Developing Computing Outreach Activities

Dr. Karen C. Davis

Electrical & Computer Engineering Department
College of Engineering

Winter 2007
Searching for Activities

Google “database K-12 outreach activities”

534,000 hits

Numerous repositories exist, but require individual searches with various interfaces

- smete.org
- ndsl.org
- needs.org
- merlot.org
- eng.uc.edu/step
Unplugged Activities

- College Success RoboRally: programming robot movement
- Information Encoding with Candy Buttons
- Information Retrieval with Legos
- Graph Coloring for Cell Phone Frequencies

By Tim Bell, Ian H. Witten and Mike Fellows
With assistance from Robyn Adams, Jane McKenzie and Matt Powell

elementary school

middle/high school
RoboRally

- pick 5 of 9 movement cards for a robot each turn
- robots can
  - bump each other
  - fall in pits or off the board
  - hit walls
- pass over each goal and end on graduation

goals:
- hit the books
- go to class
- make Dean’s List
- debug software
How Is Stuff That Is Interesting to People Stored in a Computer?
Candy Alphabet

1. On your candy button sheet, mark off each group of 6 dots.
2. Write a message (up to 8 characters) using the candy alphabet.
3. Trade with a partner and decode her message.
4. Eat candy.
query: retrieve a blue 2x2 Lego piece

Information Retrieval: Lego Query

1. Without peeking, reach in and pull out a Lego piece.
2. Put it on your board.
3. If it's blue, go to step 4.
4. If it's not, go to step 1.
5. Count how many pieces had to be retrieved before a blue one was found.

[repeat for all group members]
Can We Improve Our Retrieval Speed?

1. Sort Lego pieces by color.
2. Group them in columns on the board.
3. Sort Lego pieces by number within the color groupings.

Query: without looking, find the 2x2 piece of the left side color.

[repeat for each group member]
Managing Communication Services
An Algorithm to Assign Cell Phone Frequencies

- Represent your problem as a graph

- Assign “colors” to the nodes
NSF Broadening Participation in Computing

Mentoring for Connections to Computing (MC^2)

- ECE/CS Senior Capstone Experience
- EDGE Program for Gifted Female High School Students
- UC|21 Academic Plan Committee
- Southwest Ohio Center for Excellence in Science and Mathematics Education
Cincinnati Youth Collaborative

- CYC College Access COACH program trains mentors placed in Cincinnati Public Schools
- UC ECECS seniors will develop hands-on computing curriculum and activities

NSF Project STEP Activity at Western Hills
Cincinnati Arts and Technology Center

- serves CPS 11th and 12th grade students at risk for not graduating
- excellent digital media studio
- conduct workshop at UC/CATC
  - introduce CPS students to computing technology
  - create an original digital artwork
  - train UC computing students as mentors
# Ideas for Computing-based Activities

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<tr>
<th>theme</th>
<th>exploratory activity</th>
<th>computer-activity</th>
<th>ethical/social theme</th>
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</thead>
<tbody>
<tr>
<td>algorithms</td>
<td>solving complex problems with graph coloring</td>
<td>online software</td>
<td>cell phone frequencies</td>
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<tr>
<td>artificial</td>
<td>Eliza, Turing competition winners</td>
<td>develop conversation bot or simple expert system based on answering questions (e.g., forms-based like Madlibs)</td>
<td>robots/AI</td>
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<td>intelligence</td>
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<tr>
<td>simulation</td>
<td>design for specific objectives</td>
<td>Westpoint bridgebuilder, roller coaster simulators, lemonade tycoon</td>
<td>computer modeling</td>
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<td>graphics</td>
<td>collage</td>
<td>generate mosaics from a digital image, perhaps a photo of the student; use digital art software to create an original artwork</td>
<td>facial recognition</td>
</tr>
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Comments?
Suggestions?

Thank you

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