



**National Centre for Computer Animation**

# Entertainment Systems

A game is a series of interesting choices.  
*(Sid Meier)*



# Who are we?

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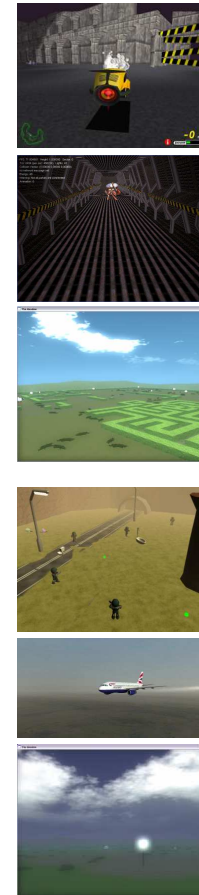
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# ES Overview

- Introduction to Entertainment Systems
- 2D Graphics in Entertainment Systems
- Sound, Speech & Music
- 3D Graphics in Entertainment Systems



# ES Reading List

## Essential Reading

- Mathematics for Computer Graphics  
Vince, J. – Springer-Verlag, 2005
- The Art of Computer Game Design  
Crawford, C. – available on-line
- Programming Guide to the Java 2D™ API  
online: <http://java.sun.com/javase/6/docs/technotes/guides/2d/spec/j2d-bookTOC.html>



# ES Reading List

## Recommended Reading

- *Mathematical and Computer Programming Techniques for Computer Graphics*  
Comninos, P. – Springer-Verlag, 2006
- *OpenGL Programming Guide*  
Woo, Neider and Davis – Addison-Wesley
- *Computer Graphics: Principles and Practice*  
Foley, van Dam and Hughes – Addison-Wesley, 1996



# ES Assessment

Term 1: project (*simple game*) – 10% (*TBC*)

- 2 weeks (20/11/2006 - 11/12/2006)
- TBA – most likely: program + post-mortem style report

Term 2: project (*joint with OOP & ISAT*) – 40% (*TBC*)

- Dates: 19/03/2007 – 30/03/2007
- nature of project TBA

Term 3: written exam (*2 hours*) – 50%



# Multimedia Systems

## Multimedia:

- the combined use of different media (*e.g. text, audio, video*)  
(*ambiguous term, i.e. a book with text and pictures could be considered multimedia*)

## (*common*) Multimedia (*content*)

- amalgamation of film and animation
- (*leading to*) interactive media/games (*combination of all*)



## (*digital*) Multimedia (*technology*)

- DVD-Players
- Mobile phones
- Games Consoles
- Computers
- Etc.



# *(Computer) Games*

Before we look at computer games as the “ultimate” entertainment system we need to discuss:

- what is a game
- game theory
- electronic games





# *(Computer)* Games

Games have been a part of human life since the dawn of humanity

So what is a game?

- a series of interesting choices (*Meier*)
- a closed formal system that represents a subset of reality (*Crawford*)
- a structured or semi-structured, contrived activity (*Wikipedia*)

These are just some of many formal definitions.



# *(Computer)* Games

## **Game Theory**

- not directly related to entertainment
- uses mathematical models to predict game results and find winning strategies
- used for economics and political models
- *(also used for board game AI, i.e. chess)*



# Computer Games

## Electronic games

- (*analogue games*)
- console games
- handheld/mobile games
- computer games

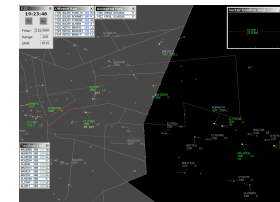
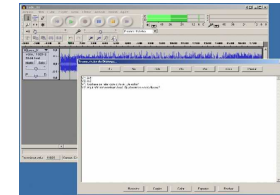
These are a culmination of entertainment system technology, providing a combination of most elements of multimedia technology.



# Serious Applications

## Simulation & Analysis

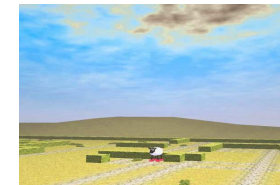
- Crime/Accident Scene Reconstruction
- Forensic Data Mapping/Analysis  
Example: Audacity Policial (forensic sound analysis)  
<http://sourceforge.net/projects/audacitypolicia>
- Archeological Visualisation
- Air Traffic Control simulation



Source: [www.londoncontrol.com](http://www.londoncontrol.com)

## Educational („Edutainment“) systems

- Learning Games

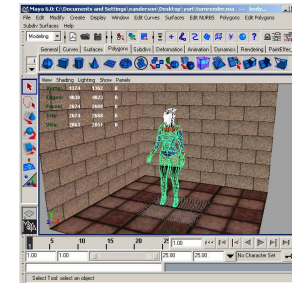




# Tool Development

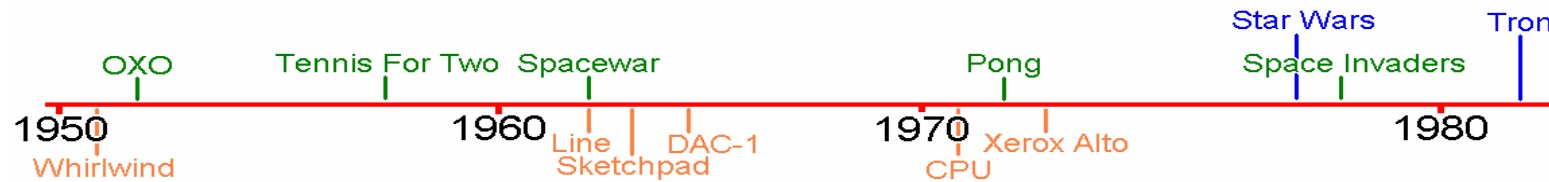
Entertainment System techniques are used for tools:

- Real-Time Data Visualisation  
(example: MoCap data visualisation)
- Architectural Visualisation
- Content Creation/Authoring Tools  
(*SFX applications, game level editors etc.*)





# History



(incomplete) timeline

1885 CRT

1927 Raster Display

1951 Whirlwind (*radar*)

1952 OXO (*EDSAC*)

1958 Tennis For Two (*Oscilloscope*)

1962 Spacewar (*DEC PDP-1*)

Line Drawing (*Bresenham*)

1963 Sketchpad (*Sutherland*)

<http://www.cl.cam.ac.uk/TechReports/UCAM-CL-TR-574.pdf>

1964 DAC-1 (*GM & IBM*)

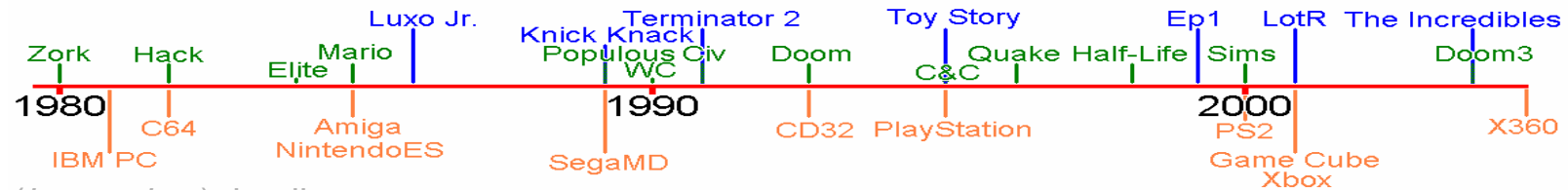
1971 Microprocessor (*CPU*)

1973 Xerox Alto

1982 Tron



# History



(incomplete) timeline

- 1981 IBM PC
- 1982 Commodore 64  
Atari 5200 (*game console*)
- 1985 Commodore Amiga  
Nintendo Entertainment System
- 1989 Nintendo Game Boy  
Sega MegaDrive (*Genesis*)
- 1993 Amiga CD32
- 1995 Sony PlayStation
- 2000 Sony PlayStation2
- 2001 Nintendo GameCube  
Microsoft Xbox
- 2005 Microsoft Xbox360



# Future

Future Entertainment Systems (*FES*) are most likely a one box solution, combining all currently available systems:

$$\text{STB} + \text{DVR} + \text{VGC} + \text{NPC} = \text{FES}$$

STB: Set Top Box  
DVR: Digital Video Recorder  
VGC: Video Games Console  
NPC: Networked Personal Computer

You will shape this future.