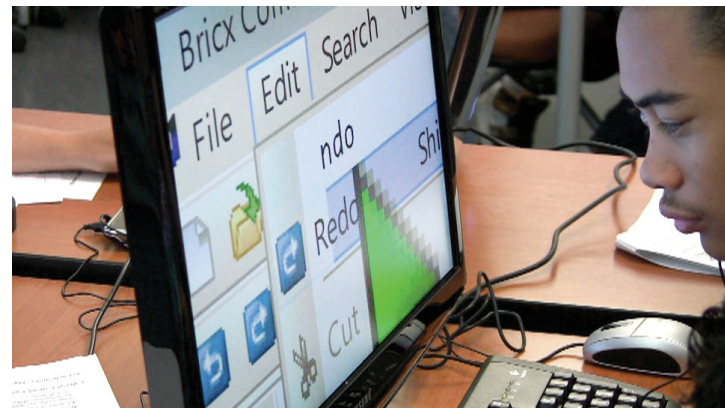


# Inclusive Pre-College Outreach: Strategies and Lessons Learned

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<http://www.youtube.com/user/retrogamer80s>



# About Me

- Faculty Member in Software Engineering
- Research includes SE-HCI intersection, accessibility, computing education
- Since 2007, I have lead Project ACE (Accessible Computing Education) to provide opportunities for visually impaired teens to explore computer science.
- Have worked with the National Federation of the Blind in their STEM camp for blind teens – Youth Slam (2009, 2011)



# Outreach via Robotics

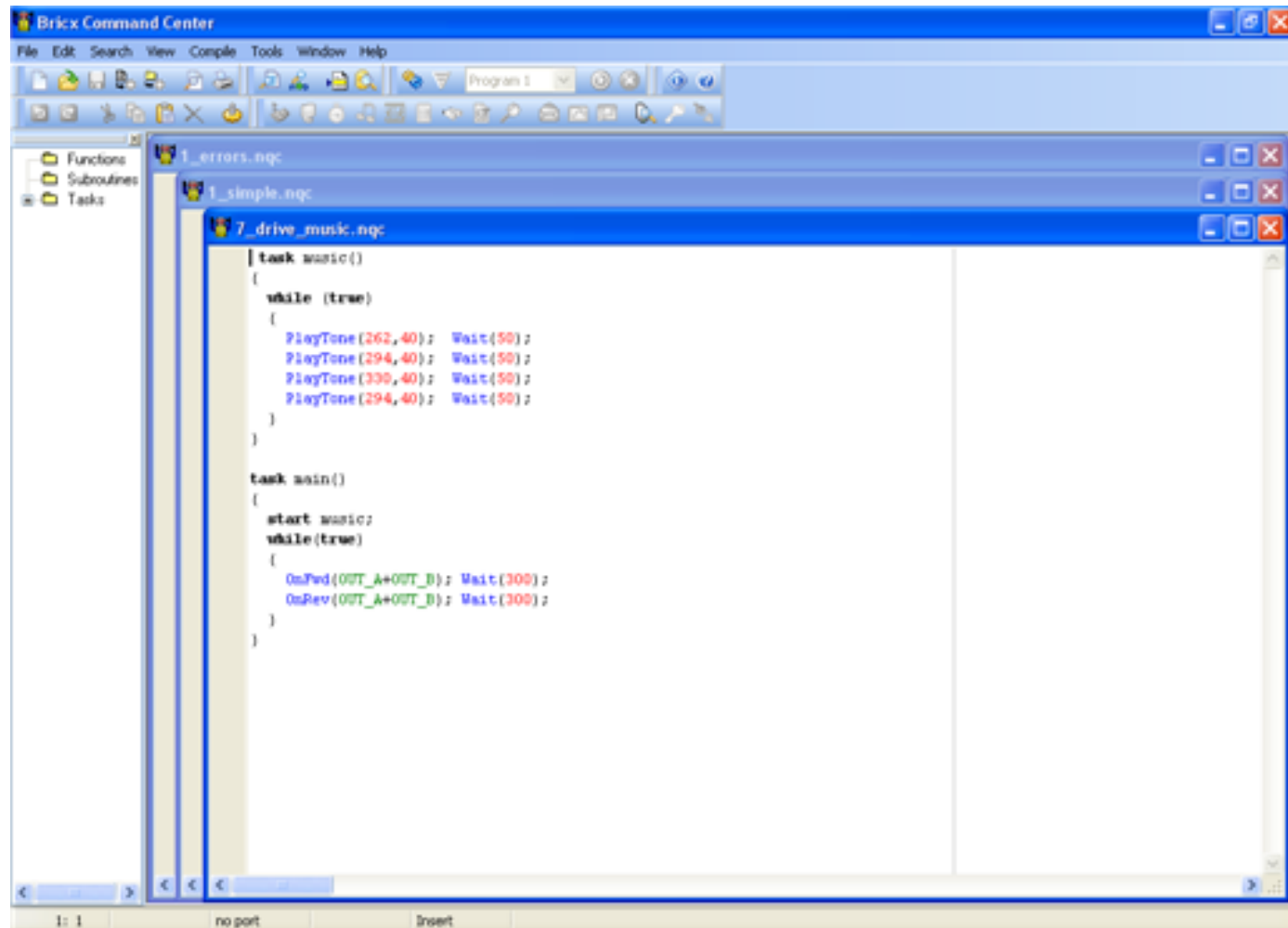
- Use of Lego Mindstorms NXT since 2007
- About 75 visually impaired and blind youth, grades 7-12 have participated
- Activities range from 2 -4 days
- Students work in teams
- Robots either built or mostly built
- Assistive technology available
- IDE (BricxCC is open source), NXC language



# Technology Selection

- Robotics is a good choice
  - Concrete, use of sensors and math
  - Not all platforms are novice-friendly
- Multiple software options
  - Text-based vs. Icon-based
  - Assistive Technology compatibility
- Open source is best for follow-up
- Ample opportunity for follow-up, including mainstream venues such as FIRST, BEST, etc.

# BricxCC Screenshot



The screenshot displays the BricxCC Command Center interface. The main window shows a code editor with the following NQC code:

```
1_errors.nqc
1_simple.nqc
7_drive_music.nqc

| task music()
| {
|   while (true)
|   {
|     PlayTone(262,40); Wait(50);
|     PlayTone(294,40); Wait(50);
|     PlayTone(330,40); Wait(50);
|     PlayTone(294,40); Wait(50);
|   }
| }

task main()
{
  start music;
  while(true)
  {
    OnFwd(OUT_A+OUT_B); Wait(300);
    OnRev(OUT_A+OUT_B); Wait(300);
  }
}
```

The interface includes a menu bar (File, Edit, Search, View, Compile, Tools, Window, Help), a toolbar, and a left-hand pane with a tree view containing 'Functions', 'Subroutines', and 'Tasks'. The status bar at the bottom shows '1: 1', 'no port', and 'Insert'.



# Activity Design

- Often only modest revisions to activities needed.
  - Braille labels, addition of sound at critical points for feedback, careful use of projectiles
- Sample activities: forklift delivering cargo, navigating a maze, guitar, bowling game
- Consideration for difference in pace for students of different abilities
- Teaming students with different abilities is positive



## Take-aways

- Have ample help (in person, handouts)
- Ask students ahead of time about assistive technology (test ahead of time)
- They may not be used to working in teams
- Skills will vary – assistive technology, STEM
- Tweens/Teens who are visually impaired have same interests as sighted peers



## See some students at work at:

- <http://www.youtube.com/user/retrogamer80s>