First Bytes Collaborative Workshop for Computer Science Teachers

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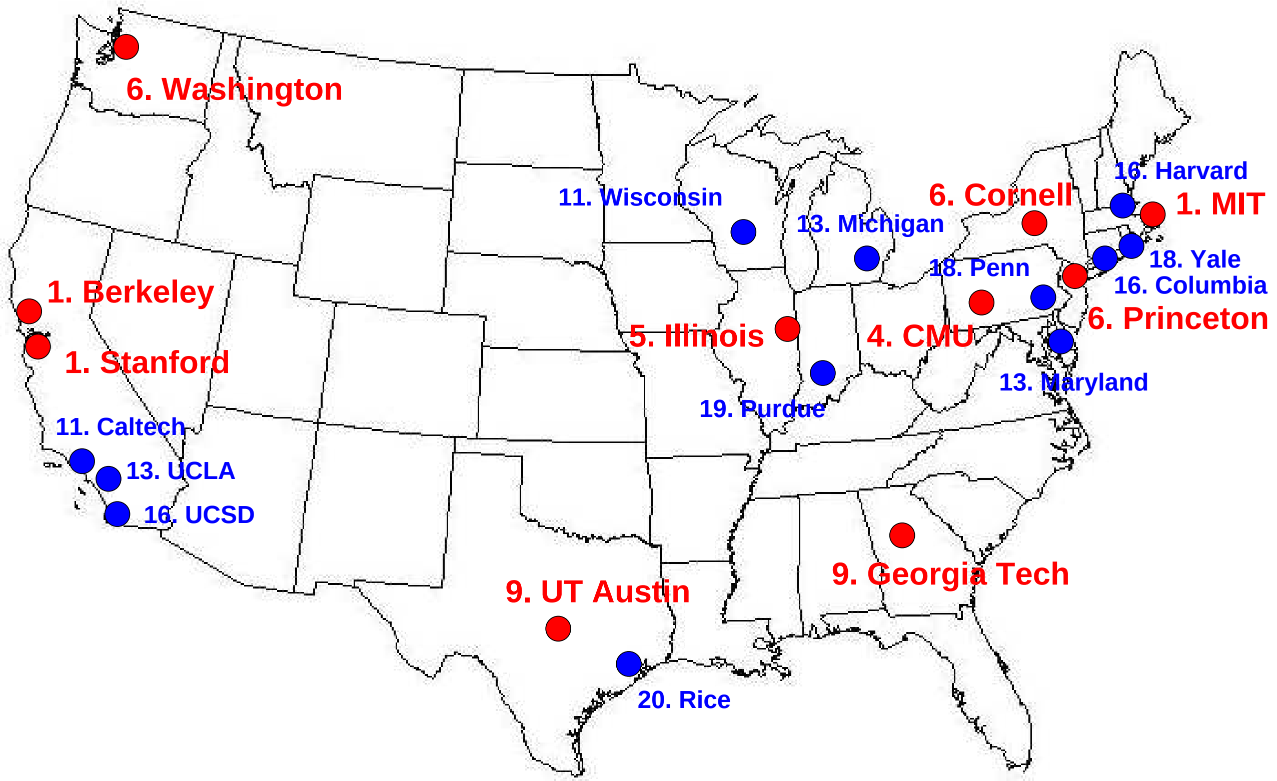
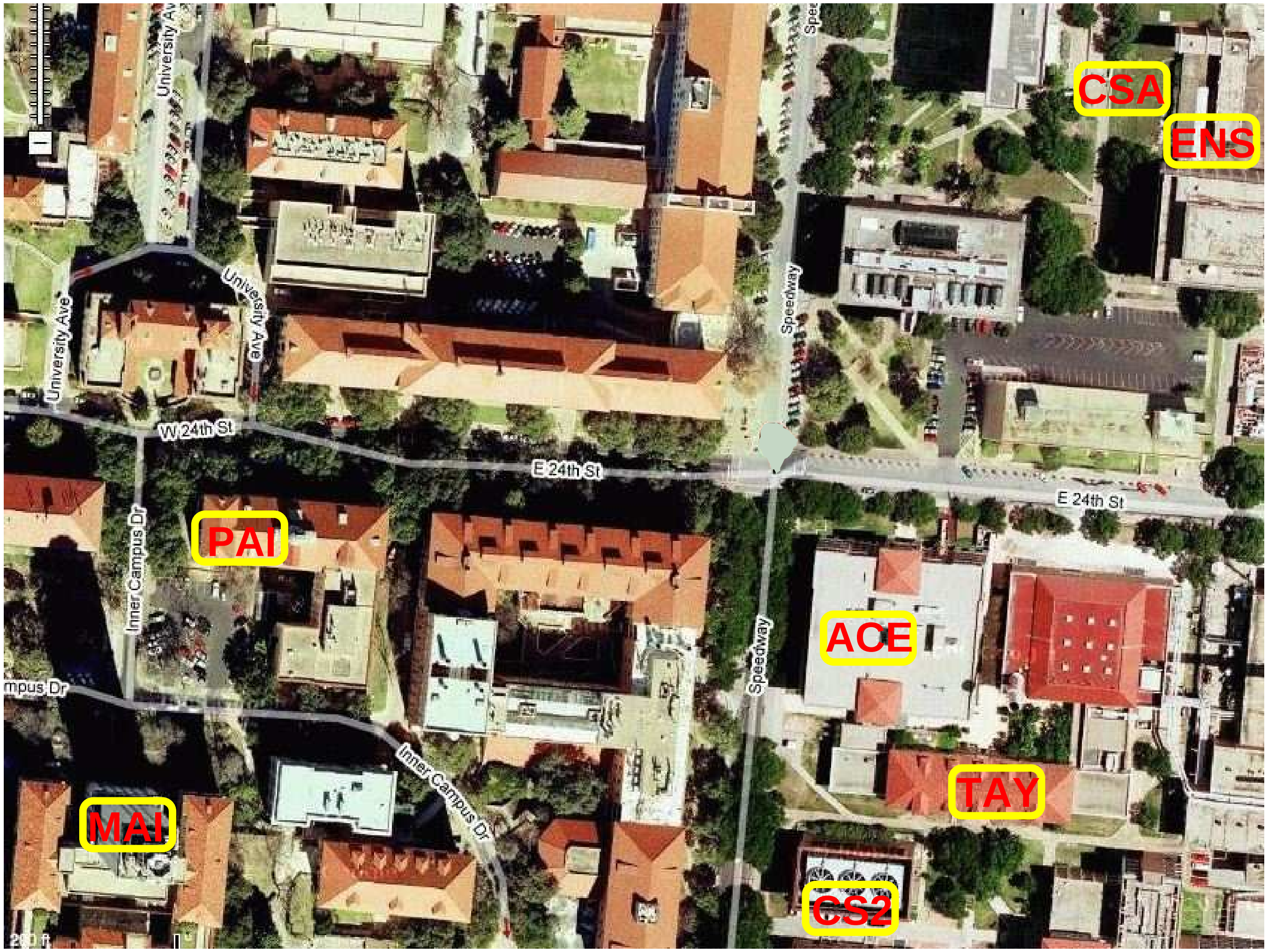
Welcome to UT Austin CS



CSA



ENS

PAI

ACE

MAI

CS2

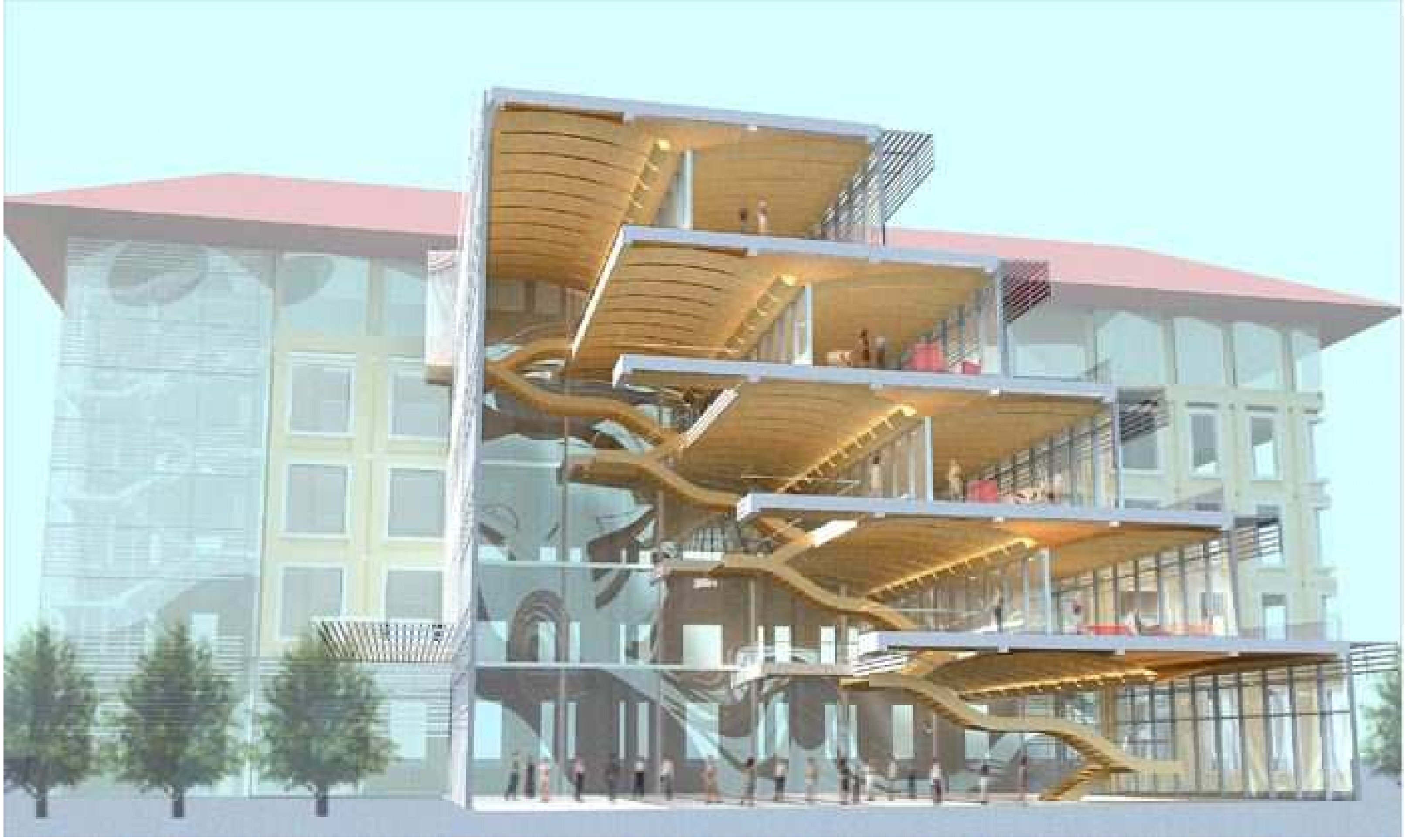
TAY

Recent Awards to the Faculty

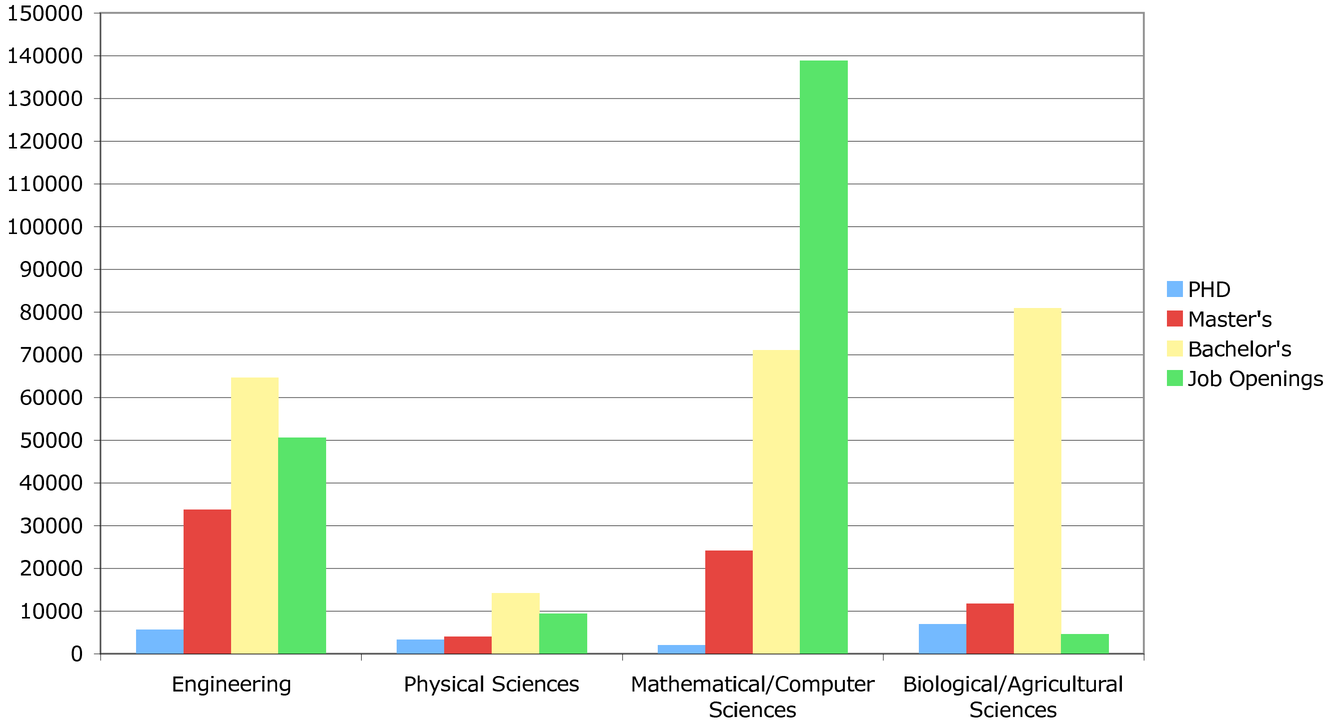
2008	*ACM Turing Award*	Allen Emerson
2008	*NSF Career Award*	Kristen Grauman
2008	*NSF Career Award*	Vitaly Shmatikov
2007	*National Academy of Engineering*	Simon Lam
2007	*National Academy of Engineering*	J Moore
2007	*IJCAI Computers and Thought Award*	Peter Stone
2007	*NSF Career Award*	Adam Klivans
2007	*NSF Career Award*	Emmett Witchel
2006	*ACM SIGARCH Maurice Wilkes Award*	Doug Burger
2006	*SIAM Linear Algebra Prize*	Inderjit Dhillon
2006	*ACM Distinguished Scientist Award*	Kathryn McKinley
2006	*NSF Career Award*	Bill Mark
2006	*NSF Career Award*	Lili Qiu
2006	*NSF Career Award*	Yin Zhang

2005	*ACM Software System Award*	Bob Boyer Matt Kaufmann J Moore
2005	*NSF Career Award*	William Cook
2004	*ACM Software System Award*	Simon Lam
2004	*SIGCOMM Award*	Simon Lam
2004	*IEEE W. Wallace McDowell Award*	Simon Lam
2004	*Guggenheim Fellowship*	David Zuckerman
2004	*Sloan Fellowship*	Peter Stone
2004	*ONR Young Investigator Award*	Peter Stone
2003	*ACM Grace Murray Hopper Award*	Steve Keckler
2003	*NSF Career Award*	Peter Stone
2002	*Sloan Fellowship*	Doug Burger
2002	*Sloan Fellowship*	Steve Keckler
2001	*ACM Karlstrom Award*	Nell Dale
2001	*Sloan Fellowship*	Lorenzo Alvisi
2001	*NSF Career Award*	Inderjit Dhillon
2000	*Sloan Fellowship*	Mike Dahlin
2000	*NSF Career Award*	Doug Burger
2000	*NSF Career Award*	Steve Keckler

1999	*CADE Herbrand Award*	Bob Boyer J Moore
1998	*ACM Kanellakis Award*	Allen Emerson
1998	*NSF Career Award*	Lorenzo Alvisi
1998	*NSF Career Award*	Mike Dahlin



Job Data



Annual Degrees (2004) and Average Job Openings in Broad S&E Fields (2004-2014)

Degree data from National Science Foundation, *Science and Engineering Degrees, 1966-2004*. Jobs Data from Bureau of Labor Statistics, *November 2005 Monthly Labor Review*.

Look at CNS Career Fair Data

But CS Is Not Just About Jobs

Computer science is the transformative science of our age.

It is also one of the deepest intellectual challenges in science.

Some Fundamental Ideas

Computability: There are fundamental limits on what can be computed. Technology can change *how fast* we can compute. Technology cannot change *what can be computed*.

Incompleteness: Some problems cannot be solved by computation.

Universality: Many different programming languages are equivalent: Anything that can be computed can be described in each of them.

Programs-as-data: Programs are just data. Programs can write programs.

Algorithm: There are different ways to solve problems.

Complexity: Certain problems are strongly equivalent to others in the sense that if any problem in the class can be solved with a certain amount of work all the other problems can be solved with the same amount of work.

Some Questions We Ask

How do people learn? Can we write programs that learn?

Can we write programs that make machines walk? Run? See? Speak? Understand? Explore? Plan?

How do people know things?

How do they use that knowledge to solve problems?

Is the complexity class “P” the same as the complexity class “NP”?

What problems can you solve faster if you had a source of perfect randomness?

If you knew the DNA of all the animals in the world, could you reconstruct the evolutionary tree of life?

How can we build a faster computer?

Is biology just a computation?

Can we model how proteins fold?

Can we design drugs for a particular individual?

The Perilous Pipeline

Figure 6. BS Production

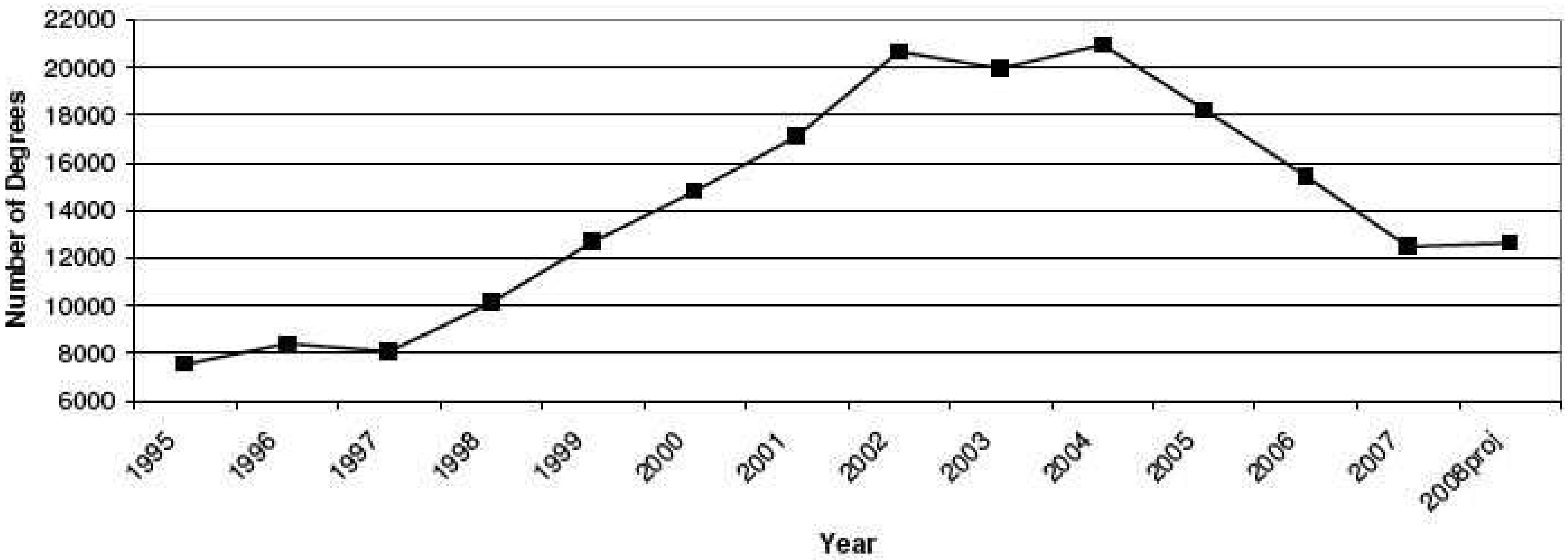
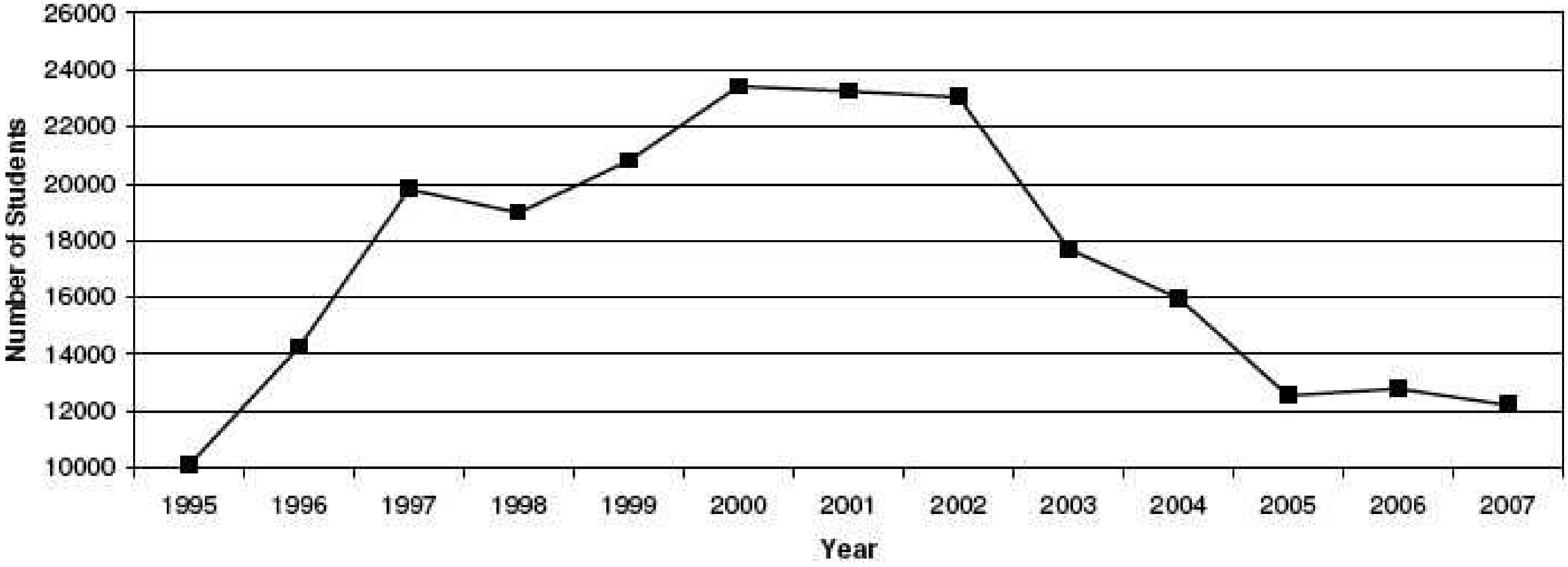


Figure 7. Newly Declared CS/CE Undergraduate Majors



Some of the Things We're Doing

helped with the inclusion of AP CS in 4x4

First Bytes Workshop for CS Teachers

First Bytes Summer Camp

CS Roadshow

EL Alliance

CRA (Computing Research Association)

ACM Educational Policy Committee

National Center for Women in IT (NCWIT)

National Academy of Engineering

Something You Can Do

Break the stereotypes associated with Computer Science.

Computer science is not about *computers* !

Computer science is the study of *computation*.

An Analogy

“I want to major in computer science because I like computers.”

is like saying

“I want to be a novelist because I like using word processors.”

Chuck

Chuck likes word processing. So he wants to be a novelist.

You see Chuck in school, turning out long manuscripts (with perfect margins, nice fonts, and no spelling mistakes).

Chuck enrolls in the English Department at UT Austin.

Is he on his way to being a successful novelist?

Answer: Who Knows?

Does Chuck have the skills it takes to be a good writer?

- Creativity
- Mastery of the language
- Insight into people
- Interesting life experiences

Computer science isn't about computers.

Liking computers is not particularly important to being a good computer scientist.

Computer science is the study of computation.

The Skills of a Computer Scientist

- creativity
- mathematics: precision, abstraction, composition, symbolism
- problem solving: decomposition, refinement
- communication and teamwork

- ability to learn constantly and forever

Chuck

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You see Chuck in school, turning out long manuscripts (with perfect margins, nice fonts, and no spelling mistakes).

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Chuck

Chuck likes computer games. So he wants to be a CS major.

You see Chuck in school, constantly talking about and showing off his skills with computer games and system administration.

Chuck enrolls in CS UT Austin.

Is he on his way to being a successful computer scientist?

The Skills of a Computer Scientist

- creativity
- mathematics: precision, abstraction, composition, symbolism
- problem solving: decomposition, refinement
- communication and teamwork

- ability to learn constantly and forever

Goal: A Partnership

Our goal is to re-excite young people in computing.

We need your help.

We're willing to work with you but you'll need to tell us what to do.

We may know a lot about computing but

we don’t know very much about K-12 issues.

Together maybe we can make a dent in this issue.

Thank You for Your Precious Time

I know you have many things to do during the summer.

Thank you for taking time out to spend with us.