



www.theesa.com/facts



## CS10 The Beauty and Joy of Computing

### Lecture #3 : Video Games


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UC Berkeley EECS Lecturer SOE Dan Garcia UC Berkeley EECS Head TA Glenn Sugden

**CONTROL GAMES WITH THOUGHT!**

The Emotiv Epoc sells for \$300 and it comes with an app called EmoKey which allows you to "think" an action and the key will be clicked in the game or program, so you can control anything. (even powerpoint slides?) ☺



emotiv.com

## How big is US video game market?




entertainment software association


- \$250,000,000
- \$2,500,000,000
- \$25,000,000,000
- \$250,000,000,000
- \$2,500,000,000,000

Garcia, Spring 2012

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## Video Games : Overview

- **History**
  - Inventors & Games
- **How**
  - Design
  - 2D & 3D graphics
  - Motion Capture
  - Artificial Intelligence (AI)
- **Good, Bad, Ugly**
  - GWAP, RSI, Violence
- **Future**
- **Glenn tells "my story"**



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## Documentaries on Video Games

- **History: Video Games: Behind the Fun (2000)**
  - Available on Netflix
- **PBS: The Video Game Revolution (2004)**
  - [video.google.com/videoplay?docid=-4729348985218842392](http://video.google.com/videoplay?docid=-4729348985218842392)
- **Discovery: History of Video Games (2006)**
  - [video.google.com/videoplay?docid=3637639460474263178](http://video.google.com/videoplay?docid=3637639460474263178)
- **ON Networks : Play Value (2009)**
  - [www.onnetworks.com/videos/play-value](http://www.onnetworks.com/videos/play-value)
- **History of Video Games (WWW)**
  - [en.wikipedia.org/wiki/History\\_of\\_video\\_games](http://en.wikipedia.org/wiki/History_of_video_games)

en.wikipedia.org/wiki/List\_of\_films\_based\_on\_video\_games#Documentaries\_on\_video\_games

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## The Beginning : Spacewar!

- **First to gain recognition**
  - Others had games before
  - "Conceived in 1961 by Martin Graetz, **Stephen Russell**, & Wayne Wiitanen"
  - Written for PDP-1 @ MIT
  - Inspired lots, widely ported
- **Can still play this!**
  - 1 Working PDP-1 ... in CHM





Java version available  
[www3.sympatico.ca/maury/games/space/spacewar.html](http://www3.sympatico.ca/maury/games/space/spacewar.html)  
[en.wikipedia.org/wiki/Spacewar!](http://en.wikipedia.org/wiki/Spacewar!)  
[www.computerhistory.org](http://www.computerhistory.org)  
[spacewar.oversigma.com](http://spacewar.oversigma.com)

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## The Founding Fathers

- **Ralph Baer**

- **Nolan Bushnell**

[www.onnetworks.com/videos/play-value/the-founding-fathers](http://www.onnetworks.com/videos/play-value/the-founding-fathers)  
(also on iTunes in HD 720p)

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## Shigeru Miyamoto

- The "Walt Disney" of computing gaming
  - Chief Game designer at Nintendo
  - 1<sup>st</sup> elected to Hall of Fame
- Designed (among others):
  - Donkey Kong
  - Super Mario Bros
  - The Legend of Zelda
  - Super Mario 64
  - Nintendo DS, Wii



[www.onnetworks.com/videos/play-value/shigeru-miyamoto](http://www.onnetworks.com/videos/play-value/shigeru-miyamoto)  
[www.time.com/time/asia/2006/heroes/bl\\_miyamoto.html](http://www.time.com/time/asia/2006/heroes/bl_miyamoto.html)  
[en.wikipedia.org/wiki/Shigeru\\_Miyamoto](http://en.wikipedia.org/wiki/Shigeru_Miyamoto)



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## Design of a Casual/Video Game

- Staff requirements
  - Can be done by one person, ala days of old
  - Bigger teams also (< 10)
  - Lots of new developers
- Phones great platforms
  - iPhone dominates field
  - Students are signing up!
- Time to completion
  - Often only a few months!



[www.apple.com/iphone/apps-for-everything/fun-and-games.html](http://www.apple.com/iphone/apps-for-everything/fun-and-games.html)  
[blog.entertainment.com/2009/07/7-addicting-casual-games](http://blog.entertainment.com/2009/07/7-addicting-casual-games)  
[en.wikipedia.org/wiki/Casual\\_game](http://en.wikipedia.org/wiki/Casual_game)

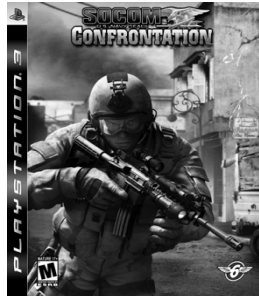


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## Design of a Core Video Game

- Staff requirements
  - Cross-disciplinary
  - Producer, programmers, game, graphic & sound designers, musicians, testers, ...
  - 100+ person teams
- Similar to film
  - Often, games->film, and film->games
  - Lucasfilm, etc. want to tie assets together



[en.wikipedia.org/wiki/Video\\_games](http://en.wikipedia.org/wiki/Video_games)



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## % of Parents "Games provide mental stimulation or education"

- a) 38%
- b) 48%
- c) 58%
- d) 68%
- e) 78%



entertainment software association



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## How : 3D Computer Graphics

- Similar to making a 3D animated film...
  - Model characters, environment in 3D
  - Add shading + lights + effects + behavior
  - Let 3D rendering engine (on graphics card) do the work of figuring out 2D scene from 3D
- Limitations
  - Many things are too "expensive" to do in 30 frames per second
  - Research breakthroughs!



[www.nytimes.com/2009/07/08/arts/television/08fight.html](http://www.nytimes.com/2009/07/08/arts/television/08fight.html)  
[en.wikipedia.org/wiki/Portal:Computer\\_graphics](http://en.wikipedia.org/wiki/Portal:Computer_graphics)  
[www.siggraph.org](http://www.siggraph.org)



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## How : Motion Capture

- Actors in MoCap suits
- Motions recorded, put in "motion libraries"
  - E.g., running, throwing, passing, tackling
  - Can be edited/cleaned
  - Motion synthesis also
- Challenges
  - Motion "blending"
  - Non-"sliding" feet
  - UC Berkeley Research!



[en.wikipedia.org/wiki/Motion\\_capture](http://en.wikipedia.org/wiki/Motion_capture)  
[www.phasespace.com](http://www.phasespace.com)

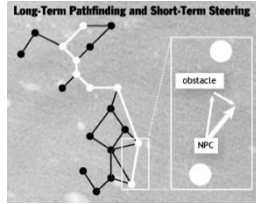


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## How : Artificial Intelligence

- **Range of intelligence**
  - Low: simple heuristics
  - High: Learns from player
- **Dynamic difficulty**
  - Must hold interest
  - "Simple to learn, difficult to master is the holy grail of game design."
  - Cheating AI (e.g., racing)



[www.businessweek.com/innovate/content/aug2008/id20080820\\_123140.htm](http://www.businessweek.com/innovate/content/aug2008/id20080820_123140.htm)  
[en.wikipedia.org/wiki/Dynamic\\_game\\_difficulty\\_balancing](http://en.wikipedia.org/wiki/Dynamic_game_difficulty_balancing)  
[en.wikipedia.org/wiki/Game\\_artificial\\_intelligence](http://en.wikipedia.org/wiki/Game_artificial_intelligence)  
[queue.acm.org/detail.cfm?id=971593](http://queue.acm.org/detail.cfm?id=971593)



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## Video Games : Good (Serious Games)

- **Simulations for training**
  - Flight simulations, combat, medical training
- **Games w/a Purpose**
  - A game to do useful stuff, hard for computers
  - Luis von Ahn ... gwap
    - ESP : Label images fastest
    - Gender Guesser
    - Popvideo : label video
    - Matchin : Pick best images



[en.wikipedia.org/wiki/Serious\\_games](http://en.wikipedia.org/wiki/Serious_games)  
[en.wikipedia.org/wiki/Game\\_based\\_learning](http://en.wikipedia.org/wiki/Game_based_learning)  
[gwap.com](http://gwap.com)

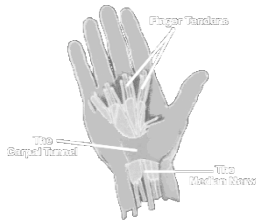


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## Video Games : Bad (RSI, addiction)

- **Gamers Thumb**
  - Caused with too much use of gamepad
  - I suffered this in 1980s!
  - Solutions?
    - Break timers, rest
- **Video game addiction**
  - Impulse control disorder
  - Stanford: yes, addictive!
  - "Gamers Wife"
  - Online gamers anon



[en.wikipedia.org/wiki/Video\\_game\\_addiction](http://en.wikipedia.org/wiki/Video_game_addiction)  
[en.wikipedia.org/wiki/Repetitive\\_strain\\_injury](http://en.wikipedia.org/wiki/Repetitive_strain_injury)



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## Video Games : Ugly (Violence)

- **Violent video games**
  - Increase aggression, decrease "helping"
  - Others found no link
- **High-profile incidents**
  - Columbine kids loved the Doom video game
- **Ratings help**
- **Games "folk devil"**
  - Billions \$, kids at stake



[en.wikipedia.org/wiki/Video\\_game\\_controversy](http://en.wikipedia.org/wiki/Video_game_controversy)  
[www.apa.org/science/psa/sb-anderson.html](http://www.apa.org/science/psa/sb-anderson.html)



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## Glenn Sugden : My Story

- **Started game development in 1991**
  - Worked until 1999 for Presage
  - Design and developed games for LucasArts, Interplay, Sierra Dynamics, Brøderbund,
    - The Incredible Machine for mac
    - Quake 2 for mac
- **Started own game development company...**



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## Conclusion : Future of Video Games

- **Media producers connecting assets**
  - Disney, Lucas big players
- **Controllers and sensors expand**
- **Games on Demand**
  - OnLive
- **Brain-Computer Interface (BCI)**
  - Invasive and Non-



[www.pbs.org/kcts/videogamerevolution/impact/future.html](http://www.pbs.org/kcts/videogamerevolution/impact/future.html)  
[en.wikipedia.org/wiki/Brain-computer\\_interface](http://en.wikipedia.org/wiki/Brain-computer_interface)

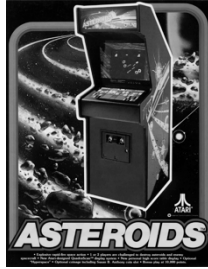


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## History of Video Games : 1970s

- **Golden age of video arcades**
  - Pong, Space Invaders, Asteroids, Pac Man
- **1<sup>st</sup> gen consoles (1972–1976)**
  - Magnavox Odyssey
- **Mainframe computers**
  - Hunt the Wumpus, Rogue
- **Home computers**
  - Type the program in!
  - Floppies, Tapes, Zork, others.
- **2<sup>nd</sup> gen consoles (1977–1984)**
  - Atari 2600, Intellivision, Colecovision, Activision



en.wikipedia.org/wiki/History\_of\_video\_games  
www.thegameconsole.com

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## History of Video Games : 1980s

- **Genre innovation**
- **Gaming computers**
  - Apple II, Commodore 64, Atari 800
- **Early online gaming**
  - Mostly text only, MUDs
- **Handheld LCD games**
- **Video game crash of 1983**
  - Atari buried millions of ETs in dump
- **3<sup>rd</sup> gen consoles (1985–1989)**
  - Nintendo Ent. System (NES)
    - Super Mario Bros, Zelda, FF I
  - Gamepad introduced



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## History of Video Games : 1990s

- **Decline of arcades**
- **Handhelds come of age**
  - GameBoy, Sega Game Gear
- **Mobile phone gaming**
- **Fourth generation consoles (1990–1994)**
  - Sega Genesis, Super NES
- **Fifth generation consoles (1995–2000)**
  - Playstation, Nintendo 64 (with Super Mario 64)
- **Transition to 3D, CDs**
  - Crash Bandicoot, Tomb Raider



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## History of Video Games : 2000s

- **Mobile games**
  - iPhone (games ½ apps)
- **Sixth generation consoles (since 2001)**
  - PS2, Xbox, GameCube
  - Return of alternate controllers (DDR, guitars)
- **Online gaming rises to prominence**
  - WoW, Ultima Online
- **Rise of casual PC games**
  - Bejeweled, The Sims



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## History of Video Games : 2005+

- **Seventh generation consoles (since 2005)**
  - Portables
    - Nintendo DS, PSP, iPhone
  - Consoles
    - PS3, Xbox 360, Wii
  - Increases in development budgets
  - Motion control revolutionizes play
    - Wii controller, iPhone



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## Example: Playstation 3 Hardware

- **State-of-the-art system**
  - But SW determines success!
  - (also, cool controllers helps)
- **9 3.2GHz Cores (1PPE, 8SPE)**
  - Power Processing Elt (PPE)
    - Supervises activities, allocates work
  - Synergistic Processing Elt (SPE)
    - Where work gets done
    - During testing, one "locked out"
      - i.e., it didn't work; shut down
      - ...even if everything DID work!



en.wikipedia.org/wiki/PlayStation\_3  
www.us.playstation.com

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