Human-amplifying and transformational computing

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Associate Professor
Computer Science
The Computers of Tomorrow

• By Martin Greenberger, 1964

• Barring unforeseen obstacles, an on-line interactive computer service… may be … commonplace by [the year] 2000
The Computers of Tomorrow

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• Barring unforeseen obstacles, an on-line interactive computer service… may be … commonplace by [the year] 2000
The Computers of Tomorrow

• By 2000, man should have a much better comprehension of himself and his system …

• because he will have learned to use imaginatively the most powerful amplifier of intelligence yet devised.
Human-amplifying computing

• Computing is and should be about amplifying people – to be more of what we think of as “human”. Not only can computing amplify intelligence – it can amplify compassion, communication, understanding, and creativity – and even transform people and our society.
STARS Haiti
Spring Break in Haiti

• Both trips:
  – Dr. Barnes (UNCC) & Dr. Eugene (Auburn)
• Trip 1 March 5-12 (9 students, 1 fac)
  – 4 UG & 1 Grad from UNC Charlotte
  – 1 UG each from FAMU, NC A&T
  – 1 fac, 1 grad, 1 UG from U Delaware
• Trip 2 March 14-19 (3 stud, 3 other)
  – 1 UG from Indiana
  – 2 Grad students from UNC Charlotte
Outreach

• 24 young women at 3 schools
• Average age: 24 years old
• 8 done with school
• Most older!
Director: Game Design and Development Program

- A concentration for CS majors
  - Intro & Advanced = capstone experience
- Courses in Game Development:
  - Intro, Advanced, and Studio
  - Game Engine Construction
  - Game AI
  - Serious Games (research & evaluation)
- Undergraduate and Graduate Certificates
  - 15-18 credits
Research areas

Serious Games
• Students make & research
• purposeful games

Artificial Intelligence
• Learn about learning
• Adapt software to users

Broadening Participation
• STARS Alliance
• AP CS Principles
• Undergrad Research
Students & Technology in Academia, Research and Service (STARS)

At 31 participating universities, students in STARS use computing to improve their communities.

Co-PI ~$9M NSF BPCA Grants: 1042468, 0739216, 0540523
“STARS .. was one of the best programs... To ..see [young students] enjoy ..computing ..and knowing that we could make a change in someone’s life was priceless.” ~Alumnus
Comparison of Alliance & Taulbee CS **undergraduate** enrollments

Comparison of Alliance and Taulbee CS **graduate** enrollments

“I have had several amazing opportunities to network and interact with not only people at my institution but with people from all over the country.” ~ SLC Student
“[STARS] has helped me map out my career goals … helped me discover how much I really want to be a professor.” ~ SLC Student

“STARS … students develop leadership skills and … participate in socially relevant outreach. [STARS creates] a sense of community … and resulted in many of them becoming graduate students.” ~ SLC Faculty
Beauty and Joy of Computing

- A new NSF Computing Education for the 21st Century grant (1138596)
- Collaborative with Berkeley
- Prepare 100 HS teachers to teach Beauty and Joy of Computing
- A new approach to introducing CS
- Targeted new AP CS Principles in 2015
BJC Tools
BJC project: Math game

Score 2 8984.4
move 1
count 3

problems wrong
1 7 x 7 NOT 77

whats 7 x 7

Score 3765.6
Scratch/BYOBY Code
Creative Computing Education

A tiered project to:

Provide creative problem-based learning experiences in computing
Engage computing students in building games to teach introductory computing

A project sponsored by NSF IIS-0757521
BeadLoom Game

cMotion: Tapia 2009

EleMental: The recurrence
SIGGRAPH 2009
Bunny Arrayser

Wu’s Castle: ITiCSE08, SIGCSE09

Okay, this time we have a 2d array. So, the first position in the array is 0,0. And the last position is 3,9.

Saving Sera: GDCSE 2008

The Catacombs: GDCSE08
Dance Tool

Bug BOTS
Serious games research

- Promoting new game mechanics
  - How can we best create interactive visualizations, new metaphors & new game mechanics for serious purposes?

- Evaluating games in a scientific way
  - How can we combine strong experimental designs with innovative ways to understand gameplay?

- Persuasive games
  - How can we promote exercise, energy conservation, beneficial social interaction through games?
Wu’s Castle: Array
Wu’s Castle: walkthrough
Mobile games

- **Table Tilt**
  - a 2- to 6- player iPhone game
  - Get the ball in the hole!
  - Promotes team building

- **World of Workout**
  - Promotes walking
  - Gets heart rate up!
My Profile

You know those cute and loveable not-quite-stick-figures with odd screen-tees you’re seeing all over the site? Meet the Snaglies. Want a Snaggle of your own? Of course you do! Your avatar will show up on your and your friends’ Networks page, so they can always remember you as the Snaggle you are.

Your SNAGEM ID#: 8606
POINTS: 123
RANK: 7 / 66
Name: Eve Powell
@uncc.edu
i44512283

Networks Page

Want to see who you’ve been connecting with? All of your snagges are shown here. The denser your network, the bigger bonus you get for every mission completion.
Pre-tip: make a strong connected network by encouraging the people you’ve snagged to snag each other.
Bead Loom Game
Custom Puzzles
Games for exercise
Astrojumper

SCORE: 112277
Saving Energy

Register Now to start saving energy!

- Report your energy-saving actions
- Follow your progress and compete with others
- Earn gold to build a rooftop garden
Educational Data Mining

• The process of using data to learn about and support student learning
Educational data mining

Affect Learning!

Intelligent Feedback & Control

Base feedback on data mining

student
Generating hints

1: Try to derive if N then T working forward.
2: Highlight if not T then not N to derive it.
3: Click on rule Transitive (TRANS)
4: Highlight if not T then not N and click on Transitive (TRANS) to get if N then T

LAST HINT FOR THIS STEP

OK
Example MDP
EDM Analyses show where we can help…
InVis

• Interactive Visualization tool to explore and understand behavior graphs
  – Built to explore and explain learning data
  – Also applicable for game & HCI data

• Leverage human intelligence
  – Learn about learning
  – And other behavioral patterns

• Build new models of domains based on data
• Associate Professor
• Computer Science Department
• Fall 2004- Spring 2012
• BS Computer Science & Math, 1995
• MS Computer Science & Math, 2000
• PhD Computer Science, 2003
• Postdoctoral Fellow, 2004

• Associate Professor, 2012
Maius Opus Moveo

"Accept the Greater Challenge"

Opened in 1980, The North Carolina School of Science and Mathematics is the country's first public, residential high school. Through a challenging curriculum centered on science and math, NCSSM shapes leaders and thinkers for a greater North Carolina. Enrolling students for their junior and senior years, the School is the model for 16 like schools in the nation and world. It is an affiliate of the University of North Carolina system and is located just outside historic Downtown Durham.
Computing Research

Distributed Mentor Project
Mentor: Carla Savage
NCSU
2 journal papers
Undergraduate Research

- Honors Program @ NCSU
- Using Genetic Algorithms to find optimal convolutional 1/2-rate codes
- Advisor: Don Bitzer
Why Research?
CURIOSITY
COMPASSION
SOLVING PROBLEMS
DOING THINGS BETTER
For all the reasons we are...
Thank you!

Tiffany.Barnes @ gmail

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## Results

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