AGI16 Calendar: [link]

- **Tue 30 Aug 13:00-15:00**
- **Fri 2 Sep 8:00 – 12:00**
- **Tue 6 Sep 13:00 – 15:00**
- **Fri 9 Sep 8:00 – 10:00**
- **Tue 13 Sep 13:00 – 15:00**
- **Fri 16 Sep 10:00-12:00**
- **Tue 20 Sep 13:00 – 15:00**
- **Tue 27 Sep 13:00 – 17:00**
- **Fri 30 Sep 8:00 – 16:00**
- **Tue 4 Oct 13:00 – 15:00**
- **Tue 11 Oct 13:00 – 15:00**
- **Tue 1 Nov 13:00 – 15:00**
- **Fri 4 Nov 9:00 – Sun 6 Nov 16:00**
- **Tue 15 Nov 13:00 – 15:00**
- **Fri 18 Nov 8:00-12:00**
- **Tue 22 Nov 13:00-15:00**
- **Tue 29 Nov 13:00-15:00**
- **Tue 6 Dec 13:00-15:00**
- **Tue 13 Dec 13:00-15:00**
- **Fri 16 Dec 15:00-19:00**

**Lecture 1:** Introduction
**Lecture 2-3:** Forming Groups and Brainstorming
**Lecture 4:** Groups formed, inspiration, and brainstorming
**Lecture 5:** Proposals
**Lecture 6:** Past projects and current technologies
**Lecture 7:** Hello World Demos
**Lecture 8:** Preparing ForskarFredag 2016
**Lecture 9:** Demo and preparation towards ForskarFredag

**ForskarFredag** *(we set up on Thursday evening)*
**Lecture 10:** Reflecting on ForskarFredag
**Lecture 11:** Preparing for Comic Con
**Lecture 12:** Preparing for Comic Con

**Comic Con** *(we set up on Thursday evening)*
**Lecture 13:** Forming groups for project 2
**Lecture 14-15:** Proposals Project 2
**Lecture 16:** Hello World Demo Project 2
**Lecture 17:** Feedback on Demos
**Lecture 18:** Preparing for Open House
**Lecture 19:** Demo project 2

**VIC AGI16 Open House**
Agenda

1. Reminder Groups and Ideas
2. Proposal Template
3. Proposal Grading Criteria
4. Assignment 2
5. Past Proposals
6. Groups discuss ideas
Remember Groups and Ideas
Group CoCAR (1)

Students
  Kevin Brundell Whittaker
  Mikael
  Ingemar Markström
  Erik Strid Markström
  Casper Renman
  Hampus Fristedt

• Idea
  – Inspired by Madsand
    • Also similar to 2Pacs and Teamtris
    • A pinch of Dangerroads
  – AR
  – Cooperate
  – 2 interfaces
    • Drive car
      – 1st person
    • Removing road obstacles
      – 3rd person
      – Recognized and integrated into the experience
Group The Chosen Ones (2)

Students
- Ludwig Sidenmark
- Emilio Lando
- Erik
- Björn Englesson
- Erasmus

• Idea
  - Inspired by Padawan 101
    • Perhaps more like Blopper
  - NEO!!!
  - VR Headset
  - Bullet time
  - Dodge ’em
  - Kinect body tracking
**Group Hubris (3)**

Students
- Marcus
- Staffan Sandberg
- Fredrik Berglund
- Karl Gylleus
- Karl

**Idea**

- Can’t see – blind
  - Or situationally blind (?)
- Eco localization
- Stealth
- Scream, but not always possible / necessary
- VR or Oculus
  - Or cardboard or Samsung Gear
  - No cables
Group Agitators (4)

Students
   Arvid Sätterkvist
   Anton Sivertsson
   Erik
   Emil Westin
   Calle Sténson
   Rickard Bergelin

• Ideas
  – Ski jump simulator
    • Similar to Basejumper
    • Kinect
    • Oculus
    • Tactile transducer
    • How about a fan?
  – Flying an airplane
    • HTC VIVE
    • VIVE controls
• **Idea**
  - Sand box game where you are God
  - People react to your actions
    - Hand gestures
  - VR Sim city (?)
  - Context awareness
  - Projections
  - Audience!!! Other people need to see it!!
    Without the AR registration
• Ideas
  – From god perspective and create something
  – Cooperation game – helping your friend survive zombie apocalypse
  – Explorer
  – Virtual quiditch sit in brom

Group Domino (6)
Students
  Wei Wang
  David Ringqvist
  Adria Cruz
  Lisa Schmitz
  Maria Krinaki
  Hans Hofer
Group Pointy Stick (7)

Students
- Mathilde Caron
- Jack Shabo
- William Schröder
- Henrik
- Max Lindblad
- Haisheng Yu

Idea
- Gesture game
  - Wizard
  - Haptic feedback to spells
  - VR
  - Kinect
Group Have Mercy (8)

Students
  Adrian Häggvik
  Alex
  Robin Tillman
  Alan AbdIlwafa
  Yinglai Xu
  Joakim Larsson

• Ideas
  – Assymetrical game
  – Two parts
  – Against each other
  – Maze game
  – Enhanced reality
  – Maze runner will have 1st person perspective
  – Gesture-based interaction
  – Kinect, or touch screen
Group monkeys with bananas (9)

Students
  Henrik
  Floris List
  Mark Kerner
  Halit Anil Dönmez
  Xu Han
  Yuchen Qiu

• Ideas
  – God!!!
  – Horror
  – Transport
  – Two player
  – Asymmetric
  – Focus on visuals!
  – Vive, oculus, kinect
• Ideas
  – Fighting game
    • Tacitile response
  – Beer pong
    • Real ball
  – Drunk driving simulator
    • VR
    • Oculus
Proposal for Project 1 Title

Student 1
email1@kth.se

Student 2
email2@kth.se

Student 3
email3@kth.se

Advanced Graphics and Interaction
AGI16
2016/09/09
Project 1 Title

Really cool image of your project!!
Outline

Don’t put this slide in your presentation. No time. We all know what the structure will be.

• Motivation 1 minute
• Goals and Challenges 1 minute
• Related Work 1 minute
• Methods and Techniques 2 minutes
• Workload / Distribution 1 minute
• Brief Questions 2 minutes
• Context Switch 1 minute

TOTAL 9 minutes
Motivation

You have one minute to motivate the problem.

• Why is this project interesting to me?
• Why is this project interesting to you?
• What do I want to learn by doing this project?
• Why does the world need this project?
• How does this project improve the world?
Goals & Challenges

You have one minute to state the main goals and challenges.

• Goals
  – What this project accomplishes in 1st place
  – What this project accomplishes in 2nd place
  – What this project accomplishes in 3rd place

• Challenges
  – What are the obstacles to attaining goal 1
  – What are the obstacles to attaining goal 2
  – What are the obstacles to attaining goal 3
Related Work

You have one minute to present related work. You will only have time to show the two most relevant projects at this stage.

- Similar cool project number one with image
  - Author
  - Year
- Similar cool project number two with image
  - Author
  - Year
Similar Cool Project 1

You have 30 seconds to show and talk about related work 1. If you will show videos, be ready to show them.

- Cool video / image demonstrating similar work.
- Say what the related project was about and how it is related to your proposed project.
- Clearly state what about your project is different from this project.
- Clearly state why these difference matter.
- Only show a video or figure, no text on this slide.
- Memorize everything you will say and only say that.
Similar Cool Project 2

You have 30 seconds to show and talk about related work 2. If you will show videos, be ready to show them.

• Cool video / image demonstrating similar work.
• Say what the related project was about and how it is related to your proposed project.
• Clearly state what about your project is different from this project.
• Clearly state why these difference matter.
• Only show a video or figure, no text on this slide.
• Memorize everything you will say and only say that.
Methods & Techniques

This is the most important slide and part of your presentation. Put most of your effort making sure you have researched and tested the feasibility of this proposal. You only have two minutes to talk about this, so memorize everything you are going to say and only say that which you mean to say.

- What methods will you use in your project?
- What devices will you use?
- What libraries will you import?
- How will you connect the parts?
- Will you develop anything new that can be contributed back to the world as code or design pattern, etc?
- What interaction paradigms will you use?
- Will you design new interactions or new algorithms?
- You should talk about these methods and techniques on separate slides using as many visual and video aids as possible, keeping a close eye on your time.

2016/09/09
Individual Contributions

This is *really* important (the only means of achieving A):

An individual contribution need not be in the critical path of the entire project. If it works, great! If it doesn’t integrate well, you can show it to course members, but need not include in the version to the open public!!!!
Thank you!

This is important:

PLEASE PRACTICE, PRACTICE, PRACTICE YOUR PRESENTATION. IT IS TOO SHORT TO MESS IT UP! Also, please make sure it runs in VIC. Google docs have worked well in the past.

Questions?

Student One {email1@kth.se}
Student Two {email2@kth.se}
Student Three {email3@kth.se}
Teacher {email4@kth.se}

For more information go to: www.project1.se
Grading Criteria

The proposal contributes 4% to your final grade.

Be sure to practice your proposal many times. Have a technically clear proposal. Include related work that is state of the art (2010+) research in graphics and interaction. Look for SIGGRAPH, SIGCHI, Eurographics, and other similar conferences for inspiration. State clear individual contributions to the project. Remember these need not be in the critical path of the project.

- Grade: 0
  - Not well rehearsed
  - Technically not clear
  - Related work not state of the art RESEARCH
  - No clear individual contribution

- Grade: +1
  - Well rehearsed
    - FINISHES ON TIME
  - Technically clear
  - Related work is state of the art in graphics and interaction
  - Clear individual contributions
Assignment 2

Due Tuesday 13 Sept 10:00 AM
Grading Pass/Fail

Pass: Google Doc with
• group name
• individual names
• ability to comment for me
• 6 papers with full reference and links to pdf
  • 3 on advanced graphics
  • 3 on advanced interaction
• before 10 AM on September 13.

Fail: everything else

Note: you should not read the full papers in your literature review to decide the 6 most relevant. Also, you do not need to read the papers for this assignment.

1. Together with your group members select 3 Advanced Graphics Topics and 3 Advanced Interaction topics you would like to consider including in your project
2. Do a literature review
3. Find at least two papers per topic
4. Goto 1 until satisfied with list of six papers
5. Send me ONE group list through a google doc that I can comment by Tuesday 13 Sept 10 AM

1. Full reference to paper
2. Link to PDF
Doing a literature review
A particle system is a technique in game physics, motion graphics, and computer graphics that uses a large number of very small sprites, 3D models, or other graphic objects to simulate certain kinds of "fuzzy" phenomena, which are otherwise very hard to reproduce with conventional rendering techniques - usually highly...

Particle system - Wikipedia, the free encyclopedia
https://en.wikipedia.org/wiki/Particle_system

People also ask
What is a particle emitter?

Particle system - Wikipedia, the free encyclopedia
https://en.wikipedia.org/wiki/Particle_system

Images for particle systems

Unity - Manual: What is a Particle System?
https://docs.unity3d.com/Manual/PartSysWhats.html

Particles are small, simple images or meshes that are displayed and moved in great numbers by a particle system. Each particle represents a small portion of a
position in its life cycle, and each particle occupies a single point in space. For effects such as fire or smoke that dissipate, each particle is given a fade out time or fixed lifetime; effects such as snowstorms or rain instead usually terminate the lifetime of the particle once it passes out of a particular field of view.

However, if the entire life cycle of each particle is rendered simultaneously, the result is static particles — strands of material that show the particles’ overall trajectory, rather than point particles. These strands can be used to simulate hair, grass, and similar materials. The strands can be controlled with the same velocity vectors, force fields, spawning ratios, and deflection parameters that animated particles obey. In addition, the rendered thickness of the strands can be controlled and in some implementations may be varied along the length of the strand. Different combinations of parameters can impart stiffness, limpness, heaviness, brittleness, or any number of other properties. The strands may also use texture mapping to vary the strands’ color, length, or other properties across the emitter surface.

![Image of particle systems](image)

**Artist-friendly particle system tools**

Particle systems can be created and modified natively in many 3D modeling and rendering packages including Cinema 4D, Lightwave, Houdini, Maya, XSI, 3D Studio Max and Blender. These editing programs allow artists to have instant feedback on how a particle system will look with properties and constraints that they specify. There is also plug-in software available that provides enhanced particle effects.

**Developer-friendly particle system tools**

Particle systems code that can be included in game engines, digital content creation systems, and effects applications can be written from scratch or downloaded. Havok provides multiple particle system APIs. Their Havok FX API focuses especially on particle system effects. Ageia - now a subsidiary of Nvidia - provides a particle system and other game physics API that is used in many games, including Unreal Engine 3 games. Both GameMaker Studio and Unity provide a two-dimensional particle system often used by indie, hobbyist, or student game developers, though it cannot be imported into other engines. Many other solutions also exist, and particle systems are frequently written from scratch if non-standard effects or behaviors are desired.

**External links**

- Particle Systems: A Technique for Modeling a Class of Fuzzy Objects® — William T. Reeves (ACM Transactions on Graphics, April 1983)
- The ocean spray in your face — Jeff Lander (Graphic Content, July 1998)
- Building an Advanced Particle System® — John van der Burg (Gamestats, June 2000)
- Particle Engine Using Triangle Strip® — Jeff Mott (fr33i)
- Designing an Extensible Particle System using C++ and Templates® — Kent Lai (GameDev.net)
- repository of public 3D particle scripts in LSL Second Life format® — Fred Frederick
- GPU-Particle systems using WebGL® — Particle effects directly in the browser using WebGL, for calculations.

Categories: 3D computer graphics | Computer physics engines | Virtual reality
Quantum many-particle systems

Quantum theory of many-particle systems. I. Physical interpretations by means of density matrices, natural spin-orbitals, and convergence problems in the method of ...

Particle systems—a technique for modeling a class of fuzzy objects

Interacting particle systems

Traffic and related self-driven many-particle systems
Quantum many-particle systems

Quantum theory of many-particle systems

Particle systems—a technique for modeling a class of fuzzy objects

Interacting particle systems

Traffic and related self-driven many-particle systems
Quantum many-particle systems

Quantum theory of many-particle systems. I. Physical interpretations by means of density matrices, natural spin-orbitals, and convergence problems in the method of...

Particle systems—a technique for modeling a class of fuzzy objects

Interacting particle systems

Traffic and related self-driven many-particle systems
Particle Systems—A Technique for Modeling a Class of Fuzzy Objects

WILLIAM T. REEVES
Lucasfilm Ltd.

This paper introduces particle systems—a method for modeling fuzzy objects such as fire, smoke, and water. Particle systems model an object as a cloud of primitive particles that define its volume. Over time, the particles are continuously added, moved, and deleted. The evolution of the particles is governed by rules that depend on their location, their interactions with one another, and the forces that act on them. The resulting motion is used to represent motion, changes of form, and deformations that are not possible with classical surface-based representations. The particles can easily be rendered turned, and therefore do not exhibit temporal aliasing or blocking. Such processes are used to generate and control the many particles within a particle system. The application of particle systems is the method of choice employed from the Genesis (Gnera) sequence of the film Star Trek II: The Wrath of Khan [14].


General Terms: Algorithm, Design

Additional Key Words and Phrases: Motion blur, stochastic modeling, temporal aliasing, dynamic objects

1. INTRODUCTION

Modeling phenomena such as clouds, smoke, water, and fire has proved difficult with the existing techniques of computer image synthesis. These "fuzzy" objects do not have smooth, well-defined, and ably surface; instead their surfaces are irregular, complex, and ill-defined. We are interested in their dynamic and fluid changes in shape and appearance. They are not rigid objects nor are their motions be described by the simple affine transformations that are common in computer graphics.

This paper presents a method for the modeling of fuzzy objects that we call particle systems. The representation of particle systems differs in these basic ways from representations normally used in image synthesis. First, an object is represented not by a set of primitive surface elements, such as polygons or patches, that define its boundary, but as clouds of primitive particles that define its volume. Second, a particle system is not a static entity. Its particles change form and move with the passage of time. New particles are "born" and old ones "die."
Particle systems—a technique for modeling a class of fuzzy objects

Animation of explosions
G. F. Yen, J. C. O’Hara, J. E. Hopkins, and C. R. Reynolds
DOI: 10.1145/283754.283985

Abstract The primary effect of an explosion is that it causes a shock wave to propagate through surrounding medium. The disturbance determines the behavior of nearly all...
Particle systems—a technique for modeling a class of fuzzy objects

[PDF] naturewizard.at
Online@KTH Biblioteket

Depicting fire and other gaseous phenomena using diffusion processes

Abstract Developing a visually convincing model of fire, smoke, and other gaseous phenomena is among the most difficult and attractive problems in computer graphics. We have created new methods of animating a wide range of gaseous phenomena, including...

Cited by 459 Related articles All 25 versions Cite Save

Simulating fire with texture splats

Abstract We propose the use of textured splats as the basic display primitives for an open surface fire model. The high-detail textures help to achieve a smooth boundary of the fire and gain the small-scale turbulence appearance. We utilize the Lattice Boltzmann models...

Cited by 113 Related articles All 15 versions Cite Save

Prop Realistic and controllable fire simulation

Abstract We introduce a set of techniques that are used together to produce realistic-looking animations of burning objects. These include a new method for simulating spreading on polygonal meshes. A key component of our approach consists in using individual flames...

Cited by 106 Related articles All 12 versions Cite Save More

Directable, high-resolution simulation of fire on the GPU

Abstract The simulation of believable, photorealistic fire is difficult because fire is highly detailed, fast-moving, and turbulent. Traditional grid-based simulation models require large grids and long simulation times to capture even the coarsest levels of detail. In this paper...

Cited by 77 Related articles All 7 versions Web of Science: 18 Cite Save

Meshes on fire

Abstract We present a new method for the animation of fire on polyhedral surfaces. Using the notion of discrete straightedge geodesics, we evolve fire fronts directly on the surface of arbitrarily complex objects. Animator control and motion complexity is achieved by driving...

Cited by 62 Related articles All 15 versions Cite Save

Interactive simulation of fire

Abstract In this paper we describe a fast and interactive model to simulate and control the fire phenomenon. We use a modified interactive fluid dynamics solver to describe the motion...

Cited by 8 Related articles Cite Save
Particle systems—a technique for modeling a class of fuzzy objects

A Geometric Control of Fire Motion Editing
X. Feng, D. Zhu, Z. Wang - 2015 International Conference on ...
Abstract—In this paper, we present a control technique to editing the fire motion with the geometry goal shape, which is designed without connection to physical parameters and physical equation solving. To fulfill this, controlling elements are extracted from the input ...
Related articles Cite Save More

Dynamic Editable Models of Fire From Video
A. Ciniery - 2015 - opus.bath.ac.uk
This thesis presents the following statement: it is possible to generate three-dimensional, intuitively editable, dynamic models of flames from video. Current techniques allow flames to be modeled via physical simulations, but these methods require significant effort to ...
Related articles All 2 versions Cite Save

[PDF] bath.ac.uk
A Geometric Control of Fire Motion Editing

Xiaobing Feng
Virtual Reality Lab, Institute of Computing Technology, Chinese Academy of Sciences.
University of Chinese Academy of Sciences
E-mail:fengxiaobing@ict.ac.cn

Dengming Zhu
Virtual Reality Lab, Institute of Computing Technology, Chinese Academy of Sciences
E-mail:md Zhu@ict.ac.cn

Zhaoqi Wang
Virtual Reality Lab, Institute of Computing Technology, Chinese Academy of Sciences
E-mail:zqwang@ict.ac.cn

Abstract—In this paper, we present a control technique to editing the fire motion with the geometry goal shape, which is designed without connection to physical parameters and physical equation solving. To fulfill this, controlling elements are extracted from the input curves conveying the target shape of fire animation. Then a force field is obtained according to these controlling elements, which would drive the fire towards the target shape. Moreover, to optimize the particles’ position, a geometric topology model is proposed to maintain the visual details while generating the fire motion under the external force field frame by frame. Experimental results show that our method can generate desirable fire shape under simple interaction.

Index Terms—Fire animation, Motion control, Data-driven.

1. Introduction

Fire animation is widely used in various areas, such as entertainment, visual simulation and games. For example, flames spreading on the house, fireman flying in the air are common in the movies. In these applications, the fire controlling is very useful to produce fire sequences to meet the needed to appear in different situations. So how to reuse the precomputed data to reduce the computational cost is another goal in this paper.

To overcome these problems, an intuitive control approach to produce realistic fire animation efficiently is presented in this paper. Based on the precomputed simulation data, we combine the geometric constraints with the fire evolving rules to create various fire animations.

Early work about fluid control focused on the parameters and didn’t allow to define the target shape directly. High level control methods are also provided for the artists to control the fluid motion. a radial basis function in [1] and B-Spline curve in [2] are introduced to deform fire animation and make the fire collide with object. [3] deform the 2D flow fields via preserving the divergence-free condition. In this paper, we provide a more convenient and flexible method to control the fire motion with simple geometric model. Curve paths and 3D mesh are both allowed to define the fire shape. In this way, a drawing board or mouse could be used as a design tool to give the burning path of flame. 3D mesh model in Autodesk Maya is another format. All these geometric constraints are represented by the uniform descriptor. Then Key elements extracted from these controlling conditions are...
9. Conclusion

In this paper, a method is developed to controlling the fire on complete visual appearance and behavior. An easy and intuitive approach to control the fire animation through a

Acknowledgment

This research is supported by National Natural Science Foundation of China Grant Nos. 61173067 and 61379085.

References
Proposal for Project 1 Title

Advanced Graphics and Interaction
AGI15
2015-09-07
Blopper
Motivation

• The Oculus/VR is state of the art in gaming
• Combining all our different technologies will be a fun challenge
• Seeing how people interact and cope with a 360 degree VR game is interesting
• Popping balloons is extremely fun
Goals and Challenges

• Goals
  – Move an IRL object in a 360 degree 3D VR world
  – Wireless playability (except for carried devices)
  – Sufficient visuals for a nice user experience

• Challenges
  – Tracking the sword in 3D space with low enough delay
  – Sending webcam data to player (carried devices)
  – Creating efficient models and effects
Related Work (maybe a Table?)

- Fruit Ninja Kinect
  - Halfbrick & Microsoft Studios, 2011
- Wiimote 6DOF Position Tracking
- Oculus rift + Razer hydra, Half life 2
Fruit Ninja Kinect - With a Sword!
HL2 with Oculus Rift and Razer Hydra
Wiimote 6DOF Position Tracking
Methods and Techniques

- Multiple webcams searching for light on a sword
- Unity 3D
- Server computer and client computer with socket connection VS. WHDI
- Oculus Rift
- Algebra to make sure VR world and real world is aligned
Thank you!

Questions?

Erik Dahlström
edahls@kth.se

Simon Fransson
simonfra@kth.se

Rasmus Ansin
ransin@kth.se

Johan Huusmann
johanhuu@kth.se

Erik Dackelid Johansson
erikdj@kth.se

Teacher:
Mario Romero
marior@kth.se
Comments on Blopper

• I am interested in the physics of your ballons.
  – How do they float and fall?
  – How do they blow up?
  – What does that look like?
• I am concerned about the feasibility and safety of 360 degrees of game play
• Wireless tech has limitations
• Building your own mocap portable studio may be too challenging
• I am interested in the special effects FX of your sword swings
• Sound and haptics?
• Razer hydra?
• I am concerned about the physical space you require
• You need more papers on the graphic elements you intend to develop
• Why use an oculus. Has cables and can’t see the world (including yourself). How about some see-through HUD – Epson Moverios?
• Will you use infrared markers?
• How about attaching a wii mote to the sword?
• What happens when you miss a ballon?
• You could use a backpack for carrying part of the equipment if you need to.
• You could force a pivot foot to restrain movement and constrain the engineering problem of you interaction infrastructure.
• I am concerned about multiple calibrations per installation. Needs more robustness.
• I know you are exploring google cardboard. Still, you can’t see the world.
• Have you though about the TI Sensor Tag?
Grading proposal

- Well rehearsed
  - FINISHES ON TIME
- Technically clear
- Related work is state of the art in graphics and interaction
- Clear individual contributions
Group 2

Student
• Douglas
• Emilie
• Mårten
• Adrian
• Victor

Idea (merged from both groups)
• Teamtris
Who are we?

Douglas Carlsson (douglasc@kth.se)
Adrian Blanco (adblan@kth.se)
Victor Hung (vhung@kth.se)
Emilie Le Moël (emilielm@kth.se)
Mårten Norman (martenno@kth.se)
Motivation

- Step out of their comfort zones
- Communicate better with each other in an easy-to-learn virtual world
- Have fun together
Goals and challenges

1. Gather people and have them collaborate with each other
   Challenge: making it work even for people that don’t know each other

2. Develop a fun and addictive game based on cooperation
   Challenge: adding something new to Tetris

3. Design mind-blowing graphics
   Challenge: creating impressive visuals from a simple base
Related works

2Pacs (2014) - KTH
Tetris with Kinect (2011) - University of Twente
Lumines (2004) - Q Entertainment
2Pacs
Tetris with Kinect
Lumines
Interactions

Two players share control of the falling pieces
One player controls movement, the other rotation
Some movements will require teamwork to execute
Teams of two can compete simultaneously in a multiplayer mode
Important to deliver intuitive interactions
Technical specifications
Many shader possibilities for eye-candy
- Noise
- Scanlines
- Distortion
- Fading
- Bloom
- Pixel displacement

Games + Retro + The 80s = ❤️
Graphics

Orthographic projection makes 3D appear as 2D

Possible to make only one axis visible at all times
Risk assessment

• Team is new.

• Need to get a working game in short time
  - Use Unity to get on high level fast
  - Selected Tetris, that is simple and well known, but still room for nice graphics and effects if time permits

• The ideal controller interface is very advanced.
  - Start with just keyboard control, then add complexity and features if time allows
Prototype Demonstration
Any questions?
Comments on Teamtris

- I like the asymmetric collaborative game aspect.
- As I said in class, I would really like you to explore constructive geometries to copy patterns presented by the game challenge. You move forward by building more complex geometries in a time limit, for example.
- I like the retro idea through shaders.
- Have you thought about different views/capabilities for different players?
Grading proposal

- Well rehearsed
  - FINISHES ON TIME
- Technically clear
- Related work is state of the art in graphics and interaction
- Clear individual contributions
Group 3

Students
- Johan
- Niclas
- Daniel
- Johan
- Anton

Project idea
- Multiplayer AR game
Augmented Reality
MULTIPLAYER GAMING
Team members

Niclas Ericsson
nerics@kth.se

Daniel Lindström
danielin@kth.se

Anton Eldh
aeldh@kth.se

Johan Kasperi
kasperi@kth.se

Johan Kitti
johanks@kth.se

Advanced Graphics and Interaction
AGI15
2015/09/07

VICSTHLM
VISUALISATION INTERACTION COLLABORATION

KTH LONDON
Using smartphones for augmented reality multiplayer gaming.
Motivation

• Everybody has a smartphone.
• You don’t need any extra hardware.
• AR through the smartphone is really cool.

• Building a multiplayer game.
• Learn Unity and especially networking with Unity.
• Learn AR.
Goals and Challenges

• Goals
  – To make a fun and interesting multiplayer game in augmented reality.

• Challenges
  – Make the AR work on multiple devices.
  – Make the input work without too much latency.
  – Make the gameplay feel meaningful and fun.
AR Defender 2 - Tower Defense Game
Ball Resurrection
Swordy
Methods and Techniques
Methods and Techniques

• The devices will be a server, multiple smartphones, a router with wireless support and a table with a texture.

• Augmented Reality (AR) through the smartphones camera.

• User input will be through the touchscreen of the smartphone.

• The parts will be connected with websockets.
Thank you!

Questions?
Johan Kasperi {kasperi@kth.se}
Niclas Ericsson {nerics@kth.se}
Anton Eldh {aeldh@kth.se}
Daniel Lindström {danielin@kth.se}
Johan Kitti Söderberg {johanks@kth.se}
Teacher - Mario Romero
Group Members

- Johan Kasperi (Interactive Media Technology, 2016, develop something cool)
- Daniel Lindström (Interactive Media Technology, 2016, have the freedom to choose my projects myself)
- Johan Kitti Söderberg (Computer Science, 2016, develop something cool)
- Niclas Ericsson (Human-Computer Interaction, 2016, develop something cool)
- Anton Eldh (Simulation Technology and Virtual Design, 2016, develop something cooler)
Individual Contributions

• Backend Team (networking, server)
  – Daniel Lindström
  – Johan Kasperi

• Game Engine Team (game dev, AR, design)
  – Anton Eldh
  – Niclas Ericsson
  – Johan Kitti Söderberg
Comments for Group 3

1. You need a name
2. I really like your idea of smartphones for AR
3. Google tango
4. You need to improve your literature review
5. Start with AR at Georgia Tech with stuff like the zombie game I showed in class – arhrrrr
6. I really like the idea of combining this with a dynamic surface (microsoft surface or samsung pixelsense in studio) and physical objects – make sure you play zap the bugs!
7. The multiplayer aspect of your project is peripheral, but if you can get it to work quickly, it will make a huge difference
8. One thing I really don’t like from the videos you showed is that people are only fixated on the screens. Can you figure out a way to allow/force them to look at each other?
9. You need to think more about the graphics in your game. Think about special effects, for example, FX.
10. Great work!

2015/09/10
Grading proposal

- Well rehearsed
  - FINISHES ON TIME
- Technically clear
- Related work is state of the art in graphics and interaction
- Clear individual contributions
Group 4

Students
• Viktor
• Vincent
• Lennart
• Huiting
• Mikael

Project idea
• Virtual reality fighting game
• Sandbox turns into real-time strategy game
Proposal for MadSand

Huiting huitingw@kth.se
Mikael mikaele3@kth.se
Viktor valderin@kth.se
Vincent vwong@kth.se
Lennart lenjons@kth.se

Advanced Graphics and Interaction
AGI15
2015/09/07
Motivation

• Fun! Combine nostalgia with new technologies
• Return to your childhood by taking the sandbox to a whole new level
• Learn about combining the physical world with the digital
• Make it easier for people to create 3D objects/maps
Goals and Challenges

• Goals
  – Create an interactive sandbox based on AR
  – Create a fun and immersive multiplayer game

• Challenges
  – Attain depth data from the sandbox
  – Make the digital world update in real time
  – Find a game balance
Related Work

• Augmented Reality Sandbox
  – Oliver Kreylos (2015)

• Project Mimicry
  – developed by Monobando (2011)
  – http://mimicry.monobanda.nl/

• Animal Crossing - Sweet day from Nintendo Land
  – Nintendo
  – released 30 November 2012 (EU)
Augmented Reality Sandbox
Project Mimicry
Method
Augmented reality: projection on the sand

- Computer
- Projector
- Kinect

> Game state projected onto the sand
> Computer vision: depth map from Kinect

Sandbox
Method
Procedural generation: digital world

> Digital world procedurally generated based on the sandbox

> Game physics: gravity, speed, acceleration
Thank you!

Questions?

Mikael mikaele3@kth.se  Huiting huitingw@kth.se
Viktor valderin@kth.se  Vincent vwong@kth.se
Lennart lenjons@kth.se

Teacher: Mario marior@kth.se

AGI15
In case they ask

EXTRA SLIDES
Load Balancing

- We have tried to split the work ahead into groups, and assigning people according to what they want to learn! Of course this is not laid in stone, and we will help each other or change as we need.

  Get Depth data into Unity:
  - Lennart, Vincent

  Project AR on Sand:
  - Lennart, Viktor

  Procedurally Generate World:
  - Huiting, Mikael

  Game models, animation:
  - Vincent, Huiting

  Game engine programming:
  - Mikael, Viktor
The plan ahead

• First: get to know Kinect, interface it with unity to be able to get the depth data.
• Get to know Unity
• Find which libraries we want to use.
• Get physical devices, such as the box, sand etc.

Our Planning document can be found here: https://docs.google.com/spreadsheets/d/11LWqKTLMnB0z1o1jNYFVbscN_4J2fwE1u0p2zwFkK88/edit?usp=sharing
Notice that there are two sheets, one for tasks and one for the general schedule
Proposal Feedback

• Sand - What kind of sand? Not too messy
• Why sand? - Are there other materials/techniques
• Other physical objects into the sand as extension.
• Hiroshi Ishii MIT tangible interfaces as inspiration
• Think about the point of the game/ gamedesign
• Google has Sandbox related patent?
1. It is a great idea to create a physical interaction device (tangible media) and use sand as a high definition phycon with intrinsic tangible feedback. You need to take it a few steps further.

2. Can you combine it with other phycons?

3. Be careful with getting stuck with the game play

4. Thinking about your proposal, I concluded it is a tower defence game where the defender modifies the terrain. The balancing is hard!

5. Have you thought about casting shadows from the projectors on the interactive surface? Do some research on multiple redundant projection

6. What about the physics of your interaction?

7. Yes, the sand could get really messy!

8. Great work!

9. Johan

1. Lemming style game!
Not Doing
• Oculus
• Skeleton
• Hand

Done and going to do
• Connected kinect with unity
• Depth data on rough terrain is wip – 10%
• Simple car game in unity
• Created some models
  – Maya
• Carpentry on the weekend
• Projection!
Grading proposal

- Well rehearsed
  - FINISHES ON TIME
- Technically clear
- Related work is state of the art in graphics and interaction
- Clear individual contributions
Group 5

Students
- Maxime
- Max
- Robert
- Omid

Project idea
- Oculus rift
- Wii remote
- Space shooter
Project proposal

Omid Ghorreshi
omidgh@kth.se

Max Turpeinen
maxtu@kth.se

Maxime Hulliger
hulliger@kth.se

Robert Amino
amino@kth.se

Advanced Graphics and Interaction
AGI15
2015/09/07
Sh&Mooning

--LIFE--

9/7/2015
Motivation

• Experience the VR immersion
• Learn new development and graphics methods
• Extend portfolio by completing a great project
• Save lives in case of alien moon invasion
• For fun!
Goals and Challenges

• Goals
  – Realistic shooting animation
  – Immersive environment
  – Fun to play (running)

• Challenges
  – Wii remote controls
  – hand movement coherent
  – workload balance as we walk in the unknown
Related Work

• Thrust yourself
  – Stefan Etoh, Oscar Friberg, Johan Bäckman
  – 2014 in AGI14
• Half-Life 2 (with the Oculus Rift and Virtuix Omni)
  – Valve
  – 2004
• Wii Fit Plus : Jogging
  – Nintendo
  – 2009
Thrust Yourself
Half-Life 2
(with the Oculus Rift and Virtuix Omni)

• https://youtu.be/dP48cLFeBms?t=3m25s
Wii Fit Plus : Jogging

• https://youtu.be/Tt0sPxlqydg?t=1m29s
Methods and Techniques

- Wii remote and Nunchuk
- Oculus Rift
- Maya
- Unity (C#)
Wii remote and Nunchuk
Maya
Unity
Thank you!

Questions?

Omid Ghorreshi {omidgh@kth.se}
Maxime Hulliger {hulliger@kth.se}
Max Turpeinen {maxtu@kth.se}
Robert Amino {amino@kth.se}
Teacher : Mario Romero {marior@kth.se}
Feedback

- We need to choose if we want the game more immersive (Oculus Rift) or more physical (Wii Remote).
- Should the player sit or stand up?
- Use Samsung Gear instead of Oculus Rift for more movement freedom.
- Hydra Razer instead of Wii Remote?
- Weapon independent from the view?
Omid Ghorreshi

- Majors: computer science, mathematics
- Graduation year: September 2016 (Master)
- Career goal: project manager in computer graphics projects in a big company
Maxime Hulliger

• Majors : Computer science
• Graduation year : 2016
• Career goal : Software development
Max Turpeinen

- Majors: computer science
- Graduation year: 2018
- Career goal: Work for a company, involving computers.
Robert Amino

- Majors: computer science
- Graduation year: 2016
- Career goal: Work in a tech company.
Individual Contributions

• Maxime will do
  – Game mechanism
  – Oculus rift integration

• Omid will do
  – Wii remote integration

• Max will do
  – The animations - bones/body
  – Model for the characters
  – The space station

• Robert will do
  – The environment
  – The space ship
Comments on Proposal

1. Try the Oculus with VR Roler coaster (Henrik)
2. Try zap the bugs
3. I am interested in the physics on the moon’s surface
4. Be careful not to treat VR like a screen. Immersion and interaction is paramount!
5. Be careful with the physical safety of players.
6. Don’t loose focus of your learning objectives by getting stuck with game mechanics
7. Great work!
8. Comments from Gregorio
   1. You could use coarse rubber sand! They use that at the historiska museum to make children play! It doesn’t make too much of a mess and it is not a problem if some one spills some water on it.
   2. You need a very fast response between the interaction on the sand and the computer. If the delay is too big the interaction to stop the cars could be too slow to stop them.
Grading proposal

- Well rehearsed
  - FINISHES ON TIME
- Technically clear
- Related work is state of the art in graphics and interaction
- Clear individual contributions
Group 6

Students
• Viktor
• Stefan
• Prasanth
• Robin
• Anton

Project idea
• Light saber
Proposal for “Jedi Academy”

Prasanth Korada
korada@kth.se

Viktor Leandersson
vlea@kth.se

Robin Palmberg
robinpa@kth.se

Anton Erholt
aerholt@kth.se

Stefan Seibert
sseibert@kth.se

Advanced Graphics and Interaction
AGI15
2015/09/07
Motivation

• Crowd pulling game experience with research value.
• Testing the limits of complete immersion.
• Learn integrating VR-Input- game play- anything and everything we can.
• World needs better gamers and gamers need better immersion.
• World needs more trained Jedis.
Goals and Challenges

• Goals
  – VR room with a laser sword that is moved by an input device
  – Game where the user can “train” by fighting against a shooting ball
  – Full experience with sound and tactile feedback fighting several Stormtroopers

• Challenges
  – Choosing working hardware and connecting everything correctly
  – Tracking works correctly and being able to create a believable graphics quality
  – Finish the assets for the stormtroopers and the “defense algorithm”
  – Staying aware of when to limit ourselves in terms of time-and-effort constraints
Related Work

• Jedi Trainer
  – Lostvectors.com
  – 2005

• A Dose of Reality: Overcoming Usability Challenges in VR Head-Mounted Displays
  – McGill, Boland, Murray-Smith, Brewster

• Sixsense STEM Controller Demo @ GDC 2015
  – Sixsense
  – 2015

• Monster Shroud
  – Choi, Malia, Pleshakov, Garncarz, Vu, Kosowski, Estes
Jedi Trainer 2.3

Use your sword to deflect enemy lasers into floating orb droids. Avoid having the lasers hit your handle and see how long you can last! Use practice mode to configure what types of enemies you want to fight against and how quickly they respawn.
A Dose Of Reality

McGill, Boland, Murray-Smith, Brewster, CHI 15
STEM Controller Demo
Monster Shroud
Methods and Techniques

- Engine / Framework: Unity Engine
- Output Device: Oculus Rift Headset
- Input Devices: Wii Motion Plus and Kinect optionally
- Sounds: Selfmade or partially from Sound Libraries
- 3D Assets: Created by our own and also 3D Libraries (Stormtroopers?)
- Libraries: UniWii maybe for connecting the Wii Devices
- Tools: Github for Code Hosting / Freedcamp for Project Management
- The whole setup could be published as public github repo for people who want to build successors
- Interaction Paradigm: Virtual Reality
- Two Algorithmic Questions: Random Fight Behaviour of the Ball and Reflecting Rays from Troopers
Methods and Techniques
Thank you!

Questions?
Prasanth Korada {korada@kth.se}
Viktor Leandersson {vlea@kth.se}

Stefan Seibert {sseibert@kth.se}
http://nada.kth.se/~aerholt/yedi-academy/
Group Members

• Prasanth Korada
  – Major in Electronics from India and presently pursuing my Masters in System Control and Robotics
  – I want to make a cool blend of Robotics and Gaming to make a complete experience.
  – I am presently working as an International Student blogger for KTH (www.kth.se/blogs/prasanth)
  – Oh wait, I am also an Art freak!
Group Members

• Anton Erholt
  – Computer Science student from KTH, took a semester abroad in France last year
  – Pursuing a Master’s degree in Computer Science, expected completion: June 2016
  – I am going to be a kind hacker when I grow up.
Group Members

• Stefan Seibert
  – Exchange Student from Stuttgart, Germany
  – Bachelor Thesis March 2015 about editing virtual objects in a film environment directly on set.
  – Therefore focus on: computer graphic and computer vision
  – Doing a Master in Computer Science and Media, expected to graduate in 2017
  – Would like to work in R&D
  – www.stefanseibert.com
Group Members

- Robin Palmberg
  - Media Technology student from KTH
  - Taking the
  - I would like to work with using media technology as a way of helping people in need in their everyday life
Individual Contributions

• Prasanth Korada will do
  – Modelling and lighting art
  – Motion capture of the player
• Viktor Leandersson will do
  – Gameplay and graphics help
  – Help with the HCI environment
• Anton Erholt will do
  – Networking and system administration
  – Web page(s), since I <3 JS

• Robin Palmberg will do
  – HCI-programming, getting the Wii remotes and Kinect to work as planned
  – Help with modelling
• Stefan Seibert will do
  – CG Programming
  – Rendering / Game Loop / etc.
  – Try to help where he can
Comments and Suggestions

• Make use of muscle-propelled force feedback to interact better with the virtual sword

Blindfold the user in some way to “feel” where the rays are shooting at him.

Change project name to something like “padawan 101”, to avoid fight with Disney Lawyers.

Use maybe GEAR VR or some other mobile phone based system to be wireless.

Keep the time in mind and where you can come towards.
Comments to Proposal

1. I really like the ideas in your proposal and want to see the realized.

2. Prioritize and focus.

3. The force may be muscle-activated force feedback. That will make me sooooo happy! Can you read the paper and replicate it? I can contact the authors if that may help.

4. Focus on the graphics special effects FX as well. Lasers, floating balls, flashing and exploding light sabers, etc!

5. If you can, but a toy light saber.

6. Padawan 101 will not get you off the hook from Disney lawyers, but at least there is only fan fiction using that name, not an actual existing game!

7. Great work!
Grading proposal

- Well rehearsed
  - FINISHES ON TIME
- Technically clear
- Related work is state of the art in graphics and interaction
- Clear individual contributions
Questions?