Advanced Graphics and Interaction 2015: Lecture 4
Project 1 Proposals

KTH VETENSKAP OCH KONST

VICSTHLM
VISUALISATION INTERACTION COLLABORATION

AGI15 Calendar: link

- Mon 31 aug 15:00-17:00 — Lecture 1 – Introduction
- Tue 1 sep 13:00-17:00 — Lecture 2-3: Forming Groups and Brainstorming
- Mon 7 sep 15:00-17:00 — Lecture 4: Proposals
- Thu 10 sep 10:00-12:00 — Lecture 5: Discussion based on Proposals
- Mon 14 sep 15:00-17:00 — Lecture 6: Hello World Demos
- Thu 17 sep 10:00-12:00 — Lecture 7: Discussion based on the Hello World Demos
- Tue 22 sep 10:00-12:00 — Lecture 8: Preparing ForskarFredag 2015
- Fri 25 sep 8:00-16:00 — ForskarFredag
- Mon 28 sep 15:00-17:00 — Lecture 9: Reflecting on ForskarFredag
- Mon 5 oct 15:00-17:00 — Lecture 10: Agile Development 1 towards Comic Con - Gamex 2015
- Mon 12 oct 15:00-17:00 — Lecture 11: Agile Development 2 towards Comic Con - Gamex 2015
- Fri 30 oct 9:00 – Sun 1 Nov 16:00 — Comic Con Gamex
- Mon 2 nov 15:00-17:00 — Lecture 12: Reflecting on Comic Con Gamex
- Tue 3 nov 13:00-17:00 — Lecture 13-14: Forming new groups and brainstorming project 2
- Tue 10 nov 10:00-12:00 — Lecture 15: Proposals Project 2
- Tue 17 nov 10:00-12:00 — Lecture 16: Hello World Demos for Project 2
- Tue 24 nov 10:00-12:00 — Lecture 17: Agile Development 1 for Open House
- Tue 1 dec 10:00-12:00 — Lecture 18: Agile Development 2 for Open House
- Fri 4 dec 15:00-19:00 — VIC AGI15 Open House

Group 1

Students

- Rasmus
- Erik
- Erik
- Simon
- Johan

Project idea

- Blopper
  - Balloon popper

Proposal for Project 1 Title

Erik Dahlström
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Simon Fransson
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Johan Huusmann
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N/A

Erik Dackelid
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N/A

Rasmus Ansin

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Blopper

Motivation

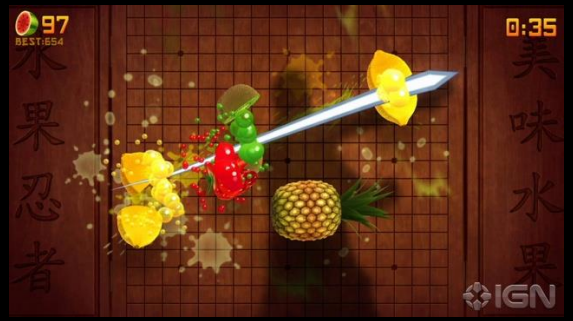
- The Oculus/VR is state of the art in gaming
- Combining all our different technologies will be a fun challenge
- Seeing how people interact and cope with a 360 degree VR game is interesting
- Popping balloons is extremely fun

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

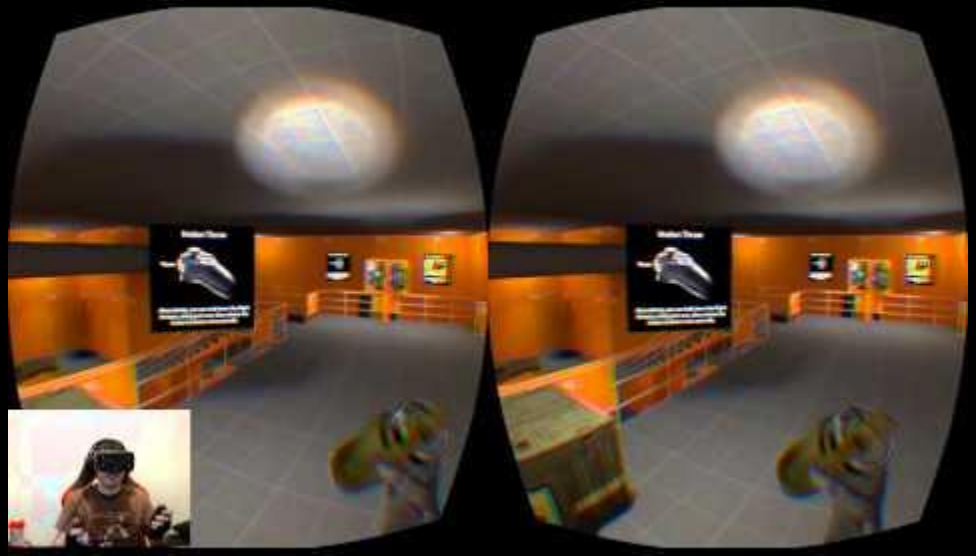
Related Work (maybe a Table?)

- 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?

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Rasmus Ansin
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Johan Huusmann
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Erik Dackelid Johansson
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Teacher:
Mario Romero
marior@kth.se

Comments on Blopper

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

Group 2

Student

- Douglas
- Emilie
- Mårten
- Adrian
- Victor

Idea (merged from both groups)

- Teamtris

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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

Make a game that helps people

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

Everybody knows Tetris !

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

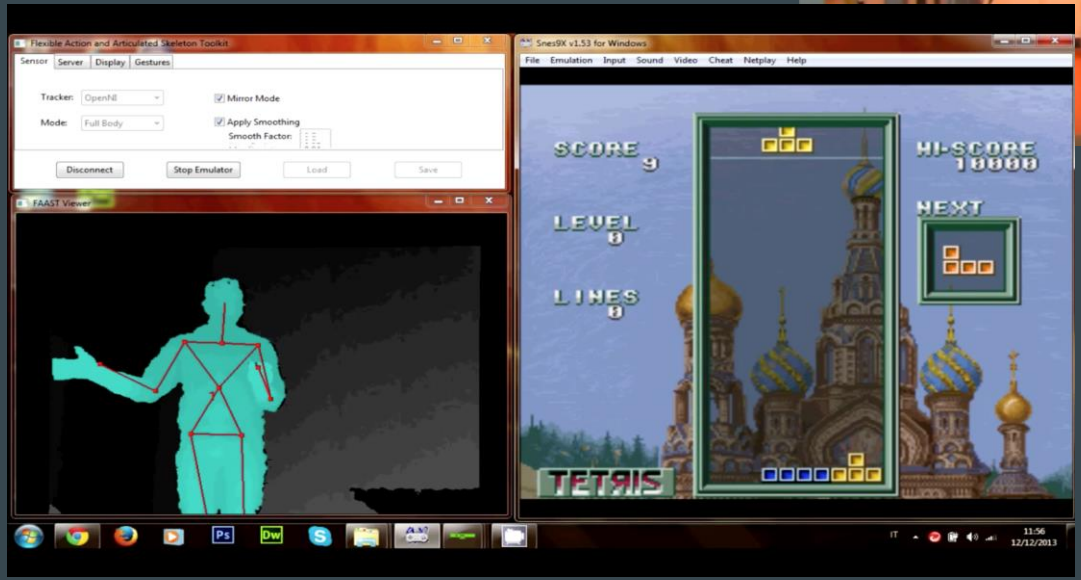
Tetris with Kinect (2011) - University of Twente

Lumines (2004) - Q Entertainment

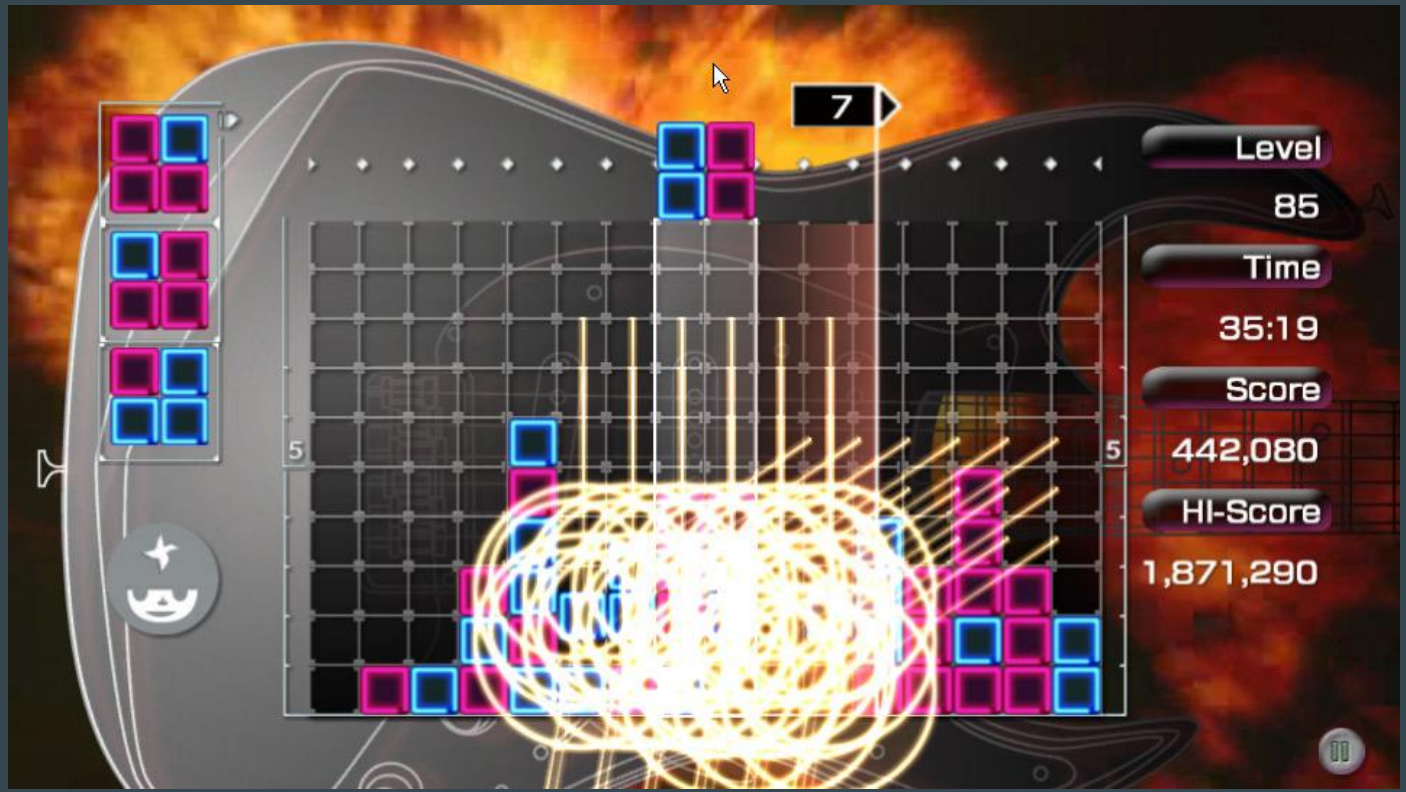
2Pacs


COMBO 4X
EMP Ready
TIME LEFT: 69
COMBO 4X
EMP Ready
TIME LEFT: 69

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

Unity & C#

Either Wii-motes or physical touch-based devices based on availability

Custom hand controller HW interfaced to Unity.

Compatibility and drivers will be important

Graphics - Shaders

Many shader possibilities for eye-candy

- Noise
- Scanlines
- Distortion
- Fading
- Bloom
- Pixel displacement

Games + Retro + The 80s = ❤

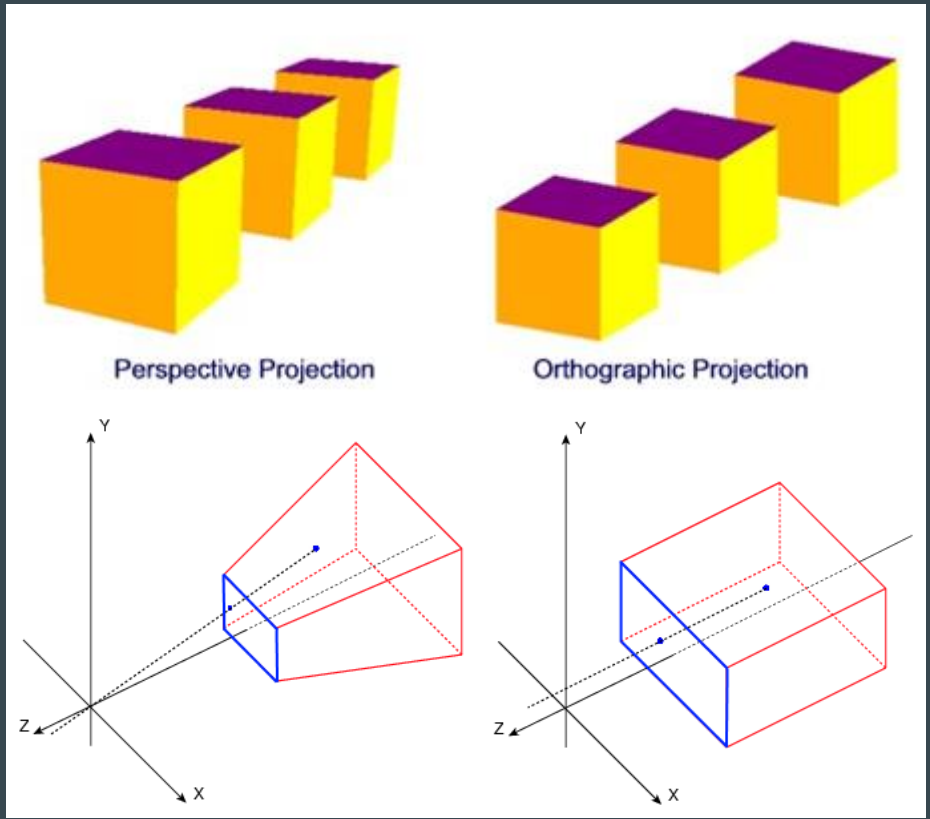
Graphics - Projection

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

1. I like the asymetric collaborative game aspect.
2. 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.
3. I like the retro idea throgh shaders.
4. Have you thought about different views/capabilities for different players?
5. Be careful with developing your own hardware. Is it robust, physically and programmatically?
6. Great work!

Group 3

Students

- Johan
- Niclas
- Daniel
- Johan
- Anton

Project idea

- Multiplayer AR game

Augmented Reality

MULTIPLAYER GAMING

Team members

Niclas Ericsson
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Daniel Lindström
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Anton Eldh
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Johan Kasperi
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Johan Kitti
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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


Augmented Reality
Multiplayer gaming

Comments for Group 3

1. You need a name
2. I really like your idea of smartphones for AR
3. You need to improve your literature review
4. Start with AR at Georgia Tech with stuff like the zombie game I showed in class – arhrrrr
5. 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!
6. The multiplayer aspect of your project is peripheral, but if you can get it to work quickly, it will make a huge difference
7. 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?
8. You need to think more about the graphics in your game. Think about special effects, for example, FX.
9. Great work!

Group 4

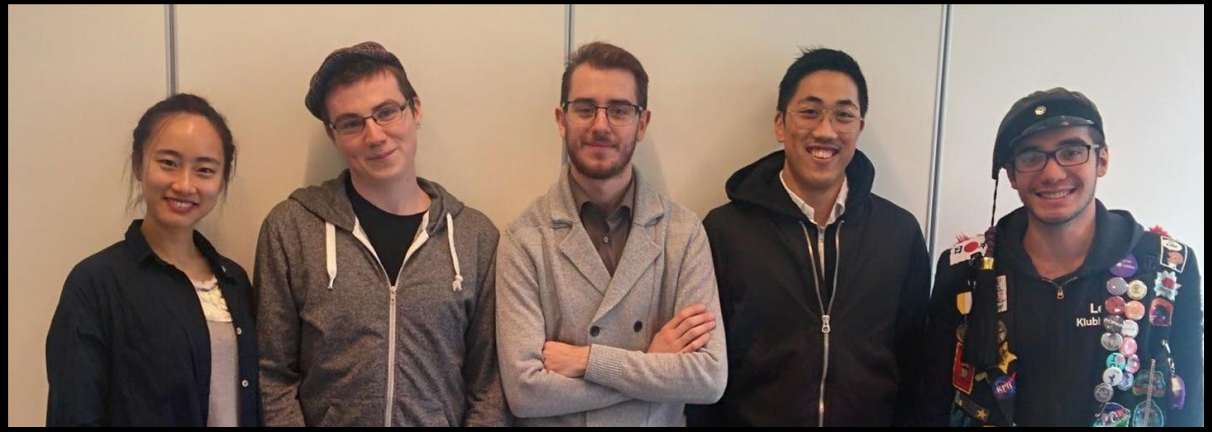
Students

- Viktor
- Vincent
- Lennart
- Huiting
- Mikael

Project idea

- Virtual reality fighting game
- Sandbox turns into real-time strategy game

Proposal for **Mad**Sand



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Mikael mikaele3@kth.se

Viktor valderin@kth.se

Vincent vwong@kth.se

Lennart lenjons@kth.se

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MadSand

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

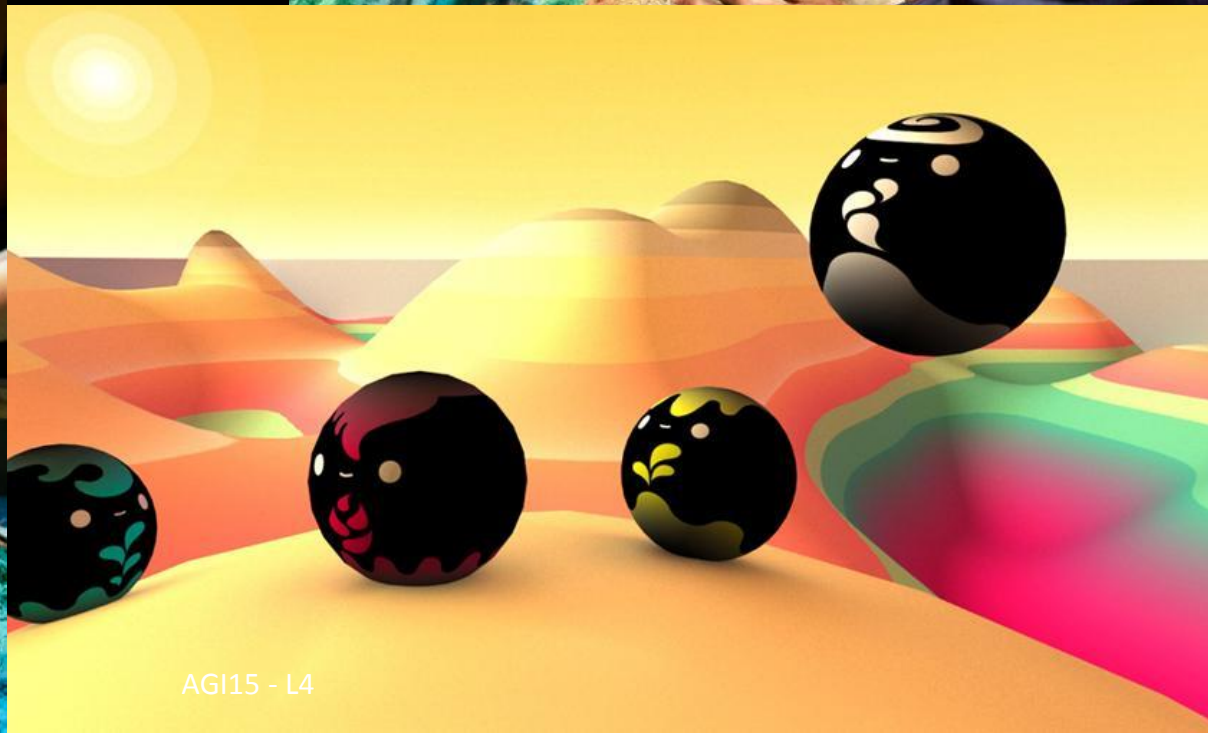
Related Work

- Augmented Reality Sandbox
  - Oliver Kreylos (2015)
  - http://idav.ucdavis.edu/~okreylos/ResDev/SARndbox/

- Project Mimicry
  - developed by Monobando (2011)
  - http://mimicry.monobanda.nl/
- Animal Crossing - Sweet day from Nintendo Land
  - Nintendo
  - released 30 november 2012 (EU)

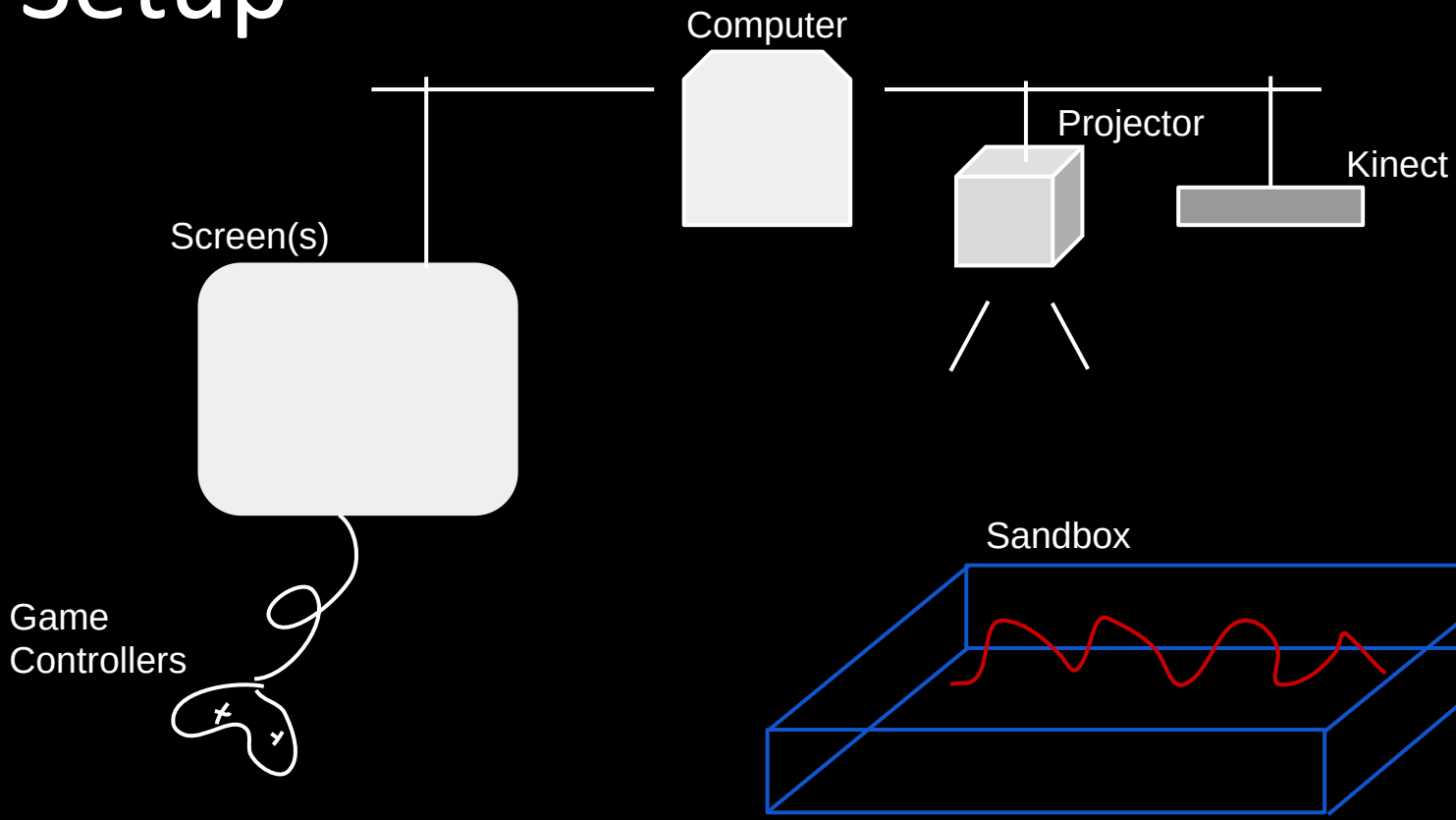
Augmented Reality Sandbox

Project Mimicry



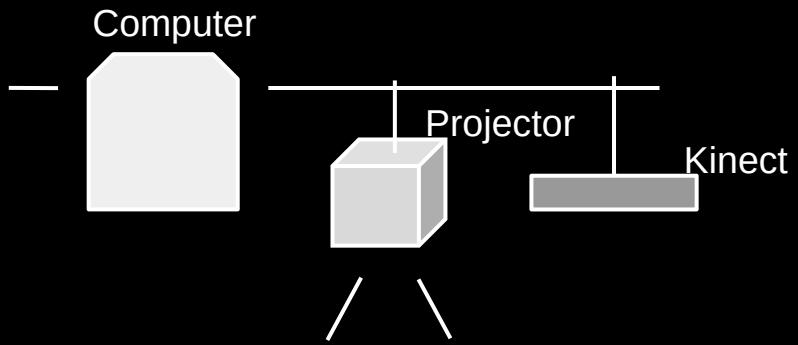

1 Toss
2 Pick up
Candy: 41 to go
1 Toss
2 Pick up
1 Toss
2 Pick up
ZR Tackle
39
X
Y
A
B
START
SELECT
Animal Crossing
SWEET DAYS
Eat and Run

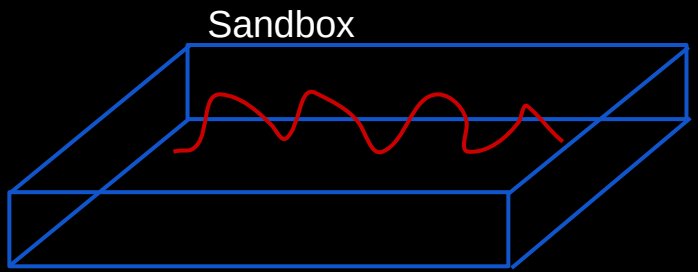
Setup


Computer
Projector
Kinect
Screen(s)
Game
Controllers
Sandbox

Method

Augmented reality: projection on the sand





> Game state projected onto the sand

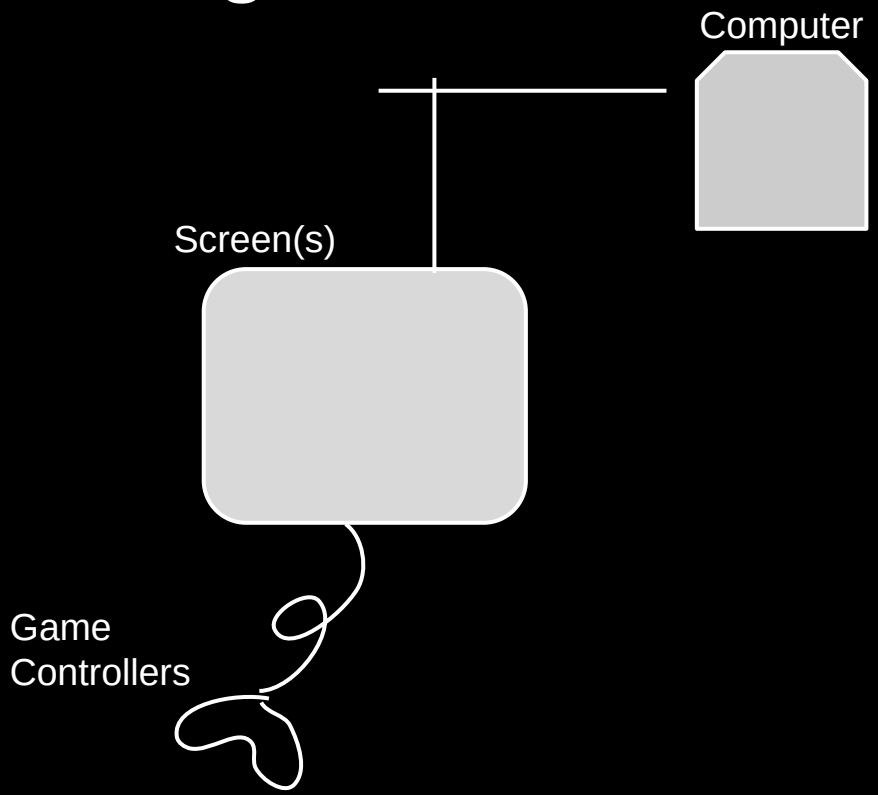
> Computer vision: depth map from Kinect

Method

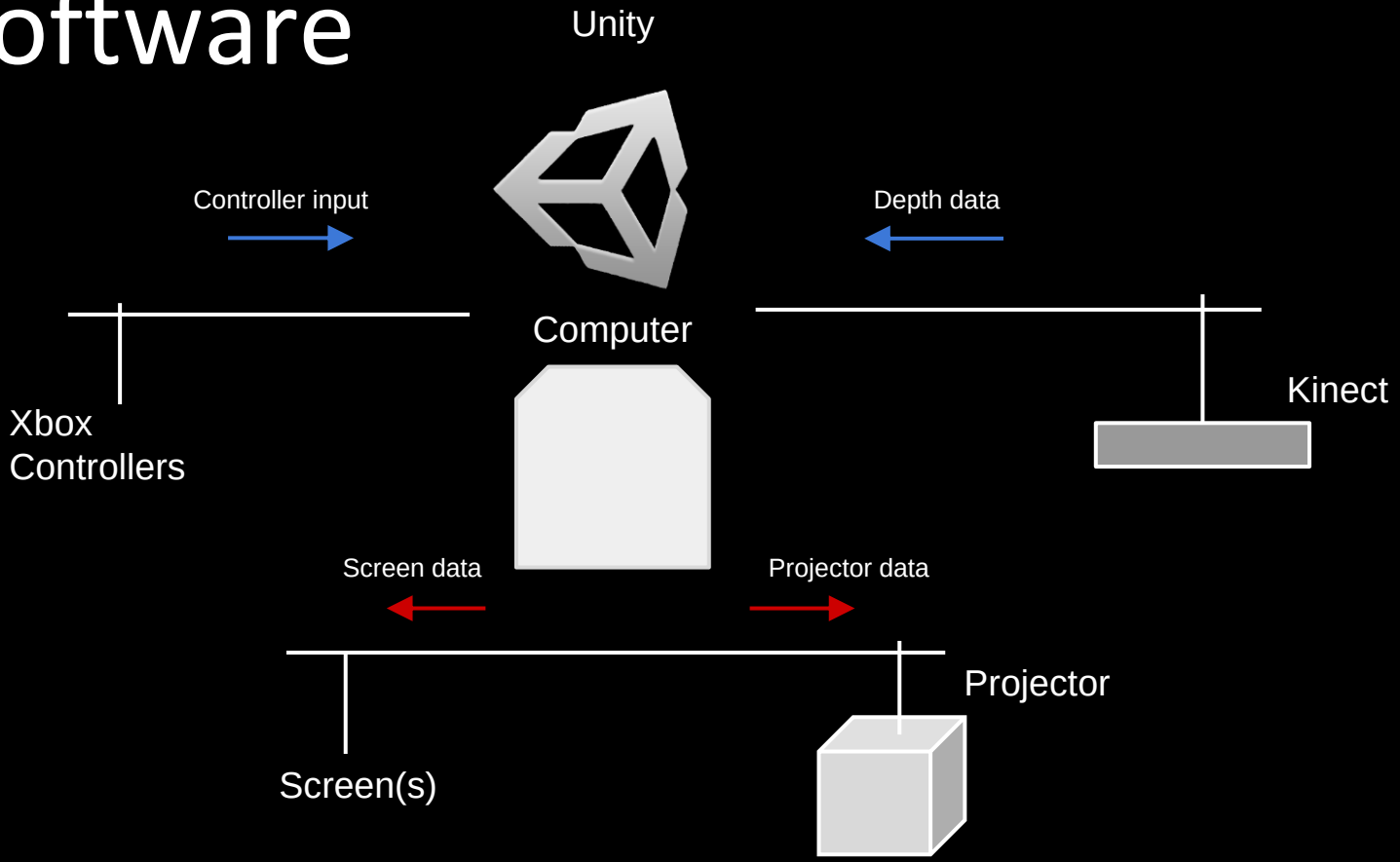
Procedural generation: digital world

> Digital world procedurally generated based on the sandbox

> Game physics: gravity, speed, acceleration



Software


Unity
Controller input
Depth data
Computer
Xbox
Controllers
Kinect
Screen data
Projector data
Projector
Screen(s)

Thank you!

Questions?

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Viktor valderin@kth.se
Vincent vwong@kth.se
Lennart lenjons@kth.se

Teacher: Mario marior@kth.se

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?


Proposal for MadSand
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Lennart
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Comments on Proposal

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 balnancing 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!

Group 5

Students

- Maxime
- Max
- Robert
- Omid

Project idea

- Oculus rift
- Wii remote
- Space shooter

Project proposal

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Maxime Hulliger
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Robert Amino
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CAPSULE
-LIFE-

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 !

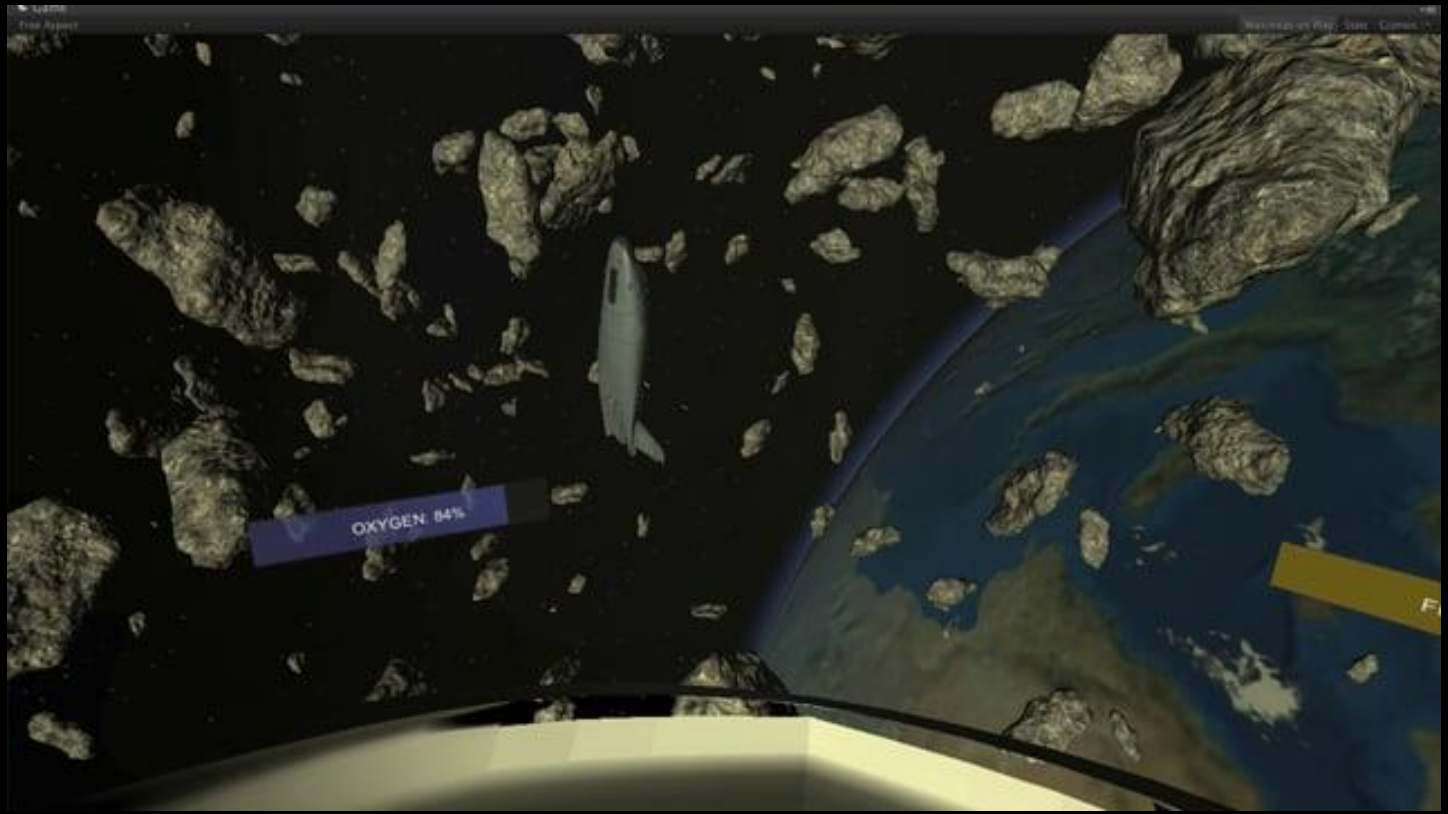
Goals and Challenges

- 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/Tt0sPxIqydg?t=1m29s

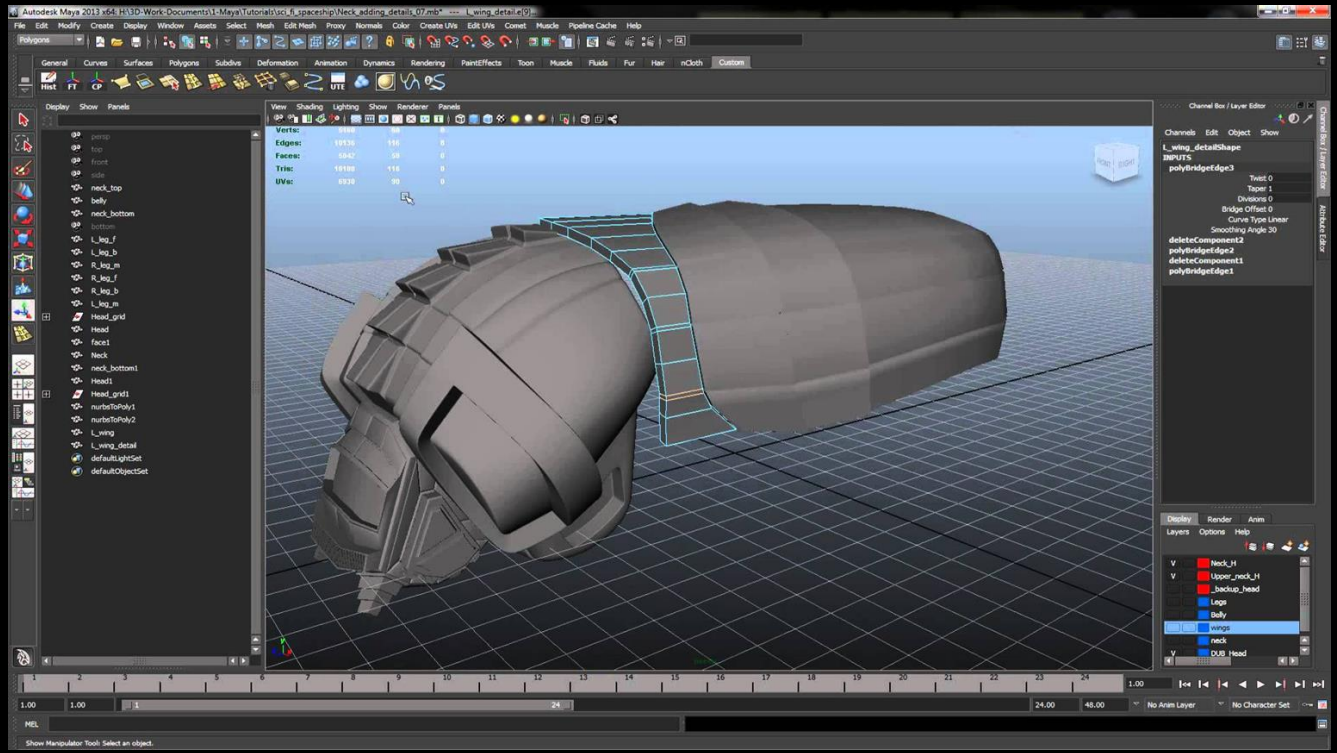
Methods and Techniques

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

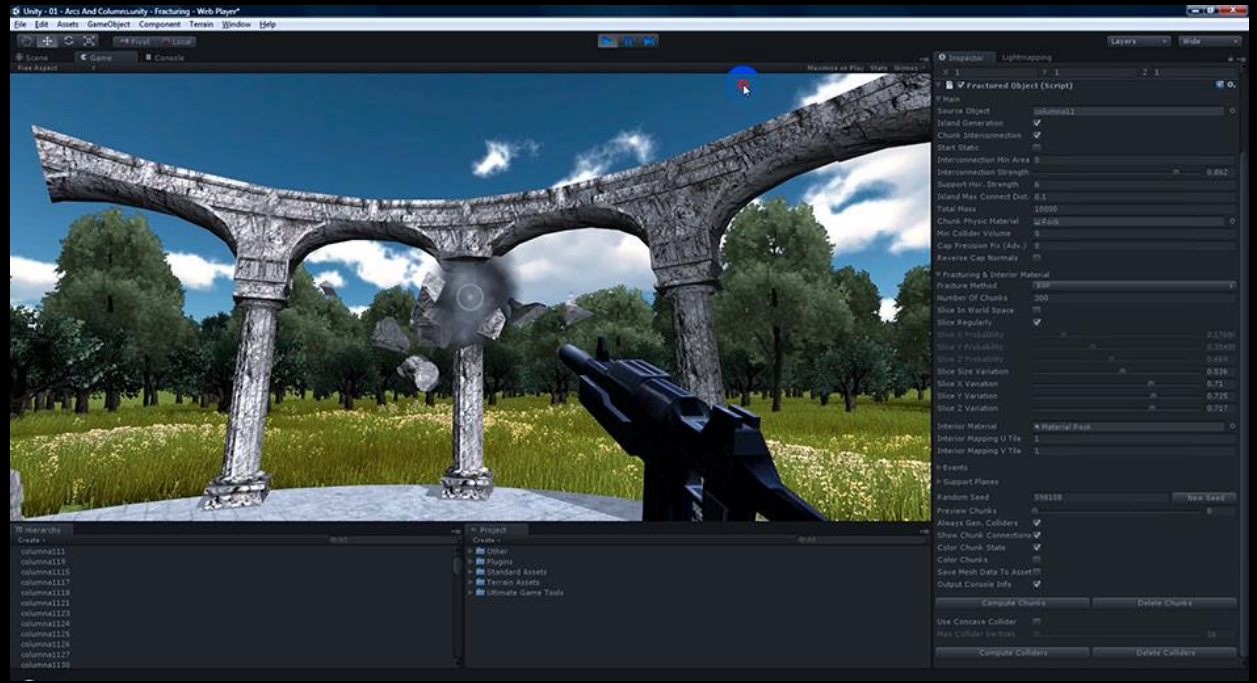
Wii remote and Nunchuk

Oculus Rift

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 samsung gear instread of Oculus Rift for more movment freedom.
- Hydra Razer instead of wii remote ?
- Weapon independant 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


Project proposal
Maxime Hulliger
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Robert Amino
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2015/09/07

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!

Group 6

Students

- Viktor
- Stefan
- Prasanth
- Robin
- Anton

Project idea

- Light saber


JEDI
ACADEMY

Proposal for “Jedi Academy”

Prasanth Korada
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Cool
Photo of
Student 2

Viktor Leandersson
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Cool
Photo of
Student 3

Robin Palmberg
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Anton Erholt
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Stefan Seibert
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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.

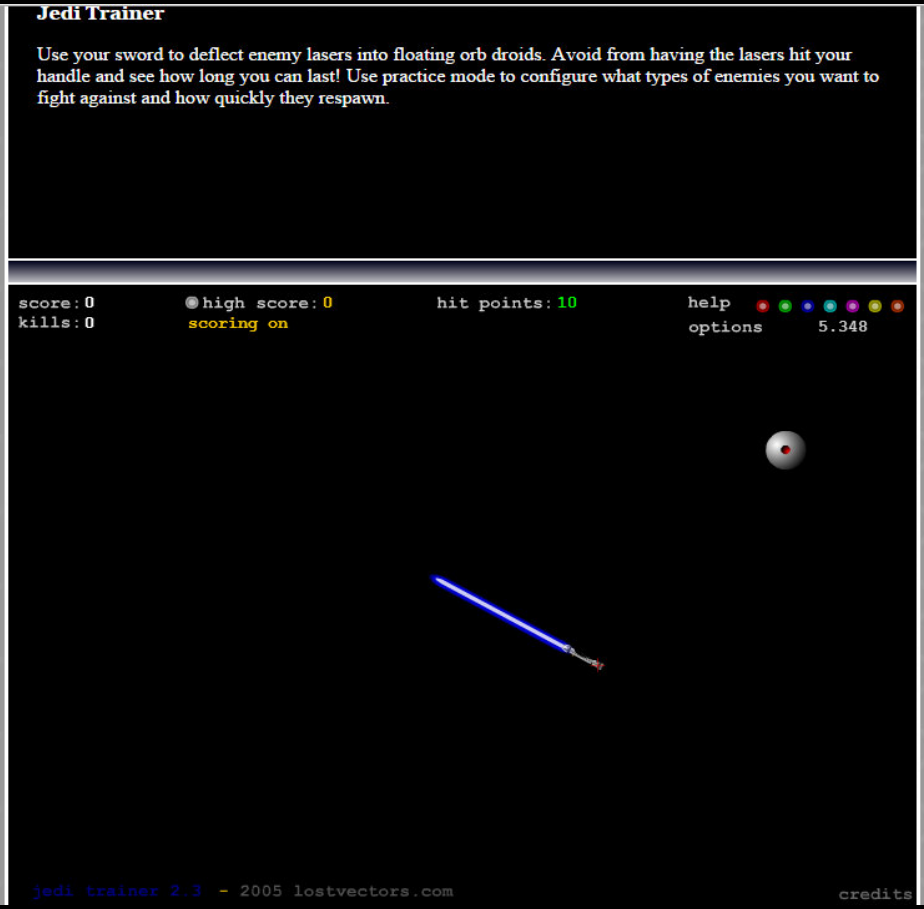
Goals and Challenges

- **Goals**
  - VR room with a laser sword that is moved by a 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

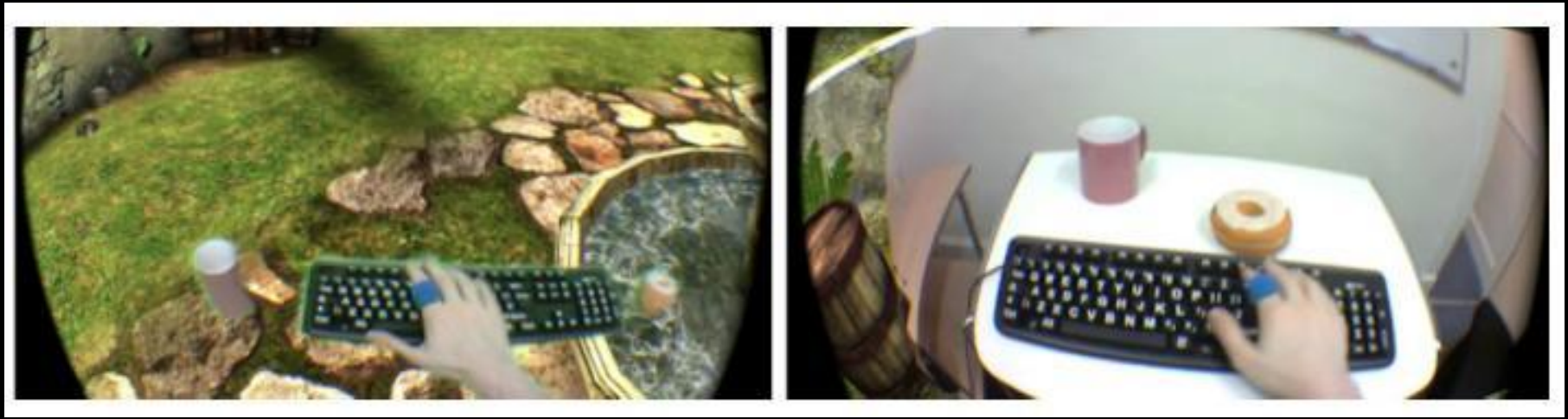
Related Work

- Jedi Trainer
  - Lostvectors.com
  - 2005
- A Dose of Reality: Overcoming Usability Challenges in VR Head-Mounted Displays
  - McGill, Boland, Murray-Smith, Brewster
  - 2015, CHI'15, Proceedings of the 33rd Annual Conference on Human Factors in Computing Systems
- Sixsense STEM Controller Demo @ GDC 2015
  - Sixsense
  - 2015
- Monster Shroud
  - Choi, Malia, Pleshakov, Garncarz, Vu, Kosowski, Estes

Jedi Trainer 2.3

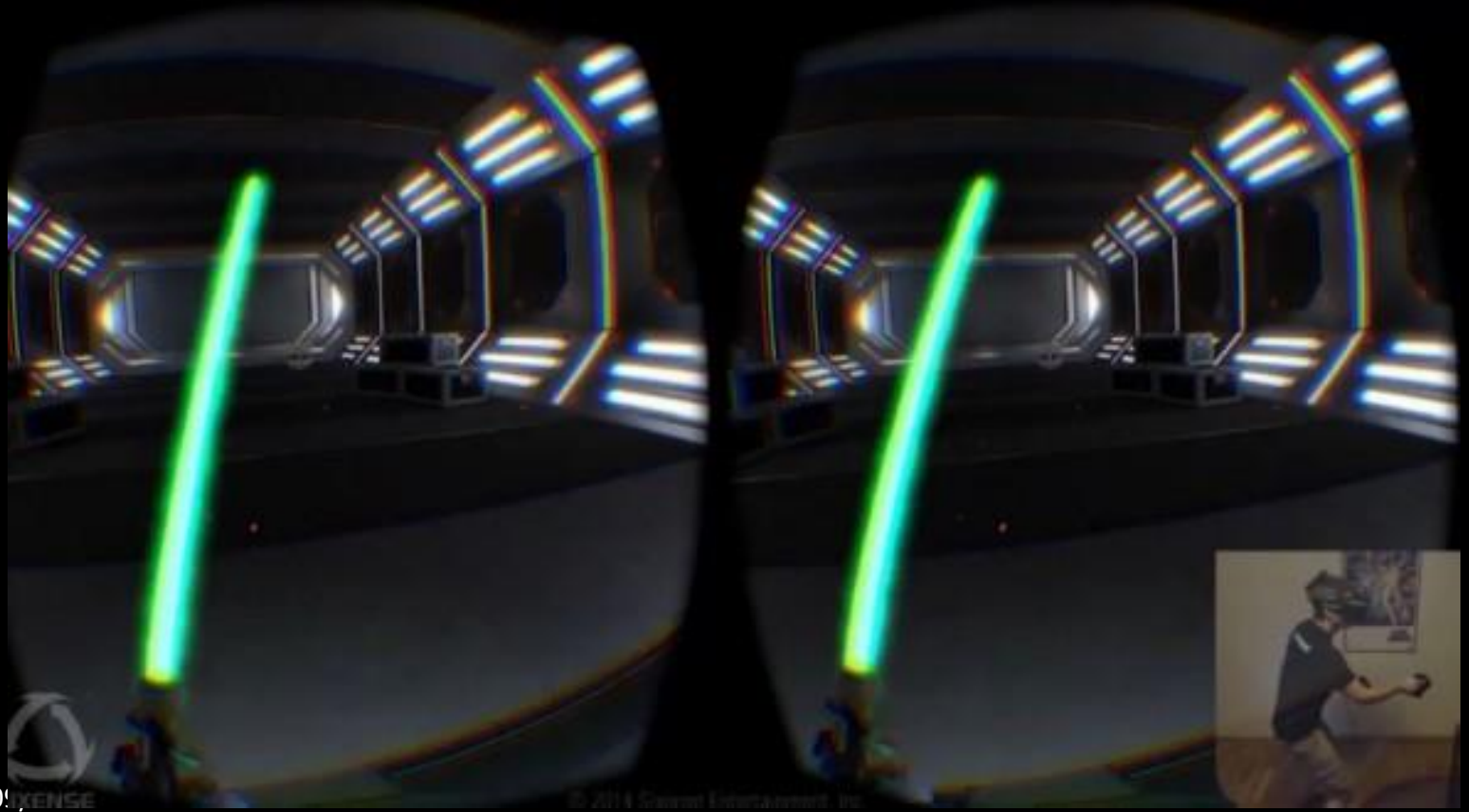


A Dose Of Reality



McGill, Boland, Murray-Smith, Brewster, CHI 15

STEM Controller Demo

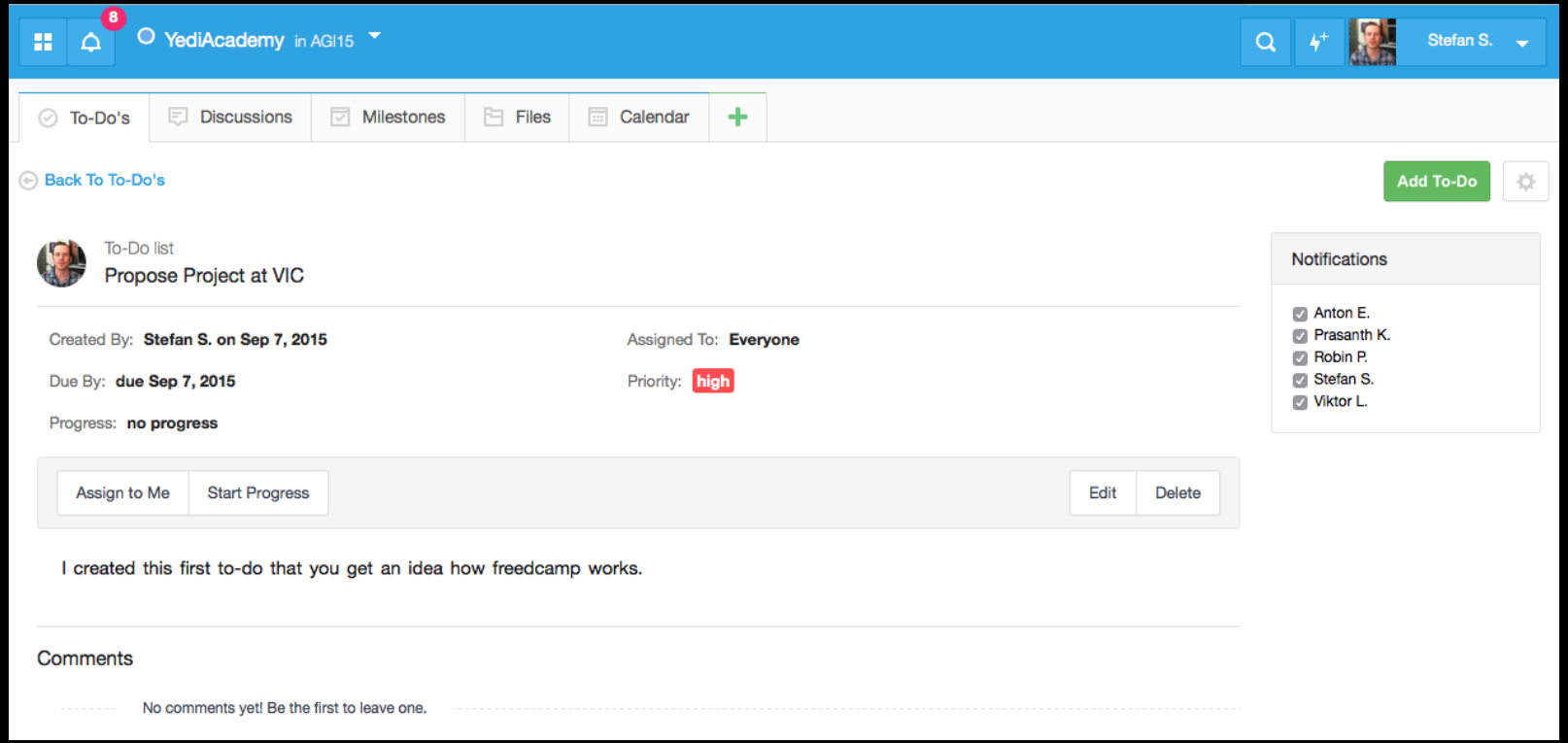


Monster Shroud

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?)
- Libaries: 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



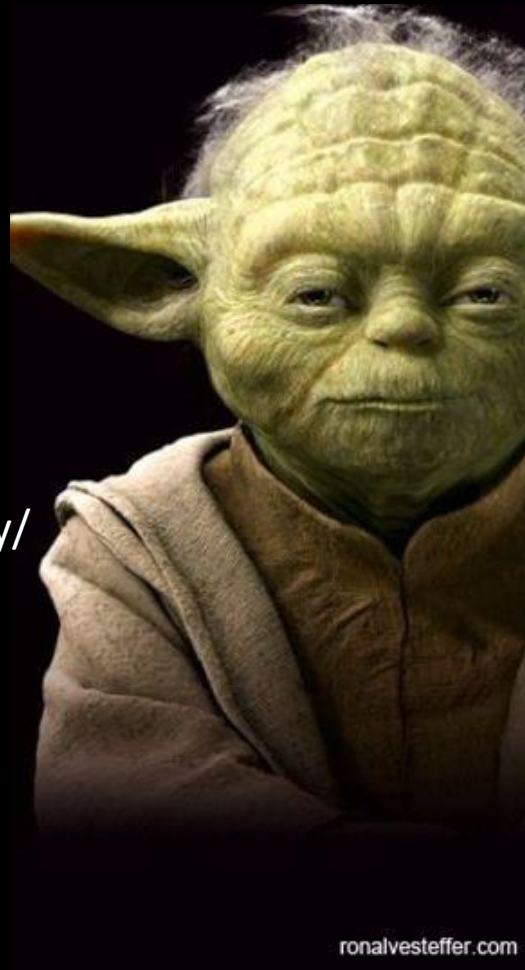
Thank you!

Questions?

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

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

"NO!
Try not!
DO or DO NOT,
There is no try."



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

- will do
  - Modelling and lighting art
  - Motion capture of the player
- will do
  - Gameplay and graphics help
  - Help with the HCI environment
- 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 soooooo 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!


Proposal for "Jedi Academy"
Anton Erholt
aerholt@kth.se
Stefan Seibert
sseibert@kth.se
Advanced Graphics and Interaction
AGI15
2015/09/07

Coming up!

- Hello World! demos next Monday

Thank you!
Questions

marior@kth.se

Advanced Graphics and Interaction

- High-Quality Ambient Occlusion
- Volumetric Light Scattering
- Shadow Maps
- Multi-Texturing Techniques
- Cloth simulation
- Soft Bodies
- Fluids
- Smoke
- Rigged body animation
- Rigid Body simulation
- Multiple specular reflections and refractions
- Shading techniques
- N-body simulation
- Generating Complex Procedural Terrains
- Animated Crowd Rendering
- Collision detection
- Hair
- Snow
- Clouds
- Geometric texturing
- Voxels - texturing - modeling - animation
- Octree rendering
- Volumetric shadows
- GPU Ray Tracing of large scenes with shadows, reflections and ambient occlusion
- ...

- Virtual Reality
- Augmented Reality
- See-through HUDs
- Embodiment
- Kinect
- Wii motes
- Multi platforms
- 4k screen - touch
- Haptics
- Mobile interaction
- 3D printing
- Microsoft surface
- Pixelsense
- Touch screens
- Gestures
- Accelerometers
- On-body sensing
- Sonification
- ...