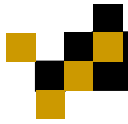




Using Video Games to Teach Computer Science

Nate AndrySCO

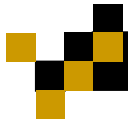


CS 490G / 590M



- Construct a video game that teaches some CS concept
 - Hopefully, the end result can be used by a professor to use in his class

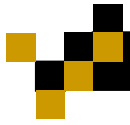
- 15 people
 - Groups of 3



Team 1



- Undergrads
 - Aaron Link, Nate Logan, Brandon Stolle
- Puzzle game - Teaches recursion
 - Navigate a character through a series of mazes using the same set of instructions.
 - The set of instructions = The recursive function
 - The character and maze = The data
 - Each level = Each recursive call



Team 2



- Undergrads

- Chris Hartman, Dan Krueger, Julie Whitsel

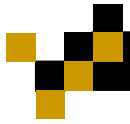
- Wario Ware style game – Minigames

- Decimal to Binary conversion

- Bug finding

- Tree Traversal – Depth-first search

- Constructing loops

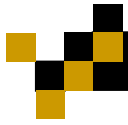


Team 3



- Undergrads - “Team 11₂”
 - Leilah Jackson, Hans Livingstone, Ken Schmidt

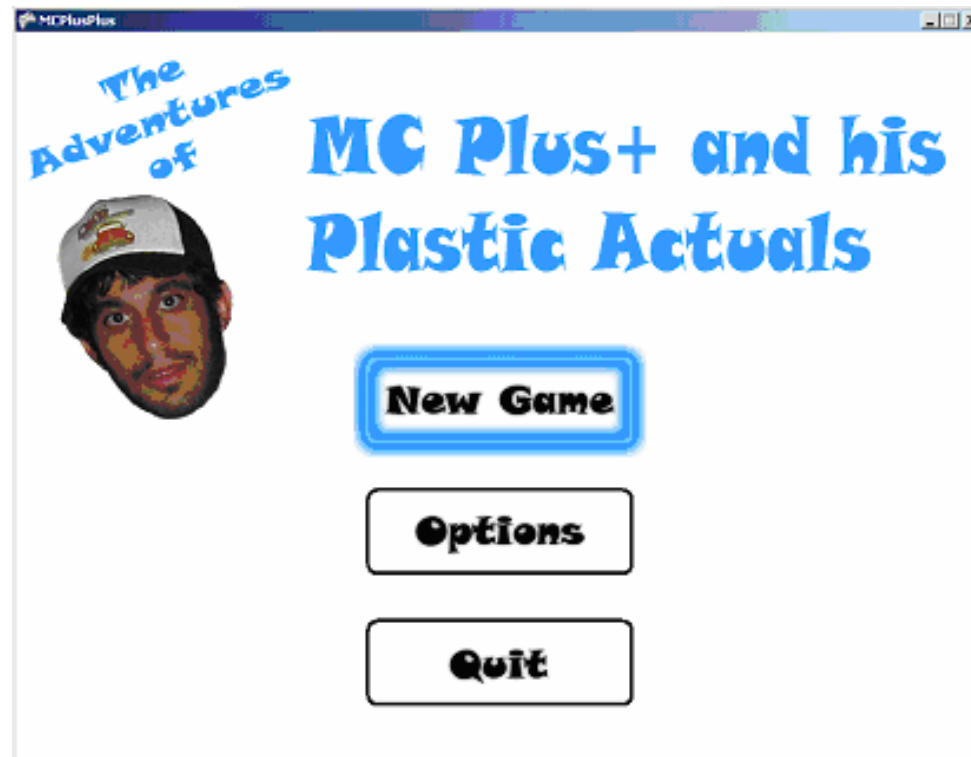
- Myst style game
 - Teaches ranking algorithm complexity

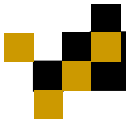


Team 4



- Graduates - “Alpha Squad 7”
 - Nate AndrySCO, Elizabeth Blythe, Paul Rosen



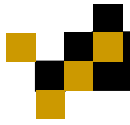


Team 4



- Mario Party style – Minigames tied together
 - Help MC Plus+ get some ill beats
 - Guide your character through a block of code and compete in minigames

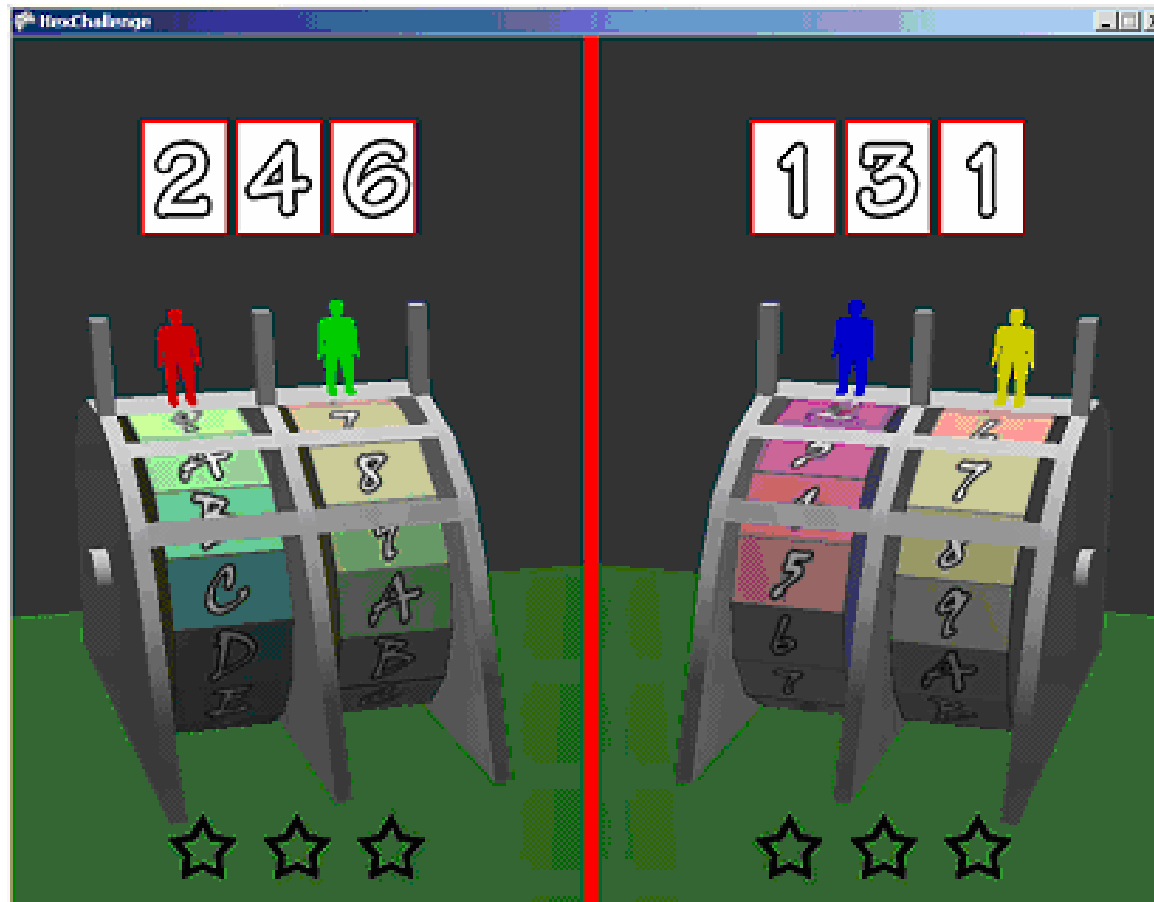
```
void beatminigame()
{
  x = 0
  y = 0
  z = 1
  while (1)
  {
    if (condition of losing minigame)
    {
      x = x + y
      z = 10
    }
    else
    {
      y = 5
    }
    x = x + y + z
    if (funk > 9)
    {
      funk = funk - 10
      illBeats = illBeats + 1
    }
  }
}
```

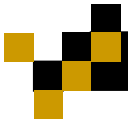


Team 4



- Decimal to Hex conversion

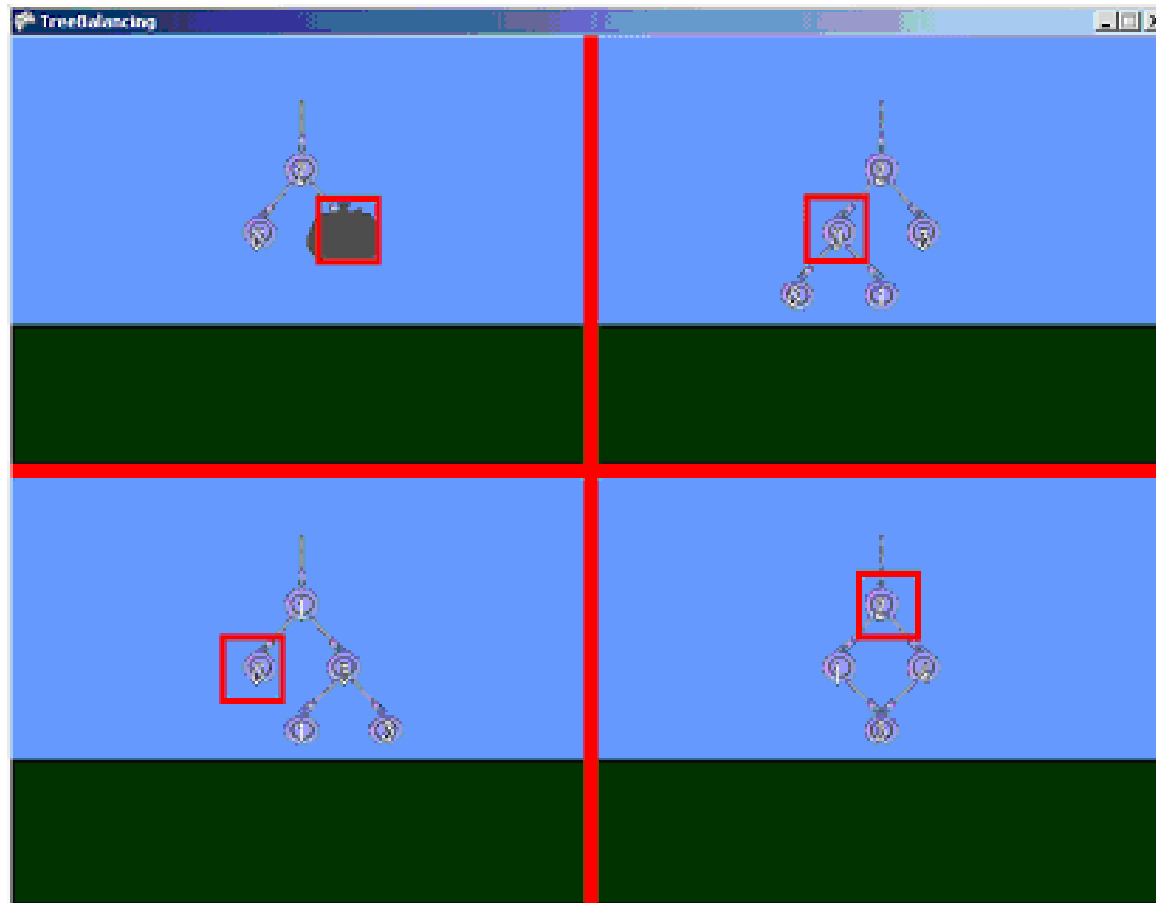


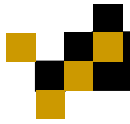


Team 4



■ Tree Balancing





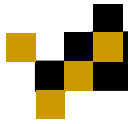
Team 4



■ Selection Algorithm

SelectionAlgorithm

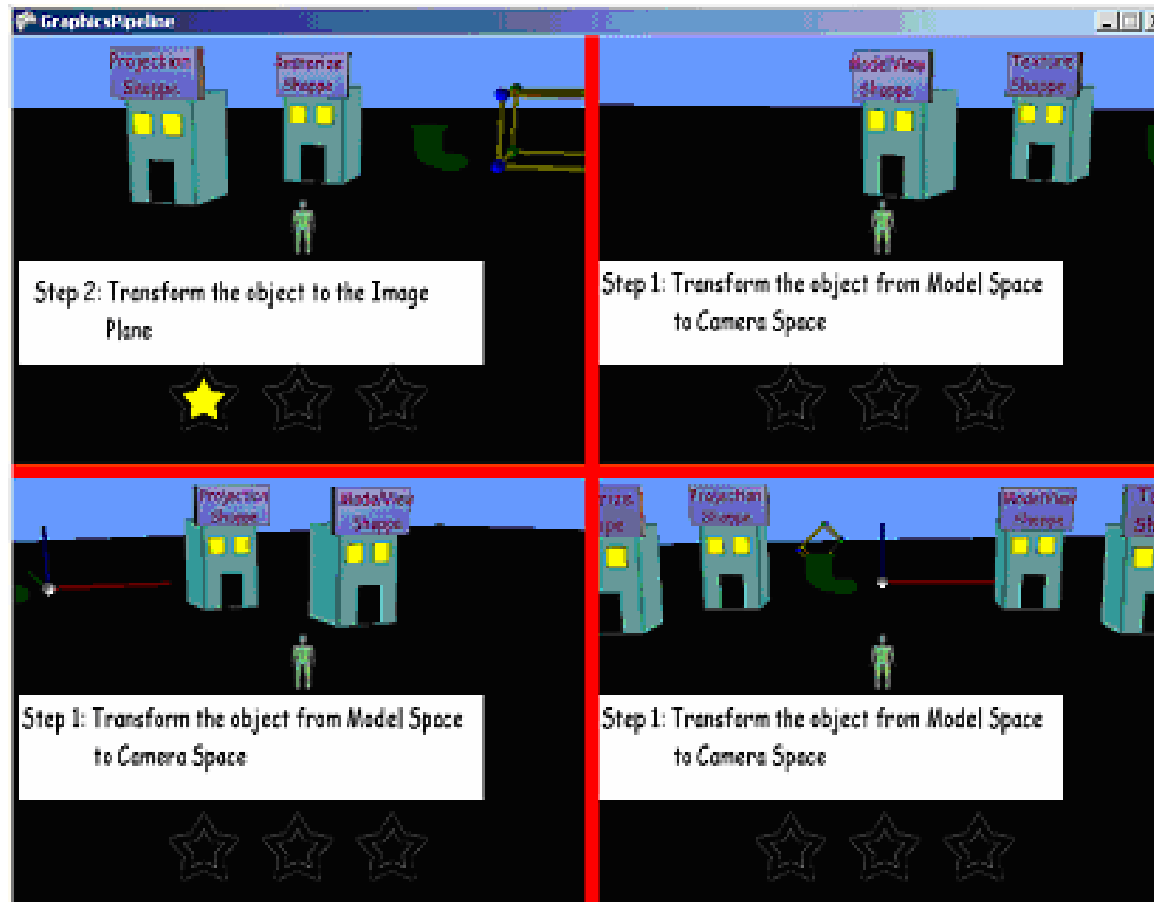
<p>Find: 35th Choices Left: 9</p>	<p>Num. < : 59 Find: 35th Num. > : 41 < eliminated: 0 > eliminated: 0</p>
<p>Num. < : 98 Find: 35th Num. > : 2 < eliminated: 0 > eliminated: 0</p>	<p>Find: 35th Choices Left: 9</p>

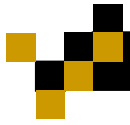


Team 4



■ Graphics Pipeline



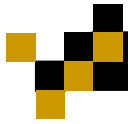


Team 4



■ Graphics Transformations





Team 5

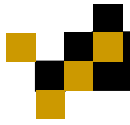


■ Graduates

- Mussabek Baimukham, Brian Hackbarth, Barry Whitman

■ Third Person Shooter - Teaches security algorithm

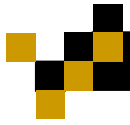
- Run around a maze which represents the internet's topography
- Alice and Bob scenario – Alice wants to deliver a message to Bob without anyone else seeing it
 - Evil packets attack you, trying to steal the message



Teh Winner



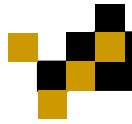
- ???



Teh Winner



- Team #1
- Winners of 3 Xbox 360s



Technology



- XNA – For developing on Windows and Xbox
 - Game engine designed for graphics noobs
 - Released right before semester started
 - Develop in C# Express environment
 - Very, very good intellisense
 - Larger projects build very slowly

Course Comments

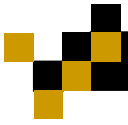


- XNA can be a pain
 - But do not have time to build everything from scratch
- Video game generation gap
- More time to plan in beginning
- Take suggestions from professors about game topics
 - Suggest to students that they create a game revolving around these suggestions
- Mix artists with programmers
 - May have to mix undergrads with grads

Critiques of Game Styles



- One big game (Teams 1 / 3 / 5)
 - Can spend more time on making it look nicer
 - Is it worth spending 4 months on a single game that teaches a single topic?
- Minigames (Teams 2 / 4)
 - Teach multiple things
 - Minigames probably cannot teach an in-depth concept



Older Educational Games



Level: 1 Multiples of 5

10	5	18	13	5	16
15	22	20	25	5	19
24	15	FF 1	24	6	3
3	13		3	20	25
20	12	5	6	14	25

Score: 0

Karen has a broken leg.

Press ENTER to size up the situation

Date: July 5, 1848
Weather: hot
Health: good
Food: 1165 pounds
Next landmark: 66 miles
Miles traveled: 866 miles

Press SPACE BAR to continue



0:01:51 WPM: 4
Typed: 38 Errors: 5

Usefulness of Video Games in Teaching

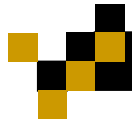


- Last Siggraph – discussion on using graphics in CS curriculum
 - Talked more about using graphics to get students interested in CS
- Is time investment to develop worthwhile?
 - Robust framework that can easily be used to develop new teaching games
- Observational Learning
 - Add CS elements to a game but the user is not actually performing some algorithm

Usefulness of Video Games in Teaching



- Are these games actually teaching or are they just testing proficiency?
- User Studies
 - Have half a class use the game, the other half not
 - A game will make a student “study” longer, but is that time better spent reading notes?
 - Cannot compare between CS / engineering majors and non-majors
- This concept is still in infancy
 - Games are not accepted teaching tools by all faculty...



Discussion

