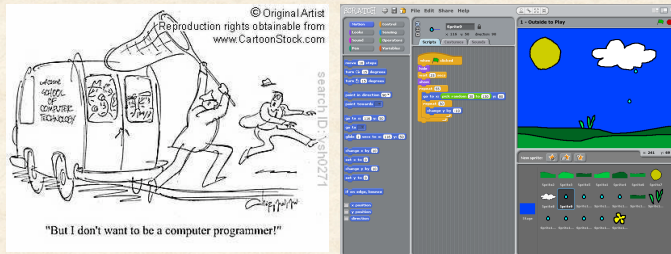


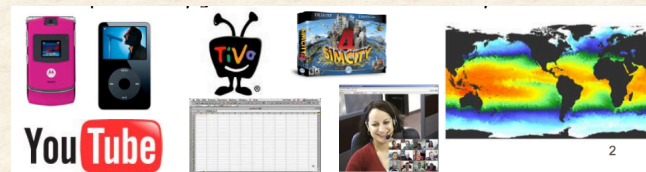
## Lecture 1: Introduction to Computation



## Motivation for CS 202

Computation is revolutionizing daily life

- Change how we live, work, learn, and communicate
- Increases productivity
- Drive advances in nearly all other fields



Goal: Understand fundamentals of computation

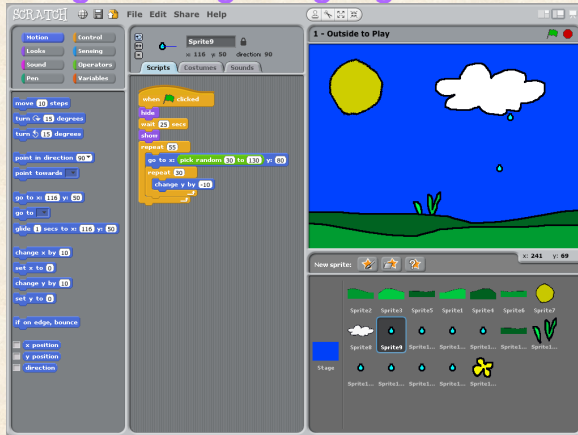
## What will you learn in CS 202?

1. Computation is powerful
  - Simple **algorithms** can solve complex problems quickly
    - Algorithm: Step-by-step method for accomplishing a task
  - Experience with creating solutions yourself (in Scratch)
2. How modern computers work
  - Hardware:
    - How to go from bits (1s and 0s) to running any program and storing all information?
  - Software (Operating System):
    - How to run multiple applications? How to send messages?  
How does Google work?
3. Interesting applications of Computer Science
  - Artificial Intelligence, Robotics, Security, Education

## What is NOT focus of CS 202?

1. How to use different applications
  - Word, ppt, excel, databases, web searching
  - Goal:** Design and build our own applications
2. How to use or administer computers
  - Reboot or install OS, new printers, network?
  - Goal:** Understand fundamentals of how computers work
3. Implications of technology
  - Impact of facebook and twitter on society
  - Goal:** Understand basics of how technology is designed

## Programming Language: Scratch



## Scratch Demo

Easy to create many interesting programs

- Animations with Music
- Interesting Graphic Effects
- Educational Software
- Simulations
- Logic and Strategy Games
- Video Games

## Administrative Details

Instructor:

- Professor Andrea Arpaci-Dusseau
- [dusseau@cs.wisc.edu](mailto:dusseau@cs.wisc.edu)
- Office: Computer Sciences 7375
- Office Hours: TBA



Four TAs: Help with homeworks and programming

- Weekly (optional) help sessions in Computer Lab
  - Help with current homework
    - Go over similar problems
  - Review solutions to homeworks
  - Group atmosphere for programming in 1370 CS
- Times posted soon

## What will you do in CS 202?

Two Scratch Projects: 25% of total grade

- Open-ended games, show some creativity
- Expect significant effort: many, many hours
- Share with classmates (work is individual)
  - Scratch website + in-class demos
  - Create mosaic at end of semester
- Instructor and TAs happy to give advice



## What will you do in CS 202?

Homework (~10 assignments): 40%

- Approximately 1/week
- Straight-forward programs, pencil+paper analysis, short essays
- First one available today (see webpage), due in one week

Exams (3): 35%

- Two in-class exams; Final exam on December 22<sup>nd</sup>!
- Closed book, closed notes

Class attendance and participation: Extra credit

- No laptops

## What will you learn in CS 202?

How do computers...?	Answer
Solve problems?	Algorithms
Know what to do?	Programming languages
Make art?	Sequential blocks and Loops
Show animated stories?	Messages
Make decisions?	If statements
Represent information?	Bits
Represent words, pictures, sound?	Encode in binary
Automate calculations?	Variables and boolean logic
Act logically?	Gates and truth tables
Calculate?	Circuits
Remember?	Memory
Answer difficult questions?	Artificial intelligence
See?	Computer vision
Interact with humans?	Social robots

## What will you learn in CS 202?

How do computers...?	Answer
Find stuff?	Searching
Find stuff faster?	Binary search
Find goal?	Optimization
Execute instructions?	CPUs
Run multiple applications?	Operating systems
Teach you with educational software?	Instructions for waiting
Teach the world?	Digital StudyHall
Avoid races in parallel programs?	Critical sections
Guess what happens?	Probability trials
Predict the future?	Simulation
Win games?	AI and Decision trees
Communicate with others?	Networking

## What will you learn in CS 202?

How do computers...?	Answer
Find web pages?	Search engines (Google)
Access data?	File systems
Solve societal problems?	Mine data
Sort data?	Selection and insertion sort
Sort data faster?	Merge and quick sort
Share secrets?	Cryptography
Catch liars?	Logic with random information
Reach their limits?	P vs. NP
Use other languages?	Compilers

## Resources

Course Web Page:

<http://www.cs.wisc.edu/~cs202-1>

Detailed syllabus

- Slides from lecture (after)
- Code samples from class
- Screencasts of Scratch programming
- Readings

Recommended textbook: Invitation to Computer Science

- Not perfect match with 202 (does not use Scratch)
- Might not be needed if attend every lecture
- Copy on reserve at library and available in Computer Lab

## Homework 1

Purpose: Investigate Scratch website and projects

- <http://scratch.mit.edu/>

1. Create new user account, upload picture of self

- User name should be `FirstnameLastname`

2. Find 3 interesting existing projects

- Recommend Featured, Top Viewed, Top Loved
- Make Gallery named something like "Assignment 1"
- Place 3 projects in your gallery
- In comments (of Gallery, not Projects) write 1 paragraph per project about why picked each

3. Request to be friends with Instructor and specified TA

- <http://scratch.mit.edu/users/dusseau>

Details on course webpage

## Today's Overview

Contents of CS 202: Introduction to Computation

1. Experience solving problems with computation (algorithms + programming)
2. Understand how computers work (hardware and software)
3. Exposure to applications of computer science

Scratch: Excellent language for beginners

Administrative items:

- Fill out survey
- Reading: Check out course web site
- Homework 1 Available; Due 1 week