

# Advanced Graphics and Interaction 2014: Lecture 4



AGI14 Students @ VIC

Mario Romero  
2014/09/10



**VICSTHLM**  
VISUALISATION INTERACTION COLLABORATION

# Course Schedule

|                               |                        |                                                 |
|-------------------------------|------------------------|-------------------------------------------------|
| • Wed Sept 03 13-15           | Lecture 1              | Intro                                           |
| • Fri Sept 05 15-19           | Lectures 2-3           | Group Formation                                 |
| • Wed Sept 10 13-15           | Lecture 4              | Proposals                                       |
| • Thu Sept 11 10-12           | Lecture 5              | Feedback on proposals                           |
| • Mon Sept 15 8-10            | Lecture 6              | Hello World! Demos                              |
| • Thu Sept 18 10-12           | Lecture 7              | ForskarFredag Preparation                       |
| • Wed Sept 24 14-16           | Lecture 8              | Demo Day!!!                                     |
| • Thu Sept 25 16-20           | Debaser Invasion       | Setup 16:00 – 20:00                             |
| • Fri Sept 26 8-18            | Debaser Domination     | ForskarFredag 2014!!!                           |
| • Mon Sept 29 8-10            | Lecture 9              | Reflections of ForskarFredag                    |
| • Wed Oct 8 13-15             | Lecture 10             | Agile Development → ComiCon                     |
| • Mon Oct 13 8-10             | Lecture 11             | Agile Development 2                             |
| • Wed Oct 15 13-15            | Lecture 12             | Agile Development 3                             |
| • Wed Oct 29 16-23            | Kistamässan Invasion   | Setup 16:00 – 23:59                             |
| • Thu Oct 30 – Sun Nov 2 9-19 | Kistamässan Domination | COMICON 2014!!!                                 |
| • Tue Nov 4 10-12             | Lecture 13             | Reflections on ComiCon                          |
| • Wed Nov 5 10-12             | Lecture 14             | New groups                                      |
| • Fri Nov 7 15-19             | Lectures 15-16         | Epson Moverio Workshop                          |
| • Tue Nov 11 10-12            | Lecture 17             | Proposals                                       |
| • Tue Nov 18 10-12            | Lecture 18             | Feedback on proposals. Early hello world dem os |
| • Tue Nov 25 10-12            | Lecture 19             | Hello world !demos                              |
| • Tue Dec 2 10-12             | Lecture 20             | Demo Day!!!                                     |
| • Thu Dec 4 15-18             | VIC Invasion           | Prepare Open House                              |
| • Fri Dec 5 15-19             | Open House             | AGI14-VIC Open House                            |

# Agenda

- Format (starting at 13:15 sharp)
  - Presentation (10 minutes) - [Template Slides](#).
  - Discussion (10 minutes)
  - Context Switch (1 minute)
- 1. Michelangelo (13:19 - 13:40)
  - Stefan
  - Johan B.
  - Oscar
- 2. Leonardo (13:40 - 14:00)
  - Carl
  - Anton
  - Johan S.
- Break
- 3. Donatello (14:15 - 14:35)
  - Søren
  - Philip
  - Daniel
  - Axel
- 4. Megatron (14:36 - 14:56)
  - Christoffer
  - Mattias
  - Ludwig
  - Linnea
- Next Lecture (14:57 - 15:00)
  - [Assignment 2](#)

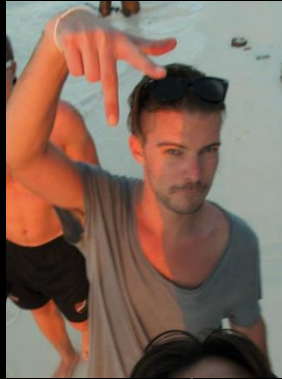
# Michelangelo

- Stefan
- Johan B
- Oscar

# Space Survival



Stefan Etoh  
etoh@kth.se



Oscar Friberg  
ofri@kth.se



Johan Bäckman  
johba@kth.se

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# Space Survival



# Motivation

- Further development opportunities
- Challenge to combine multiple interactive devices
- Cool immersive experience
- Experience outer space!
- Save dollars and make space training easier and better
- Space is fun.

# Goals and Challenges

- Avatar arms corresponding to physical movements
- Achieving realistic physics
- Believable graphics & an immersive world



# Related Work

| Title                                                                          | Author                        | Year | Published in                                  |
|--------------------------------------------------------------------------------|-------------------------------|------|-----------------------------------------------|
| Virtual Reality:<br>Avatars in human<br>spaceflight training                   | Osterlund, J.<br>Lawrence, B. | 2011 | Acta Astronautica<br>71 (2012) 139-150        |
| Creating Next-Gen<br>3D Interactive Apps<br>With Motion<br>Control in Unity 3D | Plemmons, D. Holz,<br>D.      | 2014 | SIGGRAPH 2014<br>Workshop                     |
| VR Simulation<br>System for EVA<br>Astronaut Training                          | Liu, Yuqing. et. al.          | 2010 | AIAA SPACE 2010<br>Conference &<br>Exposition |

# Control VR (Control VR)

- <https://www.youtube.com/watch?v=KkPjLBxYqoQ&feature=youtu.be&t=1m10s>

# Spacewalk (Richard Emms)

- <https://www.youtube.com/watch?v=bg7Sm6fF8vg>

# Chilling Space (RiftAway)

- <https://www.youtube.com/watch?v=vvd9HwZfl6U>

# Methods and Techniques

- Wii Remotes and Nunchucks – UniWii-plugin
- Oculus Rift
- Blender
- Unity 3D (C#)

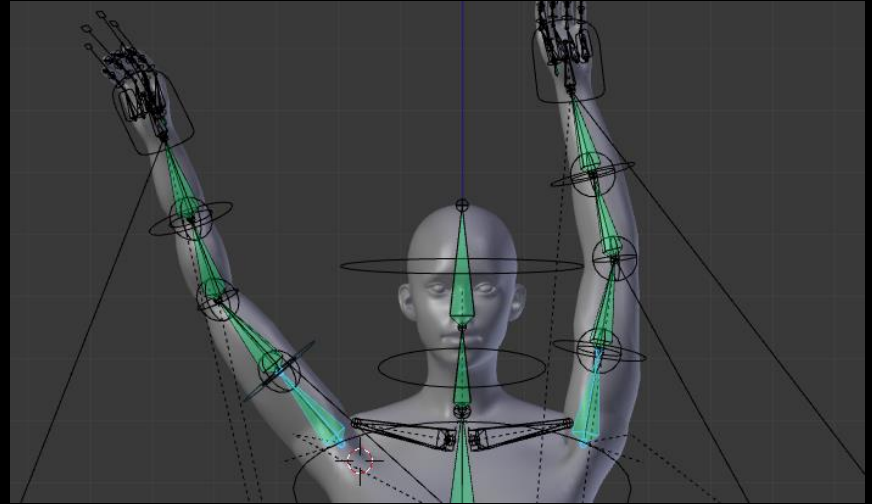
# Wii Remotes & Nunchucks



# Oculus Rift



# Blender





# Unity



# Thank you!

## Questions?

Stefan Etoh, IMT {[etoh@kth.se](mailto:etoh@kth.se)}

Oscar Friberg, IMT {[ofri@kth.se](mailto:ofri@kth.se)}

Johan Bäckman, IMT {[johba@kth.se](mailto:johba@kth.se)}

Mario Romero {[marior@kth.se](mailto:marior@kth.se)}

# FEEDBACK TO SPACE SURVIVAL

# SPACE SURVIVAL

UNITY PRO LICENSE - NEED IT? YES | OCCURS  
PLUG INS

FOCUS: 1. INTERACTION |  
2. GRAPHICS | IMMERSIVE

TURN? MOVE? (SPACE) PUSH?

TRAINING? EXPERIENCE . (OWN RULES)

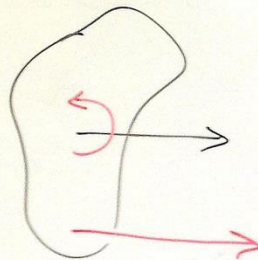
JET PACK?

→ SPACE PHYSICS ARE ODD!!

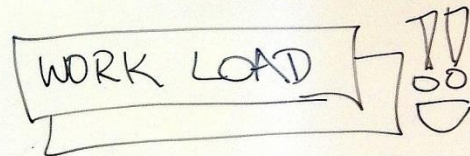
WILL ROCKS MOVE?

SPIN? ANGULAR MOMENTUM?

IN ROOM w/  $\phi G$ ? WHAT IS THE SETTING?  
WALLS



## END STATE



OSCAR - UNITY

STEFAN |  
JOHAN

# Leonardo

- Carl
- Anton
- Johan S

# Project Proposal



Carl Ahrsjö  
ahrsjo@kth.se



Anton Warnhag  
awarnhag@kth.se



Johan Storvall  
johansto@kth.se

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# Dual Engine VR Racing



# Motivation

- Why is this project interesting?
- What do we want to learn by doing this project?
- Why does the world need this project and how does it make the world a better place?



# Goals and Challenges

- Goals
  - Immersive, first person view experience of VR racing at high speed
  - Rendering a huge world/track for racing around in/on
  - A fun steering method with two "engines" (NovInt Falcons) providing *useful* haptic feedback
  - Fire particle system
- Challenges
  - Real time rendering as you race through the world/track
  - Making the haptic feedback realistic and useful
  - To not burn out the motors of the Falcon as you get caught up in the game
  - Development support for the Falcon can be hard to find

# Related Work

- Interactive Racing Game with Graphic and Haptic Feedback
  - Sang-Youn Kim, Kyu-Young Kim
  - 2007
- Dust Storm
  - Tarandi, Nellåker, Bäckström
  - 2012
- Radial-G
  - Geoff Cullen
  - 2014

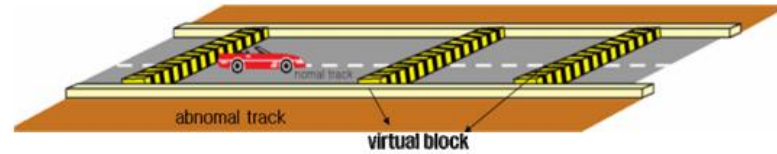
# Interactive Racing Game with Graphic and Haptic Feedback

$$V_T(L) = \sum_{n=1} h_n [u(L - p_n) - u(L - q_n)] \quad (1)$$

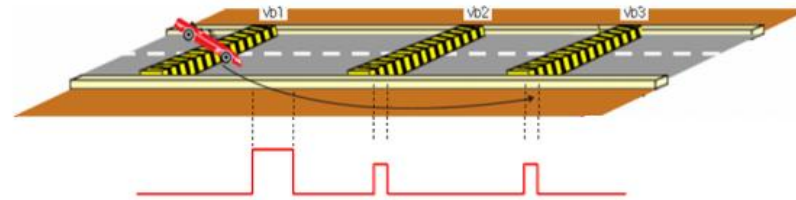
Where,

$u$  : a unit step function, and

$L$  : the distance from starting point to the current position of a car



(a)



(b)

# Dust Storm



# Radial-G



# Methods and Techniques

- General approach
- Oculus Rift and two NovInt Falcon (or Razer Hydra if not possible)
- NovInt SDK
- Connecting via FalconUnity
- Algorithms and Interaction

# Oculus Rift, NovInt Falcon, Razer Hydra



# NovInt SDK



- A Windows platform, C++ language
- Combine with Unity JavaScript (UnityScript)



# FalconUnity

- A library that allows for easy manipulation of Unity3D objects using a NovInt Falcon.
- Video: <http://www.screenr.com/baP7> for those who are interested

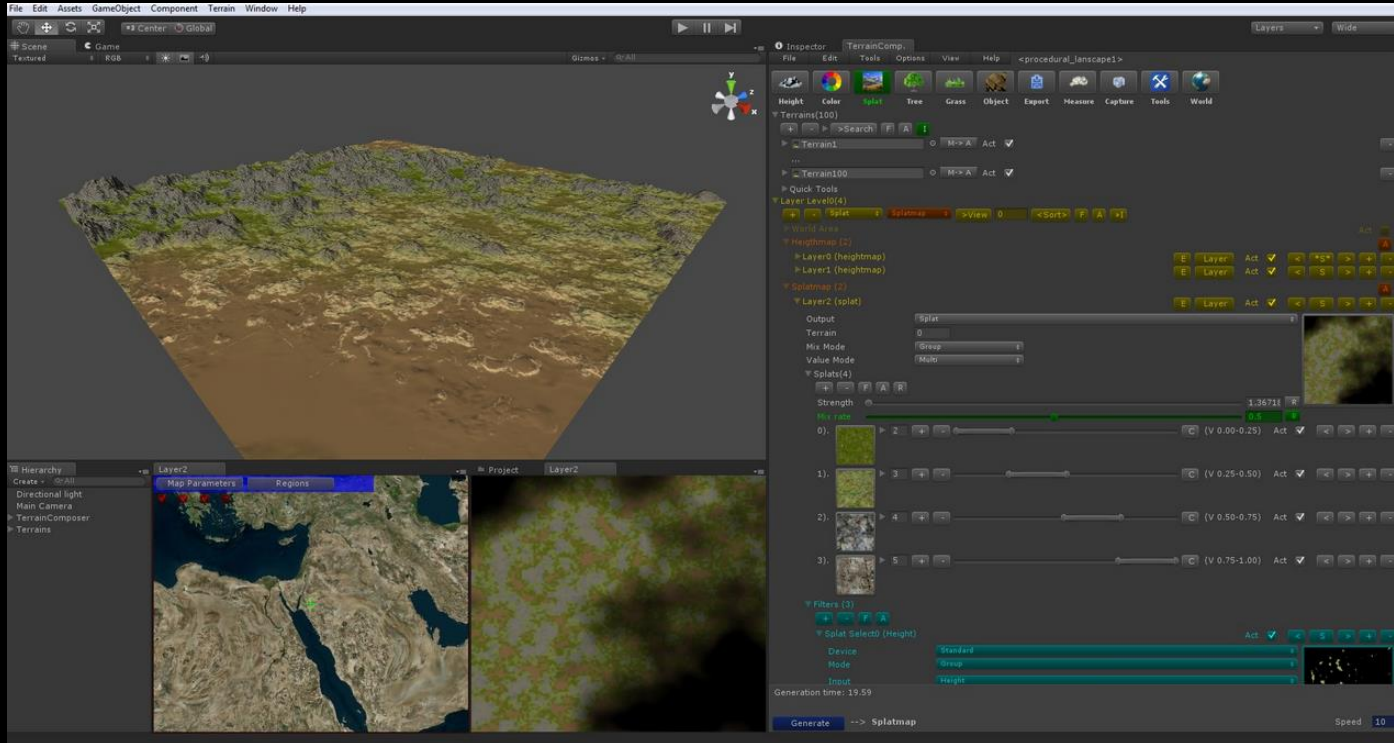
# Algorithms and Interaction

- Using existing algorithms to create a huge immersive world/track, i.e. Octree rendering (real time rendering)
- Applying existing interaction methods in a new way, using two NovInt Falcons at the same time

# Fire particle generator



# Unity's terrain engine



# Thank you!

## Questions?

Carl Ahrsjö {ahrsjo@kth.se}

Anton Warnhag {awarnhag@kth.se}

Johan Storvall {johansto@kth.se}

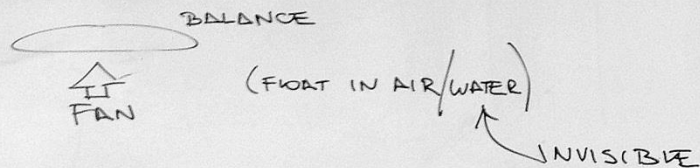
Teacher:

Mario Romero {marior@kth.se}

# FEEDBACK TO POD RACER

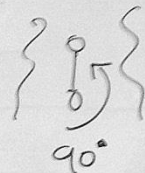
POD RAC

- FALCON (FORCE → BREAK)?
- HOVER VEHICLE BEHAVIOR?



- FORCE | INPUT/OUTPUT
- PRIORITY OF INTERACTION /  
- OCCURS / WHAT DO YOU LET GO OF FIRST?
- OPPONENTS | NOW TIMER / CHECKPOINT  
LATER. GAMIFY
- JONAS FORS...

ORIGINAL GAME?



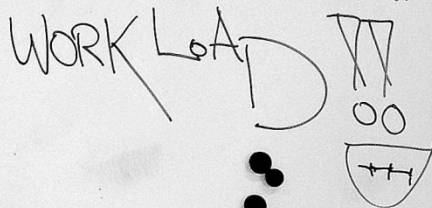
HAPTICS?  
VERY IMPORTANT

STIR WARS (NOT)

TIME OF TRACK DESIGN



② MODELING VEHICLE



# Donatello

- Søren
- Philip
- Daniel
- Axel





Axel  
axellew@kth.se



Philip  
phisko@kth.se



Daniel  
dmans@kth.se



Søren  
monobryn64@gmail.com

# YA3

ADVANCED GRAPHICS AND INTERACTION AGI 14

AG114  
9/12/2014

You Are a Tree

LEE



# General Goal

Make people smile!

# Challenge

- ▶ A seamless experience
- ▶ Low learning threshold
- ▶ No penalties

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9/12/2014

LEE



# Tech Goal

Procedural generation of trees,  
controlled with Kinect.

# Challenge

- ▶ Real-time
- ▶ Reliable gesture recognition
- ▶ **YOU** Are a Tree

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9/12/2014



# Personal Goal

Provide a testbed for learning more advanced computer graphics

## Challenge

- ▶ Robust, but simple(!), interaction
- ▶ Flexible, but not too manual/complex

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9/12/2014

LE11



# Tech

- ▶ Unity Pro
  - ▶ Boilerplate + Editor
  - ▶ Shaders
  - ▶ Animations
  - ▶ Sound
- ▶ Kinect SDK
  - ▶ v.1 or v.2

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9/12/2014

LE11



# Tech cont.

- ▶ Tree generation
  - ▶ L-system
  - ▶ Mesh generation
  - ▶ Rigging
  - ▶ Skinning
- ▶ Environment
  - ▶ Ground and sky
  - ▶ Camera
  - ▶ Time, day night cycle
  - ▶ Particles: dust, spores etc.
  - ▶ Wind
  - ▶ God rays

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9/12/2014



# Related

- ▶ TreeSketch

<http://vimeo.com/68195050>

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9/12/2014





AG114  
9/12/2014

Thank you

LEE

# L-Systems

- ▶ Fractals, all the way down!



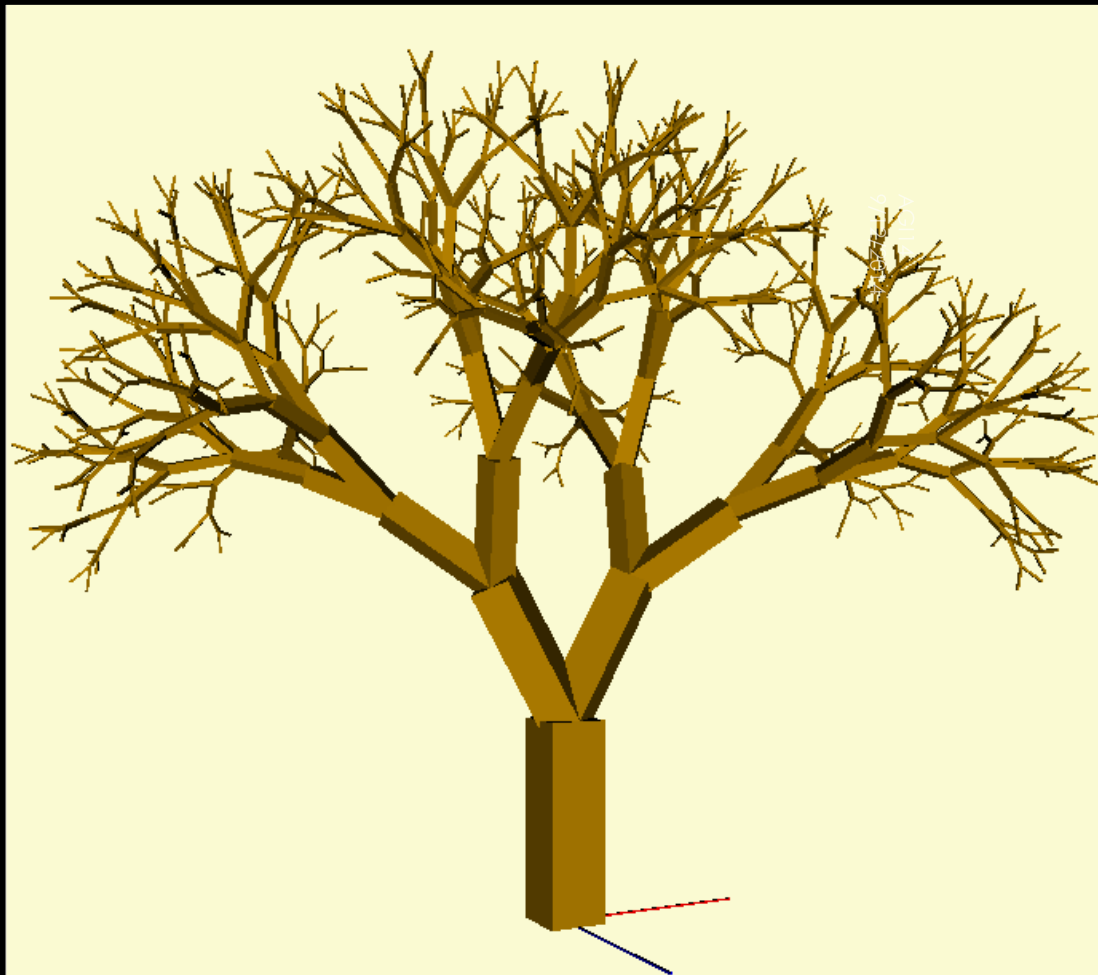
AG114  
9/12/2014

(extra slide)

# First Iteration

- ▶ Simple generation from primitives
- ▶ Basic Kinect gestures
  - ▶ Spread, duck, wave?
- ▶ Single tree, single user

4511  
(extra slide)



# Feedback to AY3



# YAZ

- PERSISTENCE
- SAVING
- EXPORTING
- PRINTING

- MULTIPAYER

- COLLOCATED COLLABORATION

DISTRIBUTED COLLABORATION (NETWORKING)

SYNCHRONOUS

A-SYNCHRONOUS

- SESSION

CAMERA

## L-SYSTEM (?)

LANGUAGE

FRACTALS

- PRODUCTIONS

NON-TERM.  
PROD. RULES  
TERMINALS

• SPORES

ARM/MOVEMENT

WIND

(TEXT RAIN  
UTTERBACK 2001?)

• SCENARIO

- SUGNAY

- RELIABILITY

↳ NOT IMP.

- ALIEN EXPERIENCE

• WHAT IS TURTLE GRAPHICS

• NO DIRECT REPRESENTATION

• NOT "BEING" A TREE

↑  
GESTURES { GROWING/  
CLIPPING } MAPPINGS?  
PRUNING

- INTERACTION / ADVANCED (COMPLEX?)

- FINGERS (PRECISION?)

↑  
NOT ESSENTIAL

- RELIABLE INTERACTION - ABSTRACT / ART

# Megatron

- Christoffer
- Mattias
- Ludwig
- Linnea

# Project Proposal



l n



Linnea  
lblo@kth.se



Christoffer  
cwiss@kth.se



[ludwigpe@kth.se](mailto:ludwigpe@kth.se)



matlon@kth.se

Helper, 2D view



Main Player, 3D view



# Project Idea

Enemy, 2D view





# Motivation

- Create a social and fun experience for three persons
- Learn about



# Goals and Challenges

- Fun multiplayer experience
- The experience must be exciting for all parts
- Increased immersion with Oculus and Razer Hydra
- Technical constraints, access to tech, difficulty to learn
- Higher level of detail (graphics and sound)
- Priority, lack of expertise, risk of breaking the core

# Related Work

- **Uncle Roy All Around You: Implicating the City in a Location-Based Performance**
  - Benford, Steve. et al. (2003)
- **Designing Asymmetrical Collaborative Gameplay for Heterogeneous Device Ecosystems**
  - Speck, Robert Sean. (2013)
- **Experimental Evidence for Suspense as Determinant of Video Game Enjoyment**
  - Klimmt, Christoph et al. (2009)







Twitch Plays Pokemon 13d1h54m19s utc54:20:38

Democracy mode disabled  
Pokemon Emerald in 6d 11:05:41



Footage from: [Twitch Plays Pokemon](#)

Recorded by: Icymate

Drartemisgrin  
Chimecho24  
Merugrin  
Enloqaz1000  
Wisdom  
Choikangchangmin  
Squohu  
Umehvarez  
Thereregabe  
Cg91335  
Alphasoxix  
Iimeel420  
Dirgess  
Joemeatballs  
Pascal7700  
Krisu16  
The asbestos  
Colonel jade  
Weezing04  
Cerebralharlot  
Mosgrad  
Nyaru1

Dirgess: FFFUUUU

Augustomrosa: NOOOO

Mealworm: ~\_~

Smn12321: Noooo

Gartemisfowl9: WHY DOES HE HAVE ONLY 3 MOVES

Zewpals: "" we're gonna get destroyed

Gamviliup: USE HYPER BEAAMI

Alphakun: BURRITO

Linkraider: dat switch tho

Alicerainy: nooooooooooooo

Ageogag: NOOOOO

Redolentgalaxy9: smart change

Mountainlord92: Why is it lagging? :

Tamchronic: This is why we need Zap Cannon!

Totow0w: nooooooooooooooooooooooooooooo

Matteo37: dead

D\_997: GO BURRITO

Bananazabily: BURRITO

Ekimthegib: noooo

# Methods and Techniques





# Methods and Techniques





# Thank You for Listening!

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¿Preguntas?



# Assignment 2

# A google scholar method

1. Search for the root
2. Search within "cited by"
3. Search for the leaf

# **FEEDBACK TO SURVIVAL IN THE DARK**

# MEGATRON

- OPPONENT (ENEMY) - FUN  
SCARED?  
BALANCING?  
YES
- TRAPS
- AR PLAYER
- PRESSURE
- CATCH

• CONSTRAINTS ON HELPER

• MAIN PLAYER (HEAD PHONES)

• COLLOCATED / DISTRIBUTED

• PROCEDURAL GENERATION

- ↑
- ENEMY PAIN & MAP
- DESIGNS SCARE HOUSE
- TRAPS

LEARNING  
MAP

HELPERS UTILITY

• HELPER (SCARED?)

2D GAME

THRILLED

• TINGLE TUNER (HELPER)

ZELDA ...

PURSES  
ELEMENTS

→ CONTENT OF MESSAGE?

LEFT... ← ↑ →  
↓

- TRAP AHEAD?

• ENEMY (SEES MESSAGES?)

→ LOCATES PLAYER

• FUN TO SCARE ← FOCUS

• CONNECTIVITY

wifi

• HELPER - IPHONE / INPUT?

SPY VS SPY?

# Thank you!

[marior@kth.se](mailto:marior@kth.se)

Questions?