MTSU COMPUTER SCIENCE SUMMER CAMP FOR HIGH SCHOOL STUDENTS

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Challenges

- Not enough CS/IT workforce in Nashville
  - estimate demand: as high as 1200 per month
  - 380 graduates per year
- No solid educational and career information about CS/IT given to TN High school students
  - No CS/IT related courses offered in high school
  - No teacher certification in CS/IT
  - Negative perceptions about technology careers
  - Dissuaded from considering careers in the high tech industry
PIIT: Partners in Innovation in Information Technology

- Three-year project supported by NSF
- Three academic partners
  - Middle Tennessee State University
  - Nashville State Community College
  - Alabama A&M University
- Industry partner
  - Nashville Technology Council
PIIT: Partners in Innovation in Information Technology

- Two foci
  - recruiting additional talented students into CS/IT majors
    - High School Seminar
    - Summer camp for high school students
  - retaining (and graduating) additional students in CS/IT majors
    - Real-world projects for college students
MTSU Summer Camp

- Three one-week long summer camps offered in the same week
  - Alice
  - Robotics
  - Multimedia
- Capacity of each camp
  - 20 students
  - Priority to underrepresented students
- Cost for Students
  - No application fee
  - Lunch provided
  - $50 allowance
<table>
<thead>
<tr>
<th>Time</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>900–1000</td>
<td>Intro.</td>
<td>CS Unplugged</td>
<td>CS Unplugged</td>
<td>CS Unplugged</td>
<td>Camp</td>
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<tr>
<td>1000–1130</td>
<td>Camp</td>
<td>Camp</td>
<td>Camp</td>
<td>Camp</td>
<td>Camp</td>
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<tr>
<td>1130–1230</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
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<tr>
<td>1230–1430</td>
<td>Camp</td>
<td>Campus Tour</td>
<td>Campus Tour</td>
<td>Campus Tour</td>
<td>Camp</td>
</tr>
<tr>
<td>1430–1500</td>
<td>Break</td>
<td>Break</td>
<td>Break</td>
<td>Break</td>
<td>Special Event</td>
</tr>
<tr>
<td>1500–1600</td>
<td>Camp</td>
<td>Camp</td>
<td>Camp</td>
<td>Camp</td>
<td></td>
</tr>
</tbody>
</table>
Summer Camp at 2010

- Received about 60 applications
- Distributed applicants evenly to three camps according to their first, second, and third choices
- About 45 students show up for the first day of camp
2010 Summer Camp Participant Statistics

Sex
- Male: 32 (78%)
- Female: 9 (22%)

Ethnicity
- White: 29 (71%)
- Asian: 5 (12%)
- Black: 4 (10%)
- Hispanic: 3 (7%)
2010 Summer Camp Participant Statistics

Grade

- 9th: 21
- 10th: 12
- 11th: 3
- 12th: 4
2011 Summer Camp Applicant Statistics

- **Sex**
  - Female: 46, 38%
  - Male: 75, 62%

- **Ethnicity**
  - White: 75, 62%
  - Black: 21, 17%
  - Asian: 20, 17%
  - Others: 5, 4%
2010 Summer Camp Participant Statistics

Grade

- 9th: 73
- 10th: 28
- 11th: 17
- 12th: 4
Feedback

- pre- and post-survey were conducted at 2010 summer camps

**Do you like Computer programming?**

- Yes: Before 14, After 26
- No: Before 0, After 5
- No Opinion: Before 17, After 8

[Bar chart showing responses]
Will you consider CS or IT as a career choice in the future?
Feedback

How do you feel this computer camp experience influenced your answer to the previous question?

- Negative: 2
- Neutral: 3
- Positive: 22

[Bar chart showing feedback distribution]
Rate your overall evaluation of the camp?

- 17 (44%) Positive
- 13 (33%) Neutral
- 5 (13%) Somewhat Negative
- 4 (10%) Negative
- 0 (0%) Other

Legend:
- Blue: Negative
- Orange: Somewhat Negative
- Yellow: Neutral
- Brown: Somewhat Positive
- Blue: Positive
Robotics Summer Camp

- **Hardware: LEGO Mindstorm NXT 2.0**
  - **NXT Intelligent Brick: a brick-shaped computer**
    - Takes input from up to 4 sensors
    - Controls up to 3 motors
    - Has a speaker and can play sound files
    - Has a 100x64 pixel monochrome LCD display and 4 buttons to navigate
Robotics Summer Camp

- Programming environment: RobotC

  - RobotC is an IDE targeted towards students that is used to program and control different robots using a programming language based on C.

- Major features
  - Explores many more functions than NXT-G
  - Is useful to create simple to more advanced programs
  - Tabbed programming
  - Detailed help pages
  - Strong debug features
```c
#pragma config(Sensor, S1, touchSensor, sensor 3)

//**!!Code automatically generated by 'ROBOTC' configuration!!**

task main()
{
    int motorspeed = 100;
    int touchValue = 0;

    while(SensorValue[touchSensor] == touchValue)
    {
        motor[motorC] = motorspeed;
        motor[motorD] = motorspeed;
    }

    motor[motorC] = 0;
    motor[motorB] = 0;
}
```
Project A: Kick the Can
Project B: Up and Down the Lines
Project C: Fetch the Balls
Alice Summer Camp

- Alice is an innovative 3D programming environment
  - easy to create an animation for
    - telling a story
    - playing an interactive game

- Alice is a teaching tool for introductory computing
  - 3D graphics
  - drag-and-drop interface
Alice Summer Camp
Alice Summer Camp

- Amazing Alice
  - Use the arrow keys on the keyboard to move Alice through the maze and search for the rabbit.

Directions:
- Help Alice find her way through the maze in order to get to Wonderland through the rabbit hole!!!
- Use the arrow keys to help guide her through.
- Press the $PACE BAR to begin!!!
Alice Summer Camp

- **Star Wars**
  - Moves a space ship through space and attempt to avoid all flying objects before reaching the ship’s destination.
Alice Summer Camp

- Whack a Penguin
  - A penguin will randomly appear and the user gains points if the penguin is whacked before the penguin disappears in the field.

**WACK-A-PENGUIN**

The object of this game is click on the penguin to get points before it disappears.

Instructions:
click on the penguin before it disappears
press space to continue
Frogger

- Use arrows on the keyboard to move a frog across 3 major highways. Each highway had numerous vehicles which randomly traverse the highways.
Multimedia Summer Camp
Multimedia Summer Camp

- Book used:
  - Introduction To Computing And Programming With Python, A Multimedia Approach, by Mark Guzdial
- Students will learn some basic image processing skills such as
  - mirroring and flipping pictures
  - changing the color of a picture
  - copying pictures, and
  - chroma keying.
Multimedia Summer Camp

- Jython Environment for Students (JES)
  - a full-featured media computation environment for programming in Jython.
  - It includes facilities for programming, debugging, and media examination.
  - It also comes with an extensive multimedia API, enabling easy and rapid manipulations of sounds, images, and on some platforms, video.
Multimedia Summer Camp

```python
def negative(picture):
    for px in getPixels(picture):
        red = getRed(px)
        green = getGreen(px)
        blue = getBlue(px)
        negColor = makeColor(255-red, 255-green, 255-blue)
        setColor(px, negColor)
```

No file has been selected. You must open a saved file, or save the opened file, before clicking LOAD.
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THANK YOU!

Questions?

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