The past and future of PodRacer and YA3

Mario Romero
2014/10/08
## Course Schedule

<table>
<thead>
<tr>
<th></th>
<th>Date</th>
<th>Day</th>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Wed Sept 03</td>
<td>13-15</td>
<td>13</td>
<td>Lecture 1 Intro</td>
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<tr>
<td>2</td>
<td>Fri Sept 05</td>
<td>15-19</td>
<td>15</td>
<td>Lectures 2-3 Group Formation and brainstorming</td>
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<tr>
<td>4</td>
<td>Wed Sept 10</td>
<td>13-15</td>
<td>13</td>
<td>Lecture 4 Proposals</td>
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<td>5</td>
<td>Thu Sept 11</td>
<td>10-12</td>
<td>10</td>
<td>Lecture 5 Feedback on proposals</td>
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<td>6</td>
<td>Mon Sept 15</td>
<td>8:30-10</td>
<td>8:30</td>
<td>Lecture 6 Hello World! Demos</td>
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<tr>
<td>7</td>
<td>Thu Sept 18</td>
<td>10-12</td>
<td>10</td>
<td>Lecture 7 Demo Day and ForskarFredag Planning</td>
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<tr>
<td>8</td>
<td>Wed Sept 24</td>
<td>14-16</td>
<td>14</td>
<td>Lecture 8 Hello World! Demos</td>
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<td>9</td>
<td>Thu Sept 25</td>
<td>16-20</td>
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<td>Debaser Invation</td>
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<td>10</td>
<td>Wed Oct 13</td>
<td>8-10</td>
<td>8:15</td>
<td>Lecture 11 Reflections of ForskarFredag</td>
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<td>11</td>
<td>Mon Oct 13</td>
<td>8:15-10</td>
<td>8:15</td>
<td>Lecture 12 Epson Moverio – Project 2 industrial sponsor</td>
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<td></td>
<td>Wed Oct 29</td>
<td>16-23</td>
<td>16</td>
<td>Lecture 10 The past and future of YA3 and PodRacer</td>
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<tr>
<td>13</td>
<td>Tue Nov 4</td>
<td>10-12</td>
<td>10</td>
<td>Lecture 13 Epson Moverio Workshop</td>
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<td>14</td>
<td>Wed Nov 5</td>
<td>10-12</td>
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<td>Lecture 14 Reflections on ComiCon</td>
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<td>15</td>
<td>Fri Nov 7</td>
<td>15-19</td>
<td>15</td>
<td>Lecture 15-16 Proposals</td>
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<tr>
<td>17</td>
<td>Tue Nov 11</td>
<td>10-12</td>
<td>10</td>
<td>Lecture 17 Epson Moverio Workshop</td>
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<tr>
<td>18</td>
<td>Tue Nov 18</td>
<td>10-12</td>
<td>10</td>
<td>Lecture 18 Feedback on proposals. Early hello world demos</td>
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<td>19</td>
<td>Tue Nov 25</td>
<td>10-12</td>
<td>10</td>
<td>Lecture 19 Hello world Idemos</td>
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<td>20</td>
<td>Tue Dec 2</td>
<td>10-12</td>
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<td>Lecture 20 Demo Day!!!</td>
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<td>Thu Dec 4</td>
<td>15-18</td>
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<td>Lecture 13 Reflections on ComiCon</td>
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<td>21</td>
<td>Fri Dec 5</td>
<td>15-19</td>
<td>15</td>
<td>Lecture 19 AGI14-VIC Open House</td>
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**Notes:**
- Setup 16:00 – 20:00
- ForskarFredag 2014!!!
- Reflections of ForskarFredag
- The past and future of 2Pac and Space Survival
Agenda

1. PodRacer
2. Particle Systems
3. Next Lecture: Epson Moverio
4. Break (Media Technology Day)
5. YA3
6. Non-photorealistic rendering
7. ComiCon
Remember: Deliverable Oct 28

• Working VIC Demo
• Code with good comments
• Webpage with:
  – Description
    • Goal and motivation of the project
    • Explanation and Justification of the graphics and interaction technologies used and developed
    • Challenges
    • Obstacles
    • Related work
    • Lessons learned
  – Photos
  – "Making of" documentary (2 minutes)
  – Demo Reel (30 seconds)
  – Optional PR material (logo, trailer, flyers, posters, catalog)
  – User testimonials (what did people say)
Pod Racer 1.0

- **Blender (Models)**
  - Engines
  - Car Saab 900
  - Chair
  - Dashboard – imported
  - Could not import materials from blender
  - No textures and shading
  - Joints and rigid bodies on the cables

- **Unity (Rendering)**
  - Terrain
    - Height map
    - Added rocks
    - Texture mapping
    - Rocks
    - Sky box
    - Lighting
      - Directional light
      - A bit of ambient
  - Shaders
  - Element properties
    - transformations
    - Weights
    - Rigid bodies
    - Drag
    - Spring joints
  - Hovering car control script

- **Falcon**
  - Falcon unity plugin
  - Arbitrary range
  - Feedback
    - Fixed update
      - No force on z
      - More bumps
      - Forces → straighten
    - Rocket scripts

- **Oculus – not interesting!**
  - Why?
Pod Racer 2.0

• Tweak interaction + track → initial balancing
• Video tutorial
• Balancing forces
• Damaged model
• Game-state visualization on panel (thrusters, maps, fuel?)
• Animated model of levers mapping falcon input
• Soundscape
• Fire particle system
Particle Systems

• **Original Paper**
  – Particle Systems A Technique for Modeling a Class of Fuzzy Objects
  – ACM SIGGRAPH 1983
  – William Reeves
  – Let’s read the paper
Demo
Model fuzzy objects
  - Fire
  - Clouds
  - Water

Particles = primitives of a volume
Shape of volume is non-deterministic (stochastic)

In time:
  - Generated
  - Move
  - Change
  - Die
Model (Algorithm)

1. Generate new particles

2. For all particles
   1. Assign individual attributes
   2. If too old, kill
   3. Else, transform = $f(\text{dynamics})$

3. Render image of living particles
Exercise at home

• Simple Particle System
  – Link
• Understand Code
• Modify to
  1. Simplify to one particle with simple trajectory
  2. Interactive Particle Cannon
• Share through FB wall
Pod Racer 2.0

- Fire Particle System
  - Modeling and animation of fire, Ding W. et. al. (2004)
  - Voxels on fire, Zhao Y. et. al. (2003)
  - A CG simulation of fire using particle systems and hypertextures, Baekkelund C. et. al. (XXXX)
  - Synthesis of cartoon fire based on hand-drawn samples, Gu Y., Yu J. (2010)
Next Lecture: Epson Moverio for Project 2

Vadim Couthon
National Sales Manager at Epson Europe

Augmented-reality see-through heads-up display.
Break
BONNIER AB

"The level of service was high and treatment incredibly professional."

Emelie Ekman, Media Year 3

UNION

"As an exhibitor, we get a lot of money, compared to other shows."

Queen Christina route 15
114 28 Stockholm
Stockholm
• If you are interested in volunteer to participate, email me as soon as possible.
• We coordinate with: Sandra Liljeqvist sanlil@kth.se
• Here some info:
  – http://www.branschdag.com/omoss
  – the exhibitors will be Outfox, TV4, Sveries Ingenjörer, Bonnier, SVT, My Academy, Starcom, Vitt grafiska, Unionen, Qasa and KTH Innovation and the lectures will be given by Bonnier, Outfox, Kapero and Spotify.
Gameplay YA3 1.0

- Gameplay encapsulates tree pipeline
- search-for-player loop
- Cinematic tour of the forest while waiting

Input
- Input separated from Interaction
- Abstract Input Interface
- Input-helper
  - KeyboardHelper
  - KinectHelper

Tree Generation
- Interaction is handled here
- Abstract representation of the tree
- InputHelper

Simulation
- Apply physics simulations
- Store in separate SimulationData structure.
- Wind, Gravity ...
- Also other systems:
  - Leaves in air
  - Particle Systems
  - Day-night cycle

Tree Construction
- Creates full tree model
- Ready for rendering
- Data to GPU!

Rendering
- Tree ready to be rendered
- Deferred Rendering Pipeline:
  - First pass: to gBuffer (positions, normals, materials..)
  - Second pass: fragment shader using data in gBuffer
- NPR - Non Photorealistic Rendering
- Lots of things to add:
  - DoF
  - Motion blur
  - Anti-aliasing
  - Volumetric light scattering
  - Bloom effects
  - Godrays
  - ...

Logging, Debugging:
- log Actions
- replay sessions
- use debugging view
- behavior statistics
YA3 2.0

- Logging
- New mappings
- Forest
- Simulation $\rightarrow$ wind, gravity
- Level of Detail: leaves, color, textures
- Non-photorealistic Rendering
Non-photorealistic Rendering

• To be continued...
Thank you!

marior@kth.se

Questions?