

# CAC 170

# Computer Science Principles

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*\*Slides from Dr. Jeff Gray, University of Alabama*  
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# About Dr. Win

- ◆ I am a native of Birmingham
- ◆ I recieved a B.S in Electrical Engineering
- ◆ I worked in industry a few years
- ◆ Decided to return to school and recieved a M.S. in Electrical Engineering and a PhD in Computer Engineering



Why study computing?



How many times did you use  
technological innovations today?

Think about what they were...



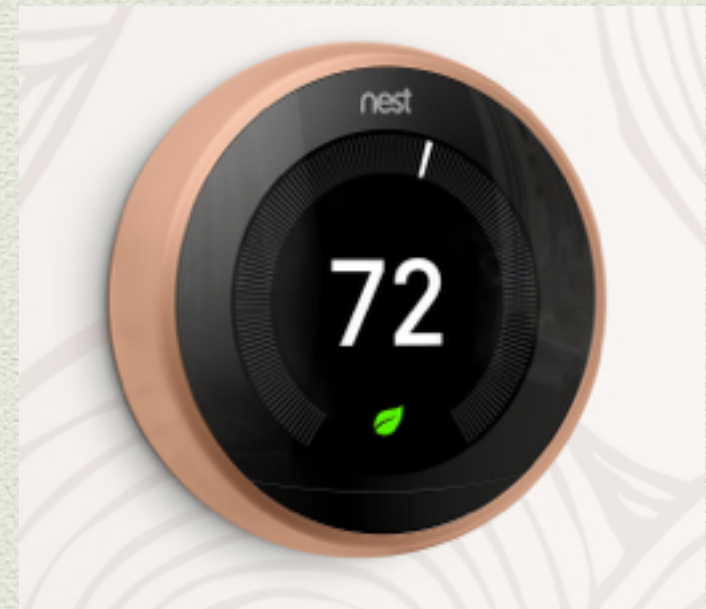
# Innovations I used today...

- ◆ Roomba
- ◆ Phone - check email, weather
- ◆ Keyless car
- ◆ Navigation to assist with traffic
- ◆ Internet and Moodle to create this class!



# Technology is Always Changing

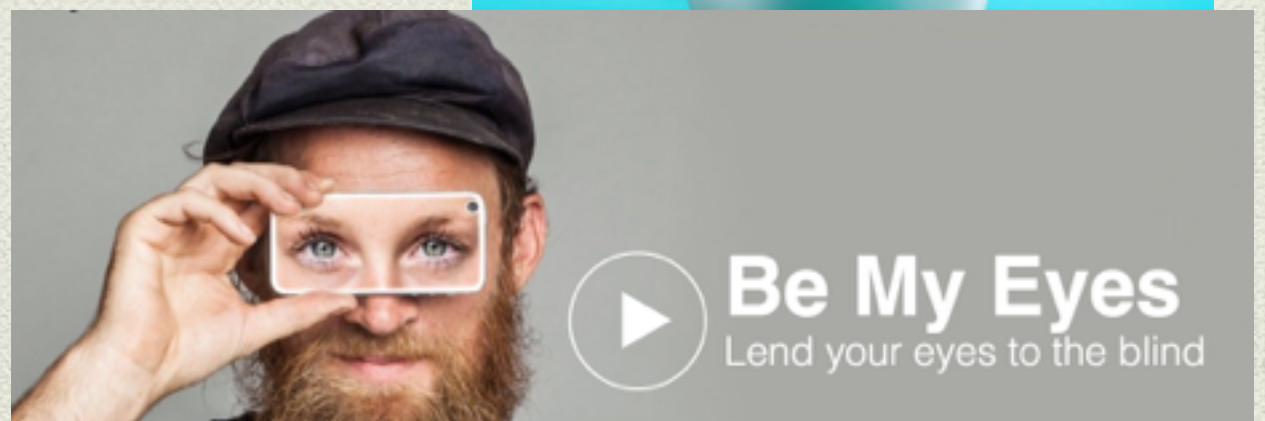
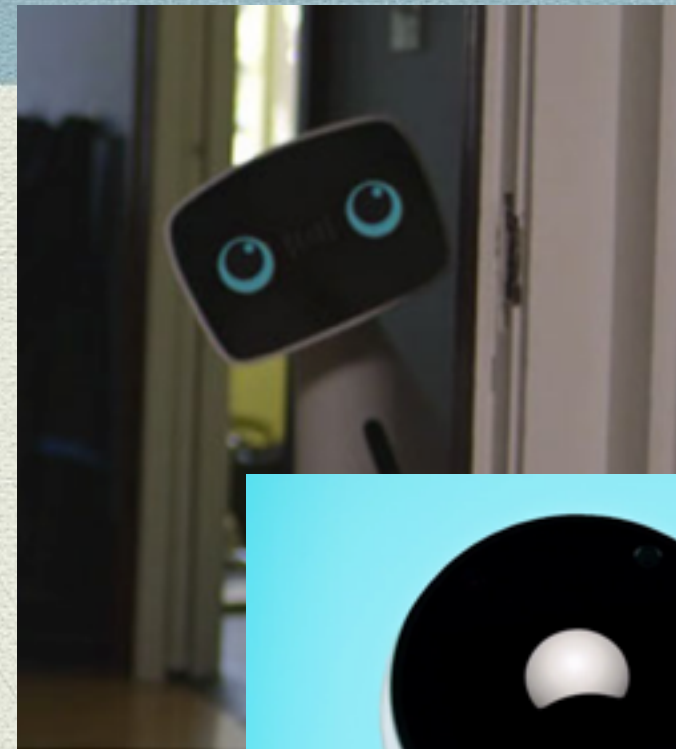
- ◆ Our homes are changing thanks to technology!
- ◆ Smart Home devices:
  - ◆ Nest - controls air conditioning system: <https://nest.com/>
  - ◆ Kevo - digital lock: <http://www.kwikset.com/kevo/default>





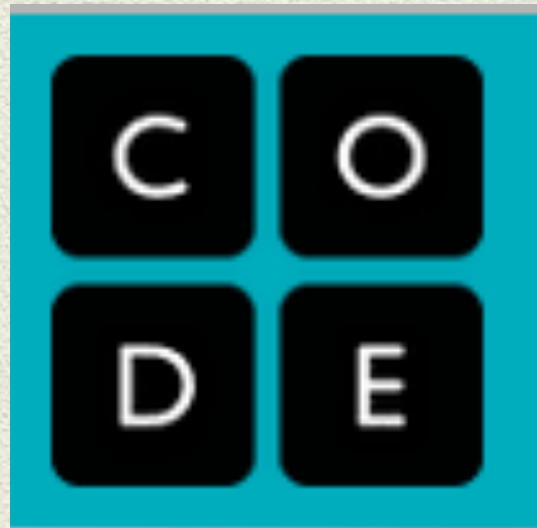
# Technology is Always Changing

- ◆ Personal Assistants: Show Video
  - ◆ Aido: <http://www.aidorobot.com/>
  - ◆ Jibo - <https://www.jibo.com/>
- ◆ Accessibility Innovations - using technology to make a difference for others:
  - ◆ Be My Eyes: <http://bemyeyes.com/>  
Show Video





If you haven't watched this video before, please do so!



<http://bit.ly/2nsbWvJ>

Show Video



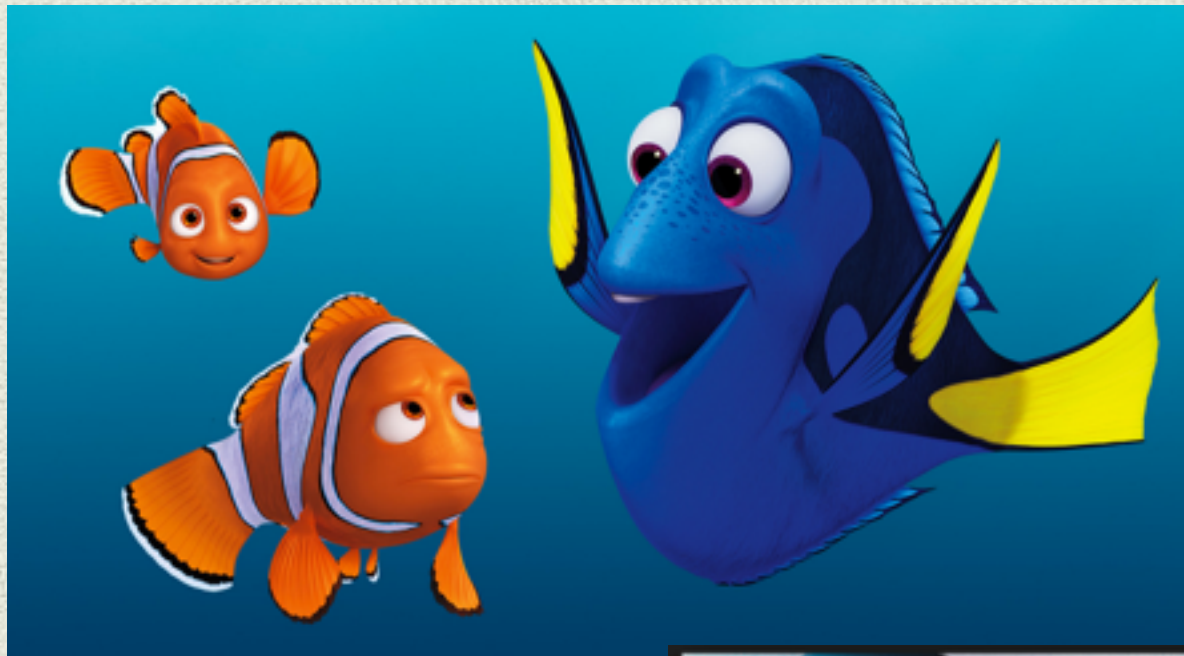
# Software is Everywhere

- ◆ How does software impact your daily life?



# Software is Everywhere

Software developers have the opportunity to work on exciting projects in really fun fields





# Software is Everywhere

Software is used in numerous fields beyond media / entertainment



Show Video



<http://spectrum.ieee.org/automaton/robotics/robotics-hardware/video-friday-darpa-luke-arm-human-support-robot-starting-robotics-company>



# Intellectual Opportunities

“...the software industry is going to make more breakthroughs in the next 10 years than it's made in the last 30...software is really going to transform not just what we think about as the computer industry, but the way that everything is done...” - Bill Gates



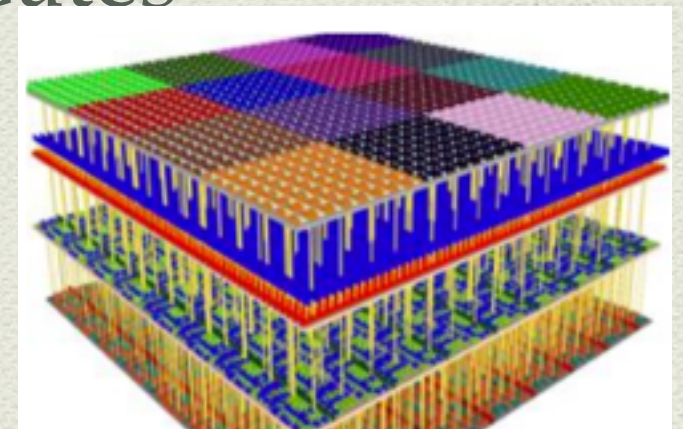
## Nanowire Circuits

<http://spectrum.ieee.org/the-human-os/biomedical/devices/this-circuit-board-will-selfdestruct-in-5-4-3>



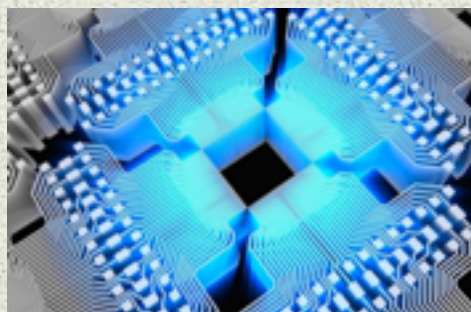
## Self-Driving Cars

<http://spectrum.ieee.org/static/the-self-driving-car>



## Carbon Nanotubes

<http://spectrum.ieee.org/nanoclast/semiconductors/nanotechnology/carbon-nanotube-computing-stacks-up>



## Quantum Computing

<https://www.scientificamerican.com/article/quantum-computers-compete-for-supremacy/>



## Prosthetics

<http://enablingthefuture.org/2017/01/24/e-nable-community-chapter-spotlight-%e2%80%a2-fundacion-protesis-3d-chile/>



# Example: Tornado Warnings

- ❖ Computer Scientists play an important role by creating software to read the Doppler radar
- ❖ Meteorologists use computing algorithms to better predict tornado patterns





# High Impact Opportunities

February 15, 2005  
Domain registered  
(youtube.com)

Jawed Karim, Chad  
Hurley, and Steve Chen  
Age: mid-20s



April 23, 2005  
First Video

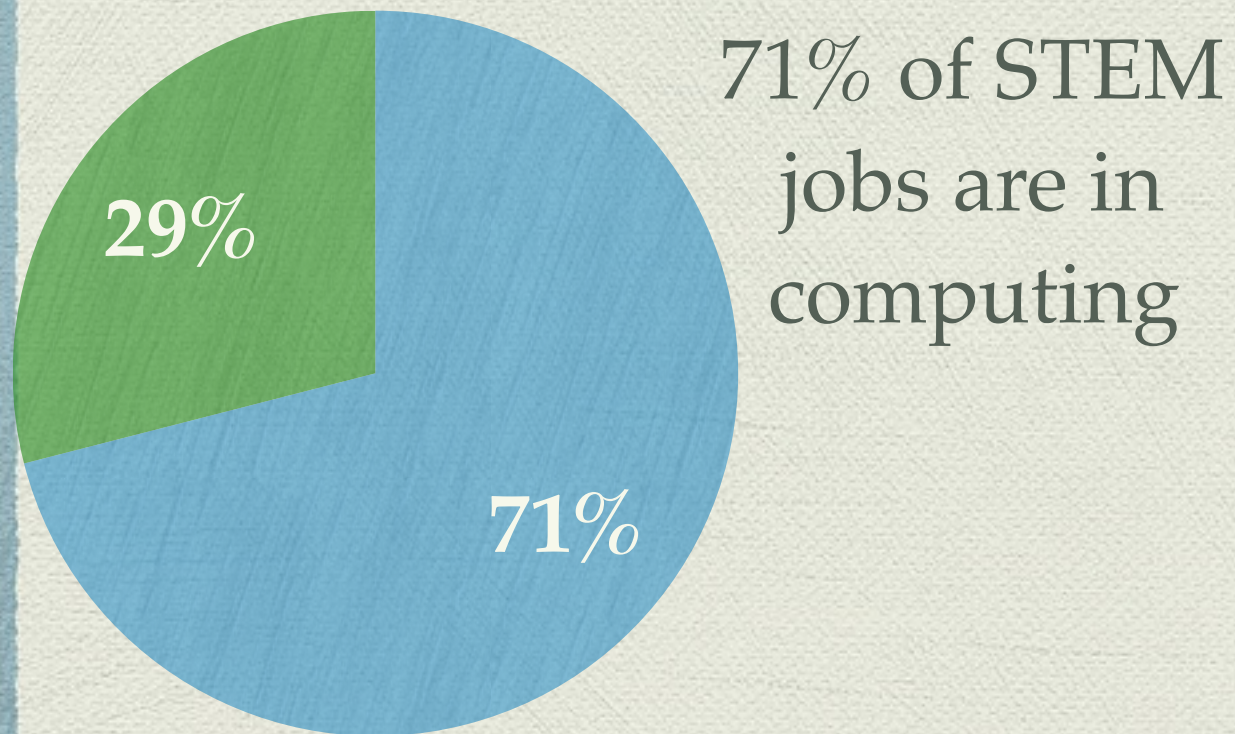


October 6, 2006  
Google purchased  
for **\$1.65 Billion**

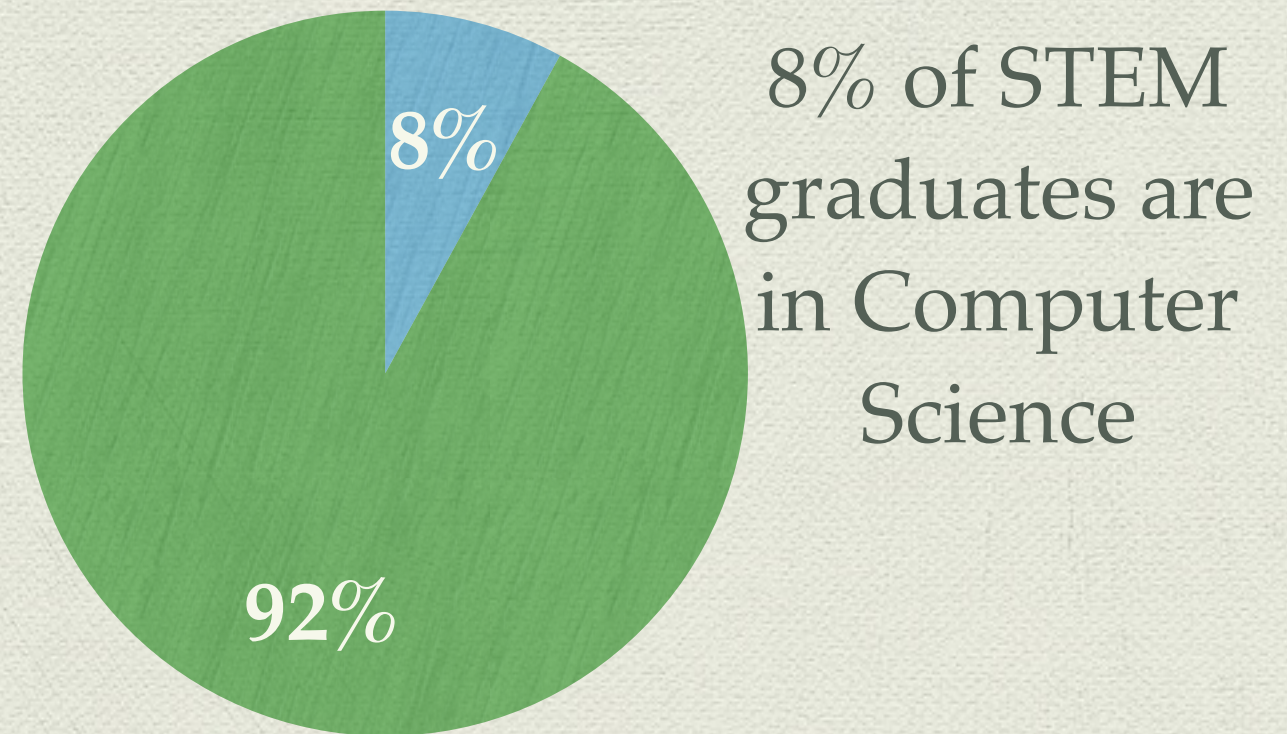
- ◆ 1 Billion unique user visits each month
- ◆ 6 Billion hours of video viewed each month
- ◆ 100 hours of video uploaded each minute
- ◆ October 2006: Time Magazine Invention of the Year



# Demand for Computer Science



71% of STEM jobs are in computing



8% of STEM graduates are in Computer Science

“300,000 current openings: These jobs are in **every** industry and **every** state, and they’re projected to grow at twice the rate of all other jobs.”

There are close to 4,400 current jobs open in Alabama that involve computing, but the state of Alabama only graduated 500 students in Computer Science this past year.



# What is Applied Computer Science?

- ◆ “These jobs are in **every** industry...”
- ◆ Traditional Computer Science has a heavy focus on theory type courses and software development
- ◆ Same concepts will be covered in CAC, but each subject will be applied to either your area of interest or a general area



# What is Applied Computer Science?

- ◆ Examples:

- ◆ Operating Systems and Cybersecurity

- ◆ Computer Architecture and Internet of Things (circuits)

- ◆ Web Design and Mobile Development



# BSC Alums in Tech

- ◆ Executive at Momentum Telecom, Inc.
- ◆ Co-Founder and CEO of Hafta Have
- ◆ Senior Developer at Teksouth Corporation
- ◆ Flight Controller for NASA
- ◆ Senior Director Technology Services at OpenSpan



# Class Details

## ◆ Texts:

1. Blown to Bits: Your Life, Liberty, and Happiness After the Digital Explosion
2. CS Principles: Big Ideas in Programming

Both of these textbooks are available online for free. Please check the syllabus for links.

- ◆ Readings are expected to be completed before class (check syllabus). There will be reading quizzes posted on Moodle to be completed before class.
- ◆ Jupiter Note Book - We will use this for the programming portion. You'll receive more info on this soon!



# Class Details

## ◆ Assignments:

1. Essay: Impact of Computing
2. Essay: Ethics
3. Data Analysis
4. Python assignments
5. Other small assignments

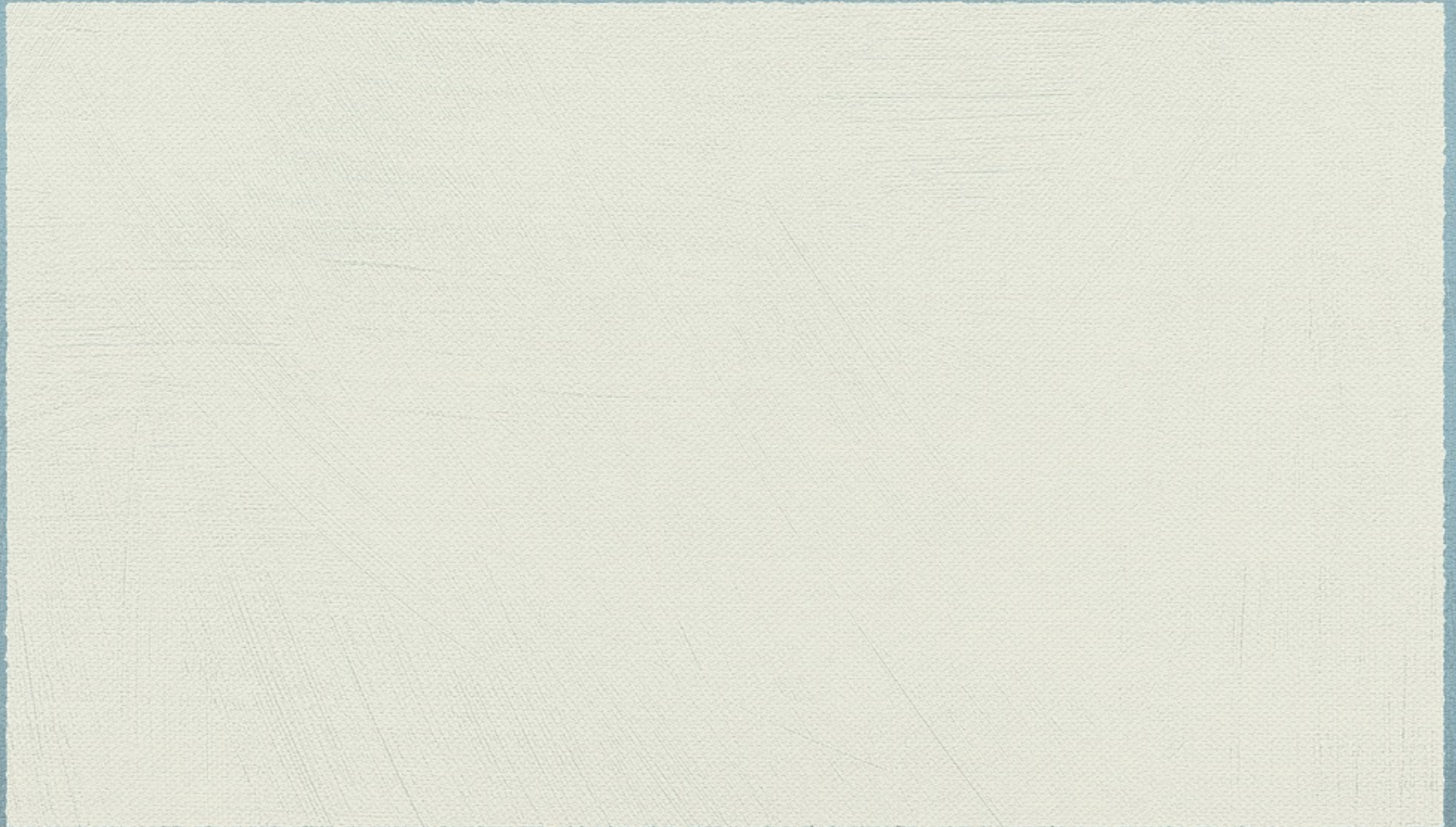
## ◆ Grading:



- ◆ Essays and Data Analysis Assignments: 10% each (30%)
- ◆ Python Assignments: 40%
- ◆ Quizzes: 10%
- ◆ Final Project: 20%

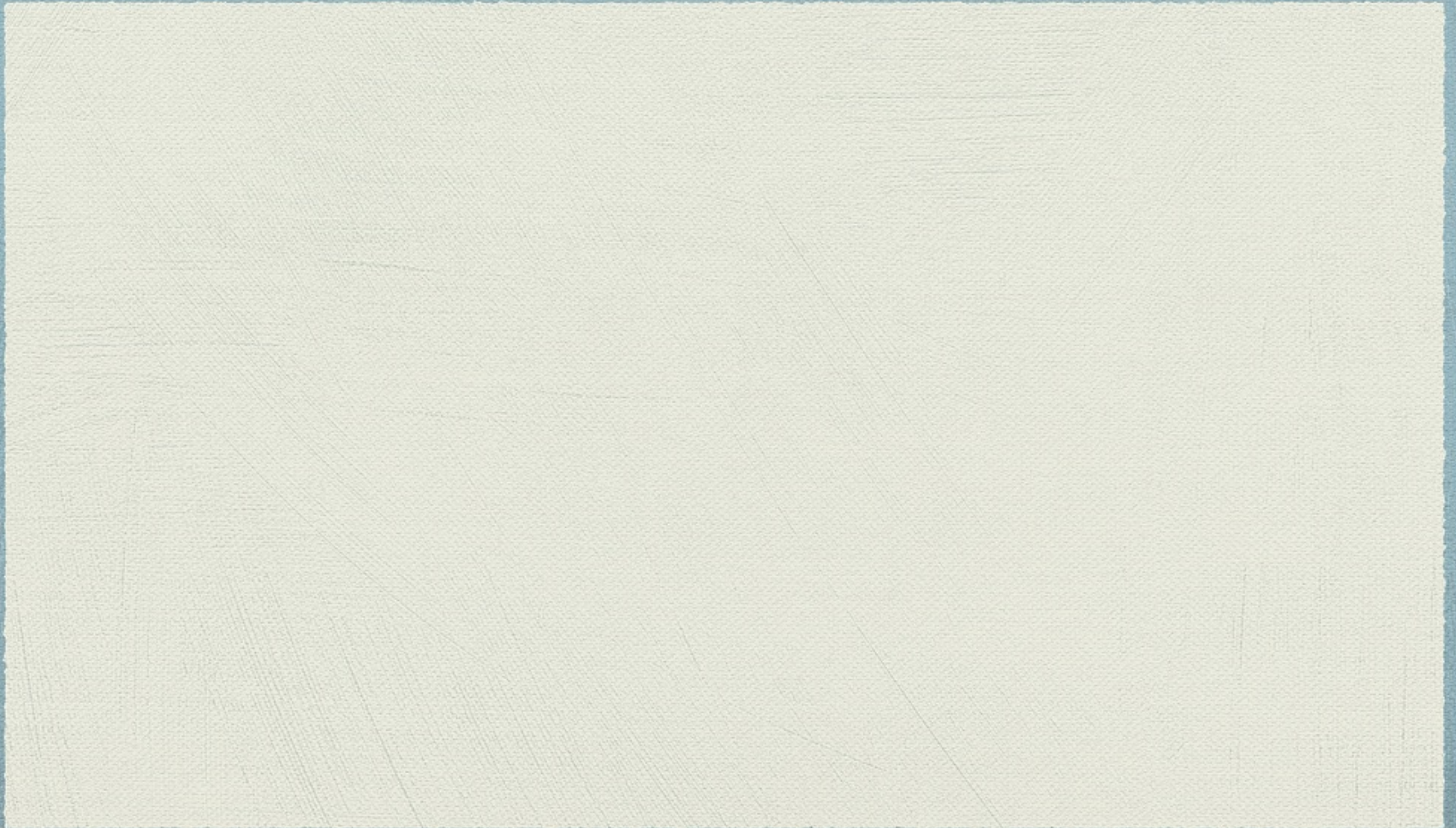


What do you view as my responsibilities?





What do you view as your  
responsibilities?





# What I view as your responsibilities...

- ◆ Follow the Honor Code - maintain academic integrity
- ◆ Treat your classmates and me with respect
- ◆ Come to class prepared including reading the material and completing the reading quizzes
- ◆ Anticipate doing some independent learning - Ever hear of Google?
- ◆ Ask questions:
  - ◆ to gain a better understanding
  - ◆ to eliminate confusion
  - ◆ to take the topic deeper



# Who's Who in Computing

I will include a Who's Who in Computing or two in the materials for each week. Lookout for some of them possibly being on a quiz!



# Ada Lovelace

December 1815 - November 1852

- Daughter of a trained mathematician (“Princess of Parallelograms”) and poet (Lord Byron)
- Met Charles Babbage (father of the computer) and became fascinated with his Analytical Engine
- Lovelace saw further than Babbage and wrote about the idea that the Difference Engine could be used to transform symbols as well as numbers - “first programmer.”
- Her thoughts on the power of the Analytical Engine have been deemed “visionary.”





# Computing in the News...

I will try to post some interesting news articles throughout the term!

## Drone Navigation in Uncertain Environments

<https://www.csail.mit.edu/news/programming-drones-fly-face-uncertainty>



# Number Systems Activity



# For Next Class...

- ◆ Complete the All About You questionnaire on Moodle
- ◆ Read Chapter 1 in Blown To Bits - Reading quiz