

**INTRODUCTION AND BACKGROUND TO  
LEGAL, SOCIAL, AND ETHICAL ISSUES IN  
INFORMATION SYSTEMS**  
*"UNWRAPPING THE GIFT"*

**CSE 312 – Legal, Social, and Ethical Issues  
in Information Systems**

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# CH 1: UNWRAPPING THE GIFT

## Overview

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# 1.1 THE PACE OF CHANGE

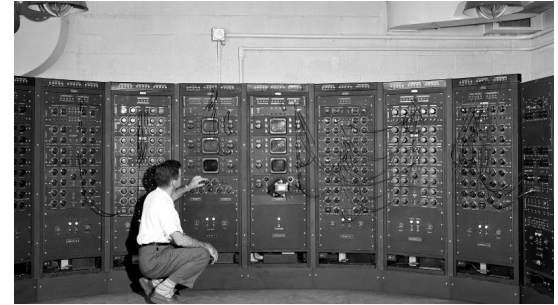
*“In a way not seen since Gutenberg’s printing press that ended the Dark Ages and ignited the Renaissance, the microchip is an epochal technology with unimaginably far-reaching economic, social, and political consequences.”*

– Michael Rothschild (1942-)

American economist, MIT, Princeton, UCLA

# THE PACE OF CHANGE

- 1940s: First computer was built.
- 1956: First hard-drive disk weighed a ton and stored five megabytes.
- 1991: Space shuttle had a one-megahertz computer.
- Ten years later, some automobiles had 100-megahertz computers.
- Speeds of several gigahertz are now common.
  - The way you use computer systems and mobile devices, personally and professionally, will change substantially in two years, in five, and in ten, and almost unrecognizably over the course of your career.



# THE PACE OF CHANGE

- Discussion Question:
  - *What devices are now computerized that were not originally?*
  - Think back 10, 20, 50 years ago.

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# 1.2 CHANGE AND UNEXPECTED DEVELOPMENTS

## ■ Self-Driving Vehicles

### Pros

- Total number of accidents decrease
- Ride sharing (less number of cars on road)
- Self driven public transport (less people own cars)
- Cheap rides
- Parking problem solved (less space needed)
- Improvement in traffic flow



# 1.2 CHANGE AND UNEXPECTED DEVELOPMENTS

## ■ Self-Driving Vehicles

### Cons

- Fatal crashes due to unanticipated situations, software bugs, and design errors
- The software has to take critical ethical decision that might harm one to save another
- Higher expense in building new roads with sensors and markers





# 1.2 CHANGE AND UNEXPECTED DEVELOPMENTS

## ■ Self-Driving Vehicles

### Discussion Questions

- Will cars with human drivers be banned from highways and major roads?
- If the number of fatalities drop by 90%. How important is the ethical decision making issue compared with all other aspect of making the software drive safely?
- What if we want to pull over to the side of the road to take a photo?
- Will we be able to override the rules of the software?

# 1.2 CHANGE AND UNEXPECTED DEVELOPMENTS

## Connections: **Cellphones**, Social Networking, and More

- Relatively few cellphones in 1990s (mostly business people).
- Approximately five billion smartphones (with cameras) worldwide in 2011.
  - Apple introduced the iPhone in 2007.
  - Consumers downloaded 10 billion apps from Apple's App Store (2011).
  - “A Masai warrior with a smartphone and Google has access to more information than the President did 15 years ago”



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Cellphones (cont.)

- Used for conversations and messaging, but also for:
  - taking and sharing pictures
  - downloading music and watching videos
  - checking email and playing games
  - banking and managing investments
  - finding maps
  - tracking friends
  - Smartphones serve as electronic wallets
  - control home appliances from a distance

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Cellphones (cont.)

- Smartphone apps for many tasks, including:
  - monitoring diabetes
  - locating water in remote areas
  - organizing flash mobs for street demonstrations (Moldova *Twitter Revolution* of 2009)
- Motion detection app to stop incoming calls (of the driver)



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Cellphones (cont.)

### ■ **Problems:**

- Location tracking raises privacy concerns.
- Talking or texting on cell phones while driving is dangerous.
- Cameras in cell phones affect privacy in public and non-public places.
- Rudeness is an issue with cellphones: Cell phones can interfere with solitude, quiet and concentration.
- Other unanticipated negative applications:
  - teenagers sexting
  - terrorists detonating bombs
  - rioters organizing looting parties

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Cellphones (cont.)

### ■ Discussion Questions:

- Is the security on smartphones sufficient for banking and electronic wallets?
- What happens if you lose your phone?
- According to the researchers, with enough data, a mathematical model could predict where someone would be at a particular future time with more than 90% accuracy. Is that disturbing to you?
- Some high schools ban use of cell phones in classes. What are some reasons for this policy? Do you think this is a good policy?

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Kill switches

- Allow a remote entity to disable applications and delete files.
- Are in operating systems for smartphones, tablets and computers.
- Used mainly for security, but raise concerns about user autonomy.



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Kill switches

### ■ Amazon:

- After the introduction of the Kindle, a company on Amazon sold books in US that they did not have the copyright for.
- Amazon deleted the book from the people's devices and refunded them
- However, people were startled to learn that Amazon could delete books from their own devices.
- It was included in the use agreement, but the document has thousand of pages and very few people read them.



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Kill switches

### ■ Google:

- In 2011, a software developer discovered malicious code in an app for Android phones.
  - Google quickly removed the app from its store and from more than 250,000 phones.
  - A good purpose for a kill switch, but again people were surprised that Google can delete apps from their phones.
- 
- Same is possible for Apple (it can remotely delete apps from phones)

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Kill switches

- **What is the problem?**
  - What if malicious hackers found a way to operate the kill switches on our devices?
  - Or even the Government can pressure businesses to act as the government prefers.
    - for over 2,000 years, governments and religious and social organizations have burned books that displeased them.
  - These tools are remarkably powerful and remarkably vulnerable!

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Social Networking:

- First online social networking site was [www.classmates.com](http://www.classmates.com) in 1995.
- Founded in 2003, [Myspace](http://www.myspace.com) had roughly 100 million member profiles by 2006.
- Facebook was started at Harvard as an online version of student directories in Feb, 2004
- Social networking is popular with hundreds of millions of people because of the ease with which they can share aspects of their lives.



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Social Networking:

- Uses:
  - People can communicate.
  - Businesses connect with customers.
  - Organizations seek donations.
  - Groups organize volunteers.
  - Protesters organize demonstrations and revolutions.
  - Individuals pool resources through “crowd funding”.

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Social Networking:

### ■ **Problems:**

- Stalkers and bullies stalk and bully.
- Jurors tweet about court cases during trials.
- Socialbots simulate humans
  - A person you follow in social media might not be a person at all
  - A socialbot is an artificial intelligence program that simulates a human being in social media
  - “on the Internet, no one knows you’re a dog.”
- Should we be comfortable with these problems?

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Social Networking

*“While all this razzle-dazzle connects us electronically, it disconnects us from each other, having us “interfacing” more with computers and TV screens than looking in the face of our fellow human beings. Is this progress?”*

– Jim Hightower, radio commentator, 1995



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Communication and the Web (email, blogs, videos):

- In the 1980s, email messages were short and contained only text.
- People worldwide send several billions of email daily, but texting, tweeting, and other social media are now preferred.
- Blogs (“we**B** log”) began as outlets for amateurs wanting to express ideas, but they have become significant source of news and entertainment.
- Inexpensive video cameras and video-manipulation tools have resulted in a burst of amateur videos.
  - We can start our own television network without any cost.
- Many videos on the Web can infringe copyrights owned by entertainment companies.

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Communication and the Web (email, blogs, videos):

- The Good and the Bad:
  - in 2006, an argument in an Hong Kong bus about a person talking loudly on the cell phone was watched by millions of people
  - Creativity: people set it on music, ringtones, pictures, quotes, etc.
    - Internet facilitates and encourages creativity and the quick creation and distribution of culture artifacts and entertainment, with the contribution of ideas, modifications, variations, improvements, and new works from thousands of people.
  - Problem: anything we do in a public place can be captured and preserved on video.



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Telemedicine

- *Long-distance medicine* refers to remote performance of medical exams, analyses, and procedures using specialized equipment and computer networks.
- Remote performance of medical exams and procedures, including **surgery**.
  - Surgeons in New York used video, robotic devices, and high-speed communication links to remotely remove a gall bladder from a patient in France.



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Telemedicine

### ■ Discussion Questions:

- 1. How will we react when we can go into a hospital for surgery performed entirely by a machine?*
- 2. Will it be scarier than riding in the first automatic elevators or airplanes?*
- 3. How will we react when chips implanted in our brains enhance our memory with gigabytes of data and a search engine?*
- 4. Will we still be human?*

# CHANGE AND UNEXPECTED DEVELOPMENTS

## The Internet of Things

- The web of items (e.g. computers, smartphones, tablets, TVs, light bulbs, garage doors, webcams refrigerators, smart watch, baby diapers etc.) embedded with software and connected through the Internet is called the Internet of things (IoT).
- 15 billion devices connected to the internet in 2015
- 50-70 billion will be connected by 2020.
- There is more noise in our life as appliances start communicating with us
- Do we really need chip in all the products?

# CHANGE AND UNEXPECTED DEVELOPMENTS

## E-commerce

- Amazon.com started in 1994 selling books on the Web.
  - It has grown to be one of the most popular, reliable, and user-friendly commercial sites.
- eBay.com facilitates online auctions.
- Traditional brick-and-mortar businesses have established Web sites.
- Online sales in the United States now total hundreds of billions of dollars a year.
- Sellers can sell directly to buyers, resulting in a peer-to-peer economy.



# CHANGE AND UNEXPECTED DEVELOPMENTS

## E-commerce and trust concerns

- **Problem:** People were reluctant to provide credit card information to make online purchases, so [PayPal.com](https://www.paypal.com) grew out of need for trusted intermediary to handle payments.
  - Encryption and secure servers made payments safer.
- The Better Business Bureau established a Web site to help consumers see if others have complained about a business.
- Auction sites implemented rating systems.
  
- **Problems:**
  - Web sites were selling illegal items (Silk Road) using crypto currency (Bitcoin)

# CHANGE AND UNEXPECTED DEVELOPMENTS

## E-commerce

### ■ **More problems:**

- International sites selling products (sometimes medicine) for other countries
- Stolen products are sold online (e.g. ebay)
- Refurbished products are sold as new (e.g. some Amazon sellers do it)



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Free stuff:

- Email programs and email accounts, browsers, filters, firewalls, encryption software, word processors, spreadsheets, software for viewing documents, software to manipulate photos and video, and much more
- Phone services using VOIP such as Skype
- Craigslist classified ad site
- Free books (Project Gutenberg, Google Books)
- News from all over the world for free
- Store our personal photographs, videos, and other files online for free
- University lectures

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Free stuff (cont.): Is it really FREE?

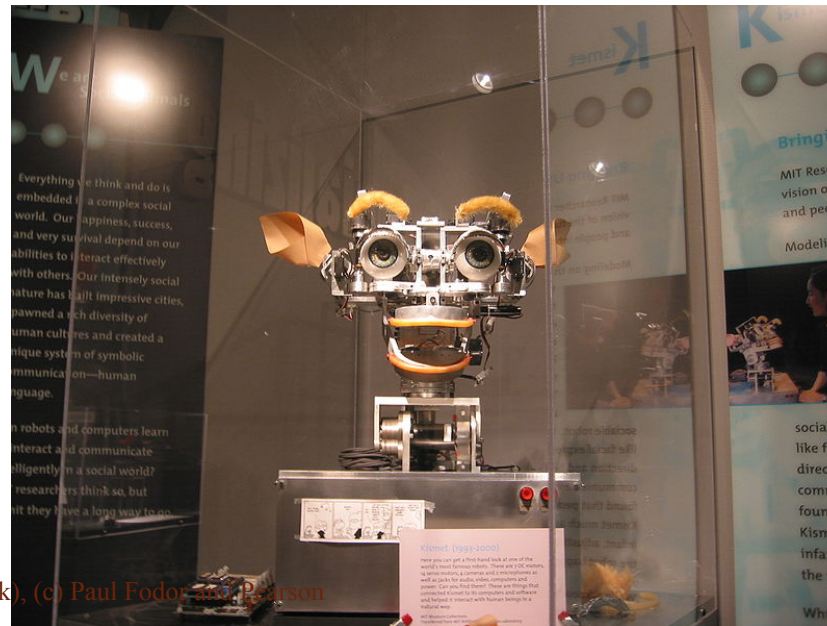
- We pay for libraries with taxes. Who pays these free services?
  - Advertising pays for many free sites and services, but not all.
  - Wikipedia funded through donations.
  - Businesses provide some services for good public relations and as a marketing tool.
  - Generosity and public service flourish on the Web. Many people share their expertise just because they want to.
- **The ugly:**
  - For companies to earn ad revenue to fund multimillion-dollar services, many free sites collect information about our online activities and sell it to advertisers. **This tracking is most of the time now obvious.**



# CHANGE AND UNEXPECTED DEVELOPMENTS

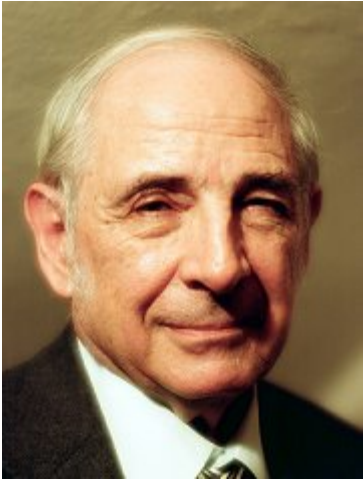
## Artificial intelligence

- A branch of computer science that makes **computers perform tasks normally requiring human intelligence.**
- Some problems are easier for computer than people (because they are rooted in mathematics)



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Artificial intelligence



- Philosopher John Searle (1932-) argues that computers are not and cannot be intelligent. They do not think; they manipulate symbols. They do so at very high speed, and they can store (or access) and manipulate a huge quantity of data. They do not understand; they simulate understanding.
- Many AI applications involve *pattern recognition*.

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Artificial intelligence

- Turing Test: If the computer convinces the human subject that the computer is human, the computer is said to “pass”.
  - Let a person converse (over a network) with the system on any topics the person chooses. If the computer convinces the person that it is human, the computer passes the test.
- Discussion Question:
  - *How will we react when we can have a conversation and not know if we are conversing with a human or a machine?*

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Artificial intelligence

- AI "struggle greatly, and humans will outperform them - by a lot."
  - See a related article "[Artificial Intelligence Is More Artificial Than Intelligent](https://www.wired.com/2016/12/artificial-intelligence-artificial-intelligent/)".  
<https://www.wired.com/2016/12/artificial-intelligence-artificial-intelligent/>
  - Why can't Microsoft conversant Twitter bot, touted as artificially intelligent, be smart enough to stop itself from spewing obscenities?
  - No existing AI technologies can master even the simplest challenges without human-provided context.
    - DeepMind spent years playing Go
    - Watson had the context for Jeopardy
    - x.ai's meeting scheduling assistant took years to learn the context around meeting scheduling in order to reach a consumer-acceptable level of competence
  - It is only because of this human hand-holding and "training" that these machines were able to deliver such dominating performances.
- What is your opinion?

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Robots

- Can operate in environments that are hazardous for people.
- Mechanical devices that perform physical tasks traditionally done by humans.
  - Robotic machines have been assembling products in factories for decades.
  - McDonald's and other fast-food sellers use robotic food preparation systems to reduce costs and speed service.
  - Amazon robots fill orders connected to a customer database, plucks the appropriate products from shelves by reading bar codes and handle billing

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Robots

- **House robots:**
  - iRobot Roomba vacuum cleaners
  - Scooba floor washer
  - robotic lawn mowers
  - Kitchen robots, such as Somabar, are some of the most funded robots on Kickstarter
  - Automated pool cleaners
  - Looj cleans house gutters



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Robots

- **Robot toys and Social Robots:**
  - Sony sold a robot pet dog, Aibo.
  - Even human shape: Honda's Asimo, for example, walks up and down stairs.
  - can serve as companions to elderly people
  - JIBO and ConnectR are family robots that includes telepresence: robots can move around in a remote location and let one communicate with people there via its camera, speaker, and microphone
- **Even help us in the near future**
  - In popular culture: Rosie the Robot from The Jetsons
  - **Discussion question: Would you trust a robot with your child?**

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Robots

### ■ Can we trust them?

- Can you trust a robot pharmacist machine, connected to a patient database, to **take the appropriate medications from pharmacy shelves by reading bar codes, check for drug interactions**?
- Sometimes human error causes them to make mistakes.
- They need continuous supervision.

### ■ Impact on jobs

- White-collar workers being replaced by AI?
- <https://qz.com/875491/japanese-white-collar-workers-are-already-being-replaced-by-artificial-intelligence/>

*"One Japanese insurance company, Fukuoku Mutual Life Insurance, is reportedly replacing 34 human insurance claim workers with "IBM Watson Explorer," starting by January 2017. The AI will scan hospital records and other documents to determine insurance payouts, according to a company press release, factoring injuries, patient medical histories, and procedures administered."*



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Smart sensors, motion, and control

- How do robots walk, climb stairs, and move?
  - Tiny motion-sensing and gravity-sensing devices collect status data.
  - These motion sensing devices are used to give robots the ability to walk, trigger airbags in a crash, and protect laptops when dropped.
- Sensors can detect leaks, acceleration, position, temperature, and moisture.
  - The Wii game console, whose controller Wii Remote detects the user's motion, brought motion-sensing applications to millions of consumers.
  - Now in smartphones and other products (like the Sony PlayStation Move)

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Smart sensors, motion, and control

- Video motion detection:
  - Kinect for the Microsoft Xbox 360
    - Webcam-style add-on peripheral that enables users to control and interact with their console/computer without the need for a game controller, **using gestures and spoken commands**



# CHANGE AND UNEXPECTED DEVELOPMENTS

## Smart sensors, motion, and control

- Sensors detect temperature, acceleration, and stress in materials
  - airplane parts
  - car parts
  - smart buildings and bridges can detect structural problems, report on damage from earthquakes
  - sensors in agricultural fields report on moisture helping farmers to use water when needed

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Smart sensors, motion, and control

- Microprocessor-controlled devices in or on human bodies: heart pacemakers and defibrillators and devices that restore motion to paralyzed people
- Sensors in baby clothes detect when a baby is sleeping face down, at risk for Sudden Infant Death Syndrome, and warn parents on their cellphone
- A heart monitor in a firefighter's shirt alerts supervisors if the firefighter is too stressed and needs a break.

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Tools for disabled people

- Assistive technology devices help restore productivity and independence to people with disabilities.
- Researchers are experimenting with chips that convert brain signals to controls for leg and arm muscles.
  - A person whose leg was amputated above the knee can walk, sit, and climb stairs with an artificial “smart” knee.
    - Sensors pick up tiny electrical fields generated by contractions of muscles in the upper (natural) limb.
- For people who are blind, computers equipped with speech synthesizers read aloud what a sighted person sees on the screen.

# CHANGE AND UNEXPECTED DEVELOPMENTS

## Tools for disabled people

- To restore control and motion to people paralyzed by spinal injuries, researchers are experimenting with **chips that convert brain signals** to controls for leg and arm muscles.
  - the people can operate a computer and control appliances with their thoughts