honors Program or the students in the program?

MD: Individually, the students in the class were very smart and motivated. However, this class was successful because of the community and culture the students developed. The stu-

Keckler Wins Hopper Award

Professor Steve Keckler, who has taught two Turing Scholars honors courses–cs310h (Computer Organization and Programming) and cs352h (Computer System Architecture)–recently won the prestigious Grace Murray Hopper Award for his groundbreaking analysis of technology scaling for high-performance processors.

The Hopper Award is given to an outstanding young computer professional each year, selected on the basis of a single recent major technical or service contribution. The candidate must be 35 years of age or younger at the time the qualifying contribution was made.



Professor Steve Keckler

Other computer scientists to win this award include:

- Don Knuth (1971)
- Stephen Wozniak (1979)
- William Joy (1986)
- Guy Steele (1988)
- W. Daniel Hillis (1989)
- Richard Stallman (1990)
- Bjarne Stroustrup (1993)

Along with Professor Doug Burger, who has also taught cs310h and cs352h, Keckler leads a research group that is translating their award-winning ideas into a prototype chip which is scheduled to be fabricated at the end of 2005. ■

The Scholars:

(continued from page 1) The same poll shows that 36 of the students received at least one scholarship during the 03-04 academic year, many of which are nationally competitive. The total number of scholarships awarded is 70, implying many students received more than one scholarship.

Individual highlights:

Turing Scholar Class of '07

- In the Spring 2004 semester, Chris Clark, '06, led a group of Deans Scholars students, several of whom are also Turing Scholars, producing a play called "Picasso at the Lapin Agile." The play had a successful three evening run in May. Andy Boothe, '06, another Turing Scholar, played a prominent role. CS faculty Alan Cline, Director of the Deans Scholars program, and Elaine Rich, another CS faculty member, provided valuable assistance. Alan Cline even made a cameo appearance one night.
- Ryan Cornelius, '06, is the new president of the UT student chapter of the Association for Computing Machinery (ACM), one of the largest student ACM chapter in the country.
- As a member of the UT Fencing team, Amanda Jensen, '07, competed on the Epee team that finished first at Nationals.
- Laurel Issen, '06, created a tutoring program for the Austin Independent School District.
- Anthony Liguori, '07, owns 5 patents from his work at IBM. ■

Money Matters

The Turing Scholars Honors Program relies on many sources of funding for its continued success. In addition to support from the Department of Computer Sciences and the College of Natural Sciences, the Turing Scholars Honors Program was jump-started by a grant from the Texas Engineering and Technical Consortium's (TETC) Texas Workforce Development (TWD) program, whose funds come from public funds matched by industrial donations.

In the most recent round of TETC funding, the UTCS department received a $477,000 grant, the largest award ever given by the TWD program, to support the Turing Scholars Honors Program and the First Bytes camp for high school girls. Unfortunately, the Texas Legislature has since cut the TETC program, so fund-raising efforts continue.

We are grateful for the support of our industrial friends. Gifts from IBM and Microsoft have provided scholarship support to more than 10 Turing Scholars students.

Thanks to Lockheed Martin, four Turing Scholars students have received scholarships and summer internships over the past two years. Last year's recipients Mark Gebhart, '06, and David Whiteford, '06, reported extremely favorable experiences. Having worked on software to support the avionics group for the F-2 fighter, Mark said, "It was a great experience and an invaluable opportunity."

Schlumberger Corporation has provided annual support by hosting a recruiting dinner for prospective Turing Scholars students who live in the Houston area. Thanks to their support, many outstanding students and their parents have been introduced to our program.

Money Matters *continued on page 4.*

LOCKHEED MARTIN

Schlumberger

IBM

Microsoft®

Money Matters:

(continued from page 3) With university budgets constantly being stretched, our goal is to establish an endowment to fund scholarships specifically for Turing Scholars. Please join us in our efforts to provide the very best for **our** very best. If you or your company would like to make a tax-deductible contribution to the Turing Scholars program, or if you have any questions about how you can help, please contact Calvin Lin at **lin@cs utexas.edu**. ■

Name this newsletter!

Send your suggestions to **honors@cs.utexas.edu** with the subject line "TS Newsletter." We have a special prize for the winner.

Send us a note...

Do you have something interesting to include in the next newsletter? Drop us a line by sending mail to **honors@cs.utexas.edu**.

2004-2005 Turing Scholars Students Association Officers

If you would like to receive future Turing Scholars newsletters by E-mail, please send mail to **honors@cs.utexas.edu**

Turing Scholars Honors Program
Department of Computer Sciences
The University of Texas at Austin
1 University Station C0500
Austin, TX 78712-0233 USA