LEAP MOTION: $70?

200x more accurate than Kinect; tracks 10 fingers to 1/100 of a millimeter... by the end of this year
Size of the US video game market?

a) $250,000,000
b) $2,500,000,000

c) $25,000,000,000

d) $250,000,000,000

e) $2,500,000,000,000

www.theesa.com/facts
Video Games: Overview

- History
  - Inventors & Games

- How
  - Design
  - 2D & 3D graphics
  - Motion Capture
  - Artificial Intelligence (AI)

- Good, Bad, Ugly
  - GWAP, RSI, Violence

- Future
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](https://video.google.com/videoplay?docid=-4729348985218842392)

- **Discovery: History of Video Games (2006)**
  - [video.google.com/videoplay?docid=3637639460474263178](https://video.google.com/videoplay?docid=3637639460474263178)

- **ON Networks: Play Value (2009)**

- **History of Video Games (WWW)**

The Beginning: Spacewar!

- First to gain recognition
  - Others had games before
  - “Conceived in 1961 by Martin Graetz, Steve 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
en.wikipedia.org/wiki/Spacewar!
www.computerhistory.org
spacewar.oversigma.com
The Founding Fathers

- Ralph Baer
- Nolan Bushnell

www.onnetworks.com/videos/play-value/the-founding-fathers
(also on iTunes in HD 720p)
Shigeru Miyamoto

- The “Walt Disney” of video games
  - Chief Game designer at Nintendo
  - 1st 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
www.newyorker.com/reporting/2010/12/20/101220fa_fact_paumgarten
www.nytimes.com/2008/05/25/arts/television/25schi.html
Design of a Casual Video Game

- **Staff requirements**
  - Can be done by one person, like 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!

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blog.entertainment.com/2009/07/7-addicting-casual-games
en.wikipedia.org/wiki/Casual_game
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

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en.wikipedia.org/wiki/Video_games
% of Parents: “Video games are a positive part of my child’s life”

- a) 22%
- b) 32%
- c) 42%
- d) 52%
- e) 62%
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!

en.wikipedia.org/wiki/Portal:Computer_graphics
www.siggraph.org
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
www.phasespace.com
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
en.wikipedia.org/wiki/Dynamic_game_difficulty_balancing
en.wikipedia.org/wiki/Game_artificial_intelligence
queue.acm.org/detail.cfm?id=971593
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
en.wikipedia.org/wiki/Game_based_learning
gwap.com
Video Games : Bad (RSI, addiction)

- **Gamers Thumb**
  - Caused with too much use of gamepad
  - Solutions?
    - Break timers, rest

- **Video game addiction**
  - Impulse control disorder
  - Stanford: yes, addictive!
  - "Gamers Wife"
  - Online gamers anon

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en.wikipedia.org/wiki/Video_game_addiction
en.wikipedia.org/wiki/Repetitive_strain_injury

UC Berkeley CS10 “The Beauty and Joy of Computing” : Video Games (15)
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
Conclusion: Future of Video Games

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

www.pbs.org/kcts/videogamerevolution/impact/future.html
en.wikipedia.org/wiki/Brain–computer_interface
History of Video Games: 1970s

- **Golden age of video arcades**
  - Pong, Space Invaders, Asteroids, Pac Man

- **1st gen consoles (1972–1976)**
  - Magnavox Odyssey

- **Mainframe computers**
  - Hunt the Wumpus, Rogue

- **Home computers**
  - Type the program in!
  - Floppies, Tapes. Zork, others.

- **2nd gen consoles (1977–1984)**
  - Atari 2600, Intellivision, Colecovision, Activision

Learn more at:
- [www.thegameconsole.com](http://www.thegameconsole.com)
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
  - Nintendo Ent. System (NES)
    - Super Mario Bros, Zelda, FF I
    - Gamepad introduced

Chun, Summer 2012
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
  - Playstation, Nintendo 64 (with Super Mario 64)
- **Transition to 3D, CDs**
  - Crash Bandicoot, Tomb Raider
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
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
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 Element (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

Chun, Summer 2012

UC Berkeley CS10 “The Beauty and Joy of Computing” : Video Games (23)