EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

FACULTY OF
SCIENCE
Computer Graphics

Computer Games & Visual Effects / Computergraphics

Practical Course

Organization: ILIAS

ILIAS System (important):

- Important information, materials, templates, dates, …
- Groups

Contact:

mark.boss.at.uni-tuebingen.de
andreas.engelhardt.at.uni-tuebingen.de
zohreh.ghaderi.at.uni-tuebingen.de

Overview

1. Registration in ILIAS

2. Find a group

Computer Games

BSc. Practical course

Game Jam

Definition:

From Wikipedia, the free encyclopedia

A **game jam** is a contest where participants try to make a video game from scratch. Depending on the format, participants might work independently, or in teams. The contest duration usually ranges from 24 to 72 hours. Participants are generally programmers, game designers, artists, writers, and others in game development-related fields.

Traditionally, game jams focus on video games;[1] however, board games have also been the subject of game jams.[2]

Our Context:

- During the semester we will create a game
- It is up to you what kind of game you build
- Main gameplay mechanic:

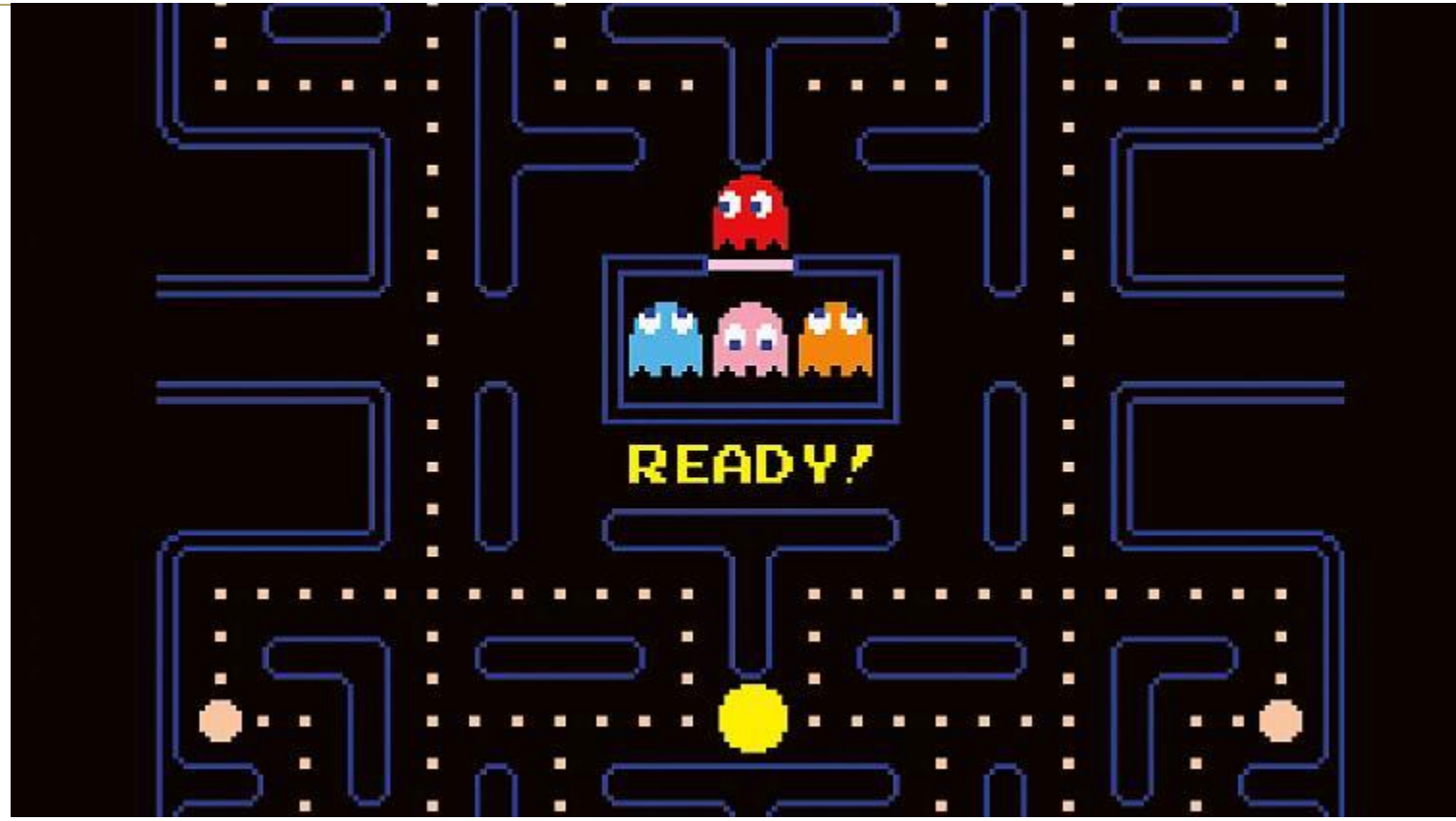
Light And Darkness

Gameplay loops

- Primary / Core Gameplay Loop
  - What happens every second
- Secondary
  - Minute to minute basis
  - E.g. advancing levels
- Tertiary
  - Longer goals
  - Story
  - Unlocking items etc.

Gameplay loops – Example Pac Man

- Primary
  - Eat pellets, avoid ghosts
- Secondary
  - Eat everything in a levels
- Tertiary
  - Get a high score



Gameplay loops – Example Super Mario

- Primary
  - Run, Jump, Survive
- Secondary
  - Reach end of level
  - Get coins
- Tertiary
  - Save the princess
  - Also high score

Prototype

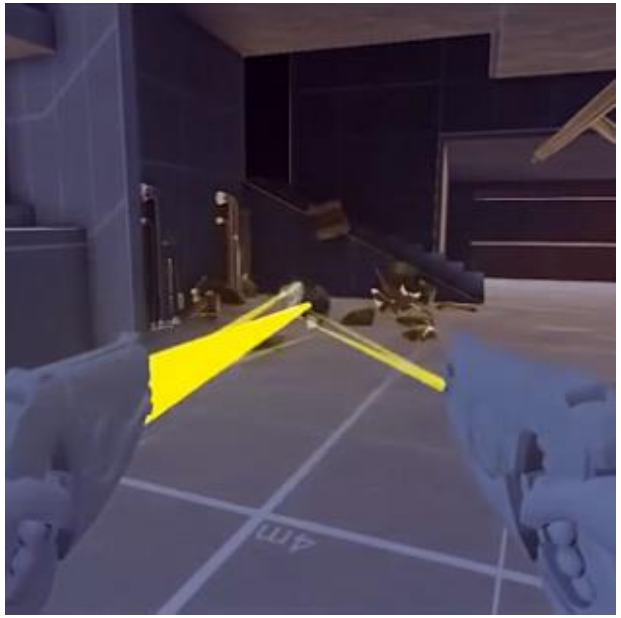
- Make sure the primary gameplay loop is fun
  - So if you require jumping, make sure the jumping feels right
  - Make sure the gameplay is in general fun
- Ignore any art

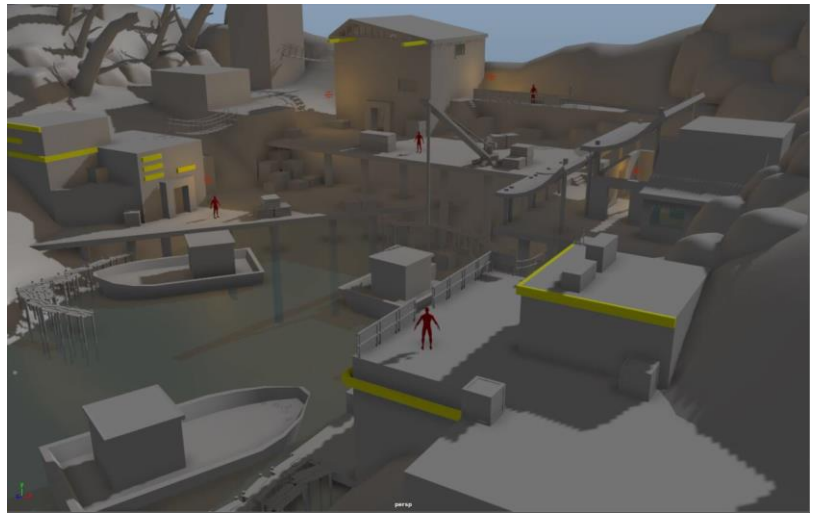
From God Of War:
Empty scene. Just gameplay

Level Prototyping

Orange maps of the Prison area, used for gameplay prototyping.

The final Prison map, after input from the orange map tests.





Useful Resources

Game Engines

- Unity
  - https://unity.com
- Unreal Engine
  - https://www.unrealengine.com/en-US/
- Godot
  - https://godotengine.org

Art Creation

- Blender (3D)
  - https://www.blender.org
- Piskel (2D)
  - https://www.piskelapp.com
- Paint.net (2D)
  - https://www.getpaint.net/index.html

Game Design Videos

- GMTK – Game Maker's Toolkit
  - https://www.youtube.com/channel/UCqJ-Xo29CKyLTjn6z2XwYAw
  - Has recently started an excellent "Developing" series
- Noclip
  - https://www.youtube.com/c/NoclipVideo
- Design Doc
  - https://www.youtube.com/channel/UCNOVwMpD-5A1xzcQGbIHNeA

6 or 12 ECTS

- 6 ECTS
  - Finish game until end of February
  - Present in the end
  - Due to restricted time this is a prototype (Single level etc.)
  - Main focus on the concept
  - Can be slightly rough

- 12 ECTS
  - Finish game until April
  - Present in the end
  - Also create a small web page which advertises the game and a teaser
  - Playable game with one or more levels
  - Polish it

Requirements

6 ECTS:

- Game Concept (Single Level)

12 ECTS:

- Trailer
- Website
- Game with multiple polished levels

Grading

- We won’t play every game
- Try to make the game playable in browser

Type	Weight
Trailer (Only 12 ECTS)	2x
Website (Only 12 ECTS)	2x
Presentation	2x
Completeness	4x
Creativity	1x
Execution	2x
Complexity	2x
Concept	2x
Bonus	1x

Groups

- Find a group with 5-10 people
  - Depending on overall size
- Also the whole group should remain consistent between 6 or 12 ECTS
- Our expectations grow with the group size!

Timetable (6 ECTS)

Datum	Typ	Inhalt
19.10.2021	Meeting (All)	Introduction • Dates • Groups
26.10.2021	Meeting (All)	Present 3 short ideas - 3 Slides – 3 Minutes • In the end which idea you will continue
09.11.2021	Meeting (Group)	Detailed presentation of concept • Rough sketches etc. • Project Name
30.11.2021	Meeting (All)	Prototype Primary Gameplay loop
11.01.2022	Meeting (Group)	Progress Update • Blocking of level
08.02.2022	Deadline/Meeting (All)	Final presentation

Timetable (12 ECTS)

Datum	Typ	Inhalt
19.10.2021	Meeting (All)	Introduction • Dates • Groups
26.10.2021	Meeting (All)	Present 3 short ideas - 3 Slides – 3 Minutes • In the end which idea you will continue
09.11.2021	Meeting (Group)	Detailed presentation of concept • Rough sketches etc. • Project Name
30.11.2021	Meeting (All)	Prototype Primary Gameplay loop
25.01.2022	Meeting (Group)	Progress Update • Blocking of level
12.04.2022	Deadline/Meeting (All)	Final presentation • Web page

Computer Graphics

MSc. Practical course

Goal of the Course

- Learn to solve a given complex problem in a group, using your programming skills

- Research the problem
- Find or come up with a solution that you like
- Implement that solution in a group (git)
- Make it "nice"
- Evaluate your solution

- Present your work to the Group

- Write a Report

The Problems

- Intentionally very general
  - Subject to interpretation
  - One problem can be chosen by multiple groups, if they concentrate on different aspects / solutions

- Aligned with research interests of Computer Graphics group
  - GDV required
  - Any of our master courses are advantageous

- Use whatever language and tools you want to. Just don't take credit for stuff you used from others!
- We will grade your work, not the work of others.

Organization

Next meeting in two weeks 02.11.2021

- Fix Groups and problem selection
- Present short brainstorm of ideas and a rough plan for the semester

- Regular individual group meetings
  - Progress discussion

- Final Presentation 15.02.2022
  - 15 Min presentations of the project.

- Written Report until 05.04.2022

Problems

- Raw Converter for Android
  - Insight into all processing steps from raw to jpeg, especially whitebalance and tonemapping

- Camera Stabilization
  - E.g. smooth hyperlapse from casual images

- Video matting using color unmixing http://yaksoy.github.io/scs/ http://yaksoy.github.io/keying/

- Good object masking:
  - Several NN method for object background removal: https://www.remove.bg/de u2net etc.
  - Still mask cut off parts of an object or include too much
  - Find ways using semantic segmentation, multiple networks to improve masks

Problems

- Point Cloud to Mesh
  - Million scale 3d points
  - Each point annotated with information (color, objectid, importance, reflectance)
  - Project annotations into textures of the mesh

- BRDF Explorer
  - Visualize lobe and shading
  - Extract slice of rendered sphere and visualize BRDFs
    - Rough idea: https://markboss.me/project/web_brdf_viz/

- Slicer for 3D-Printer (own 3D-Printer required)
  - Learn G-Code and write your own happy little slicer

- Fractal Explorer
  - Create beautiful art!

Problems

- Add multispectral output (e.g. as multi-channel OpenEXR) to Mitsuba 2
  - Render multiple bins at once (configurable)

- Style Transfer for video
  - Take some state-of-the-art approaches and make an app out of it
  - Go for some artistic results
  - Deal with temporal stability

Timetable

Datum	Typ	Inhalt
19.10.2021	Meeting	Introduction • Dates • Introduction of problems
02.11.2021	Meeting (All)	Topics selected / ideas for solution / working plan
23.11.2021	Meeting (Groups)	Progress meeting
21.12.2021	Meeting (Groups)	Progress meeting
18.01.2022	Meeting (Groups)	Progress meeting
15.02.2022	Meeting (All)	Final Presentation
05.04.2022	Deadline	Final report finished