

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic visual effect.

Computer Science/Computer Engineering

Wheeler HS Fall 2018

Foundations of Engineering

Warmup! - Before we begin...

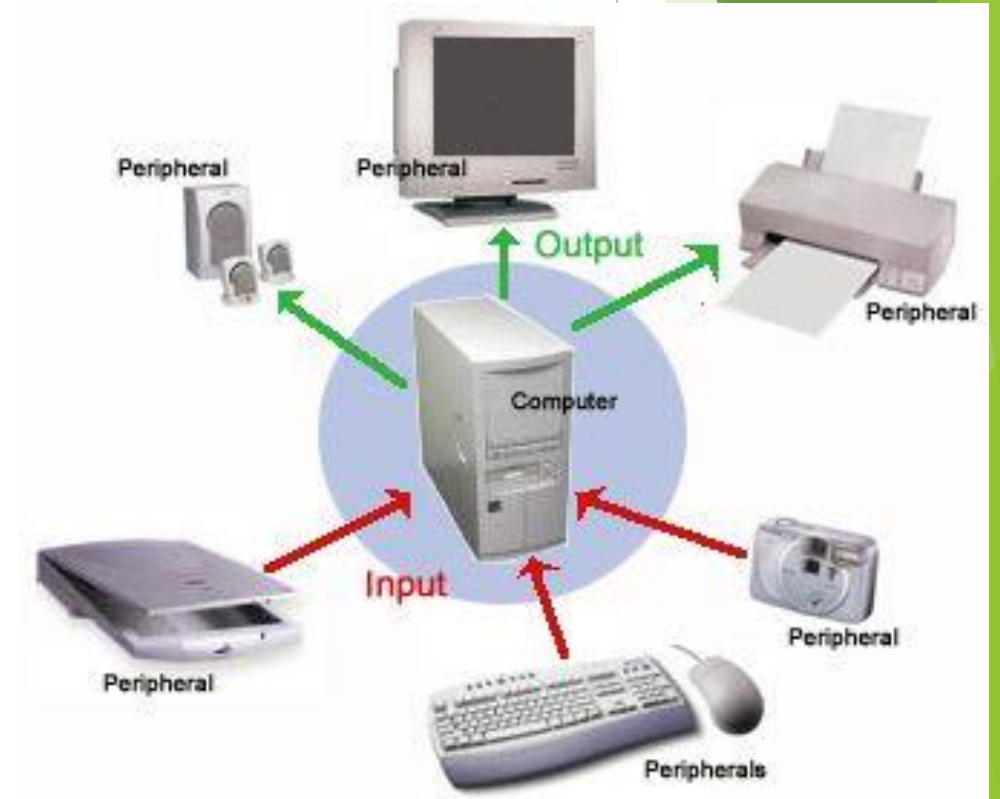
- ▶ Go to the following link and complete this very brief pretest
 - ▶ Do not google/bing/yahoo any of the questions, it is not for a grade

What is Computer Engineering & Computer Science

- ▶ Computer Engineering
 - ▶ Branched out of Electrical Engineering after computers took over the world
 - ▶ Deals with how parts of a computer communicate to each other
- ▶ Computer Science
 - ▶ Development of software/code
 - ▶ Think App development and all those smart people that work at Google/Facebook/etc.

What is a Computer?

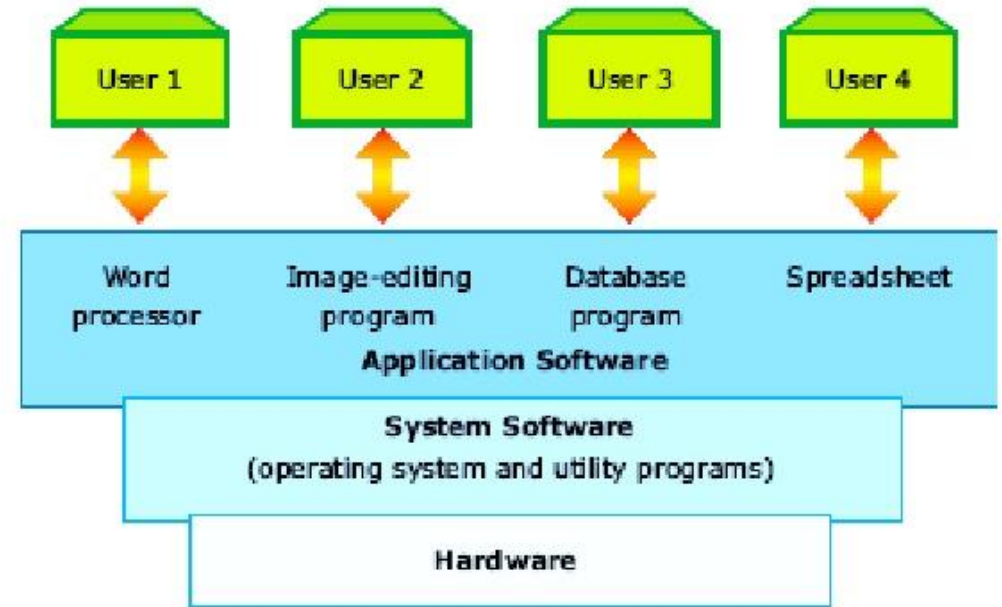
- Definition: Electronic device for storing and processing data
- Examples: calculators, laptops, desktops, phones, microcontrollers



What is Code

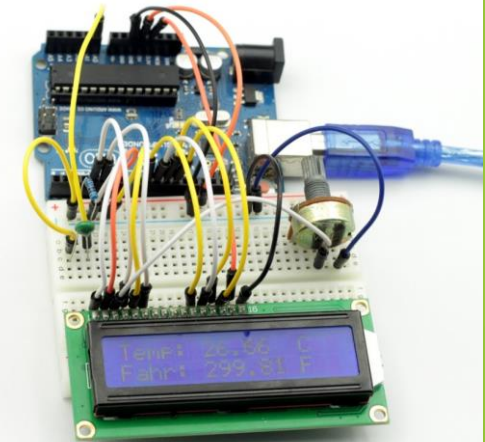
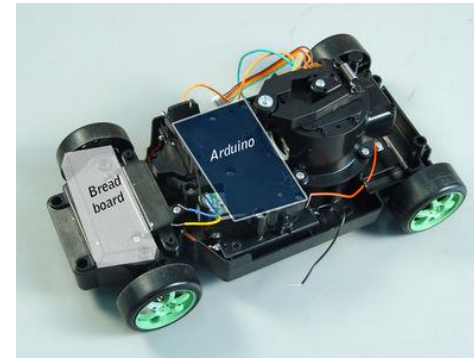
- ▶ How Computers talk to each other and people
- ▶ Different languages
 - ▶ Low-level: how parts of a computer talk to each other
 - ▶ Binary (Machine language)
 - ▶ High-level: how humans talk to/read computer talk
 - ▶ Python
 - ▶ Java
 - ▶ C/C++

Hierarchy of computer software

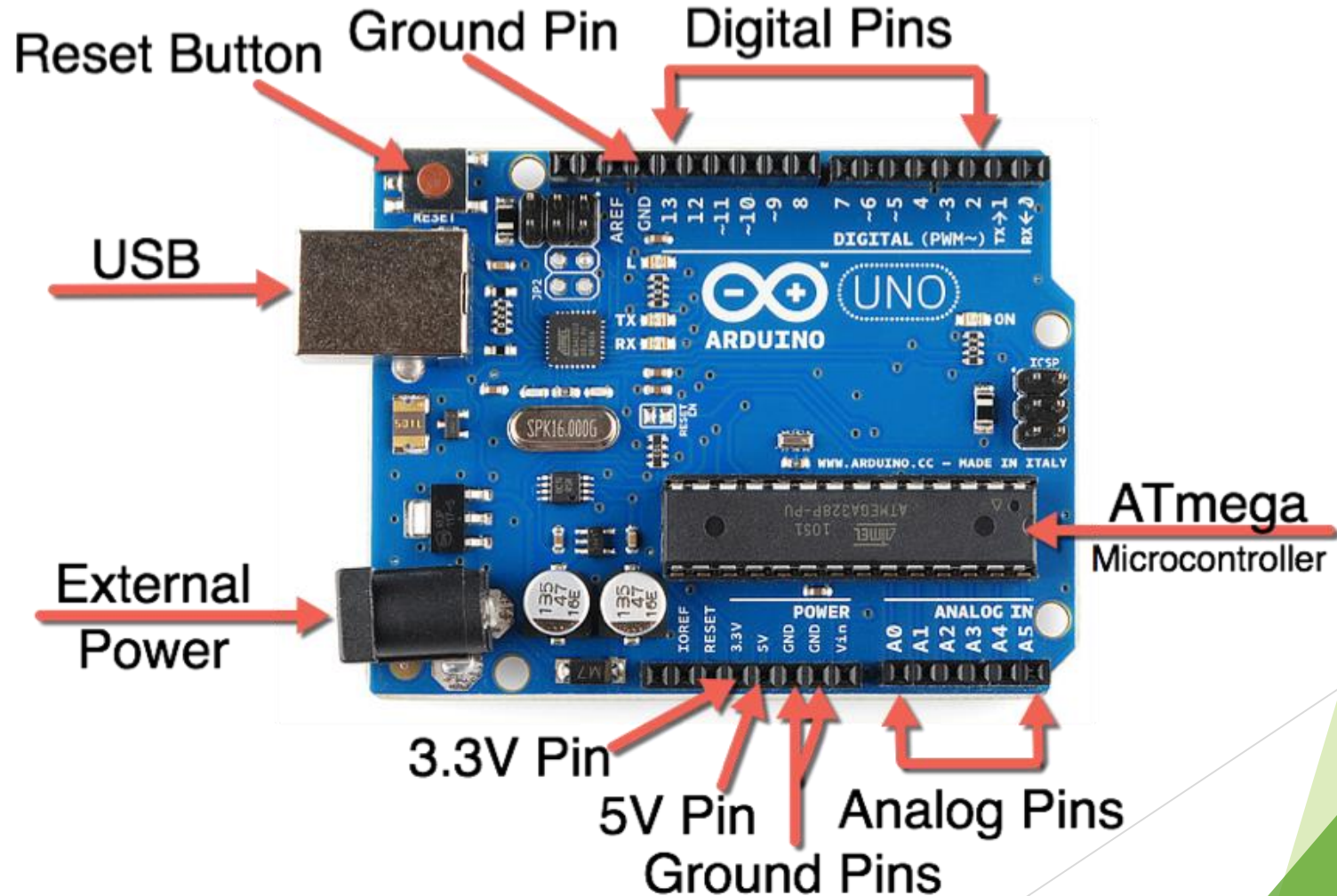


What We're Doing - Arduino Uno

- ▶ Arduino Uno
 - ▶ A common and *relatively* beginner friendly microcontroller
 - ▶ Kit comes with a bunch of devices which it can control
 - ▶ Code language: C/C++
- ▶ Microcontroller
 - ▶ A small, simple computer



Your Arduino Uno



Why we're learning this

- ▶ For prospective Engineers
 - ▶ We are in the digital era, and virtually every STEM related job will in some way
- ▶ For prospective business majors/workers or interested in media work
 - ▶ Business is driven by numbers and the analysis of numbers. Understanding code is a great leg up for understanding data analysis
- ▶ For the lovers of green
 - ▶ <https://www.forbes.com/sites/jeffkauflin/2016/10/17/the-20-college-majors-with-the-highest-starting-salaries/#4fd06f962d50>
 - ▶ Consistently** the highest starting salaries of all majors
- ▶ Other reasons
 - ▶ Practice perseverance, logic and problem-solving skills

<https://www.youtube.com/watch?v=nKlu9yen5nc>

Before we begin! - Norms/Expectations

I plan to use these kits from year to year and they have a bunch of small parts that are easy to lose/break, so let's go over how we will use them:

1. Grab the box with you (or your group's) number
2. Open the box and remove the Arduino and the USB cable
DO NOT TAKE OUT/LEAVE OUT ANY PARTS YOU ARE NOT ACTIVELY USING
3. Enjoy the Arduino!
4. Unplug the Arduino and return all parts back to the box
5. Return the box to me

Running your first Program

1. Open “Arduino IDE” on your computer
 1. May need to install through the “Software Center”
 2. Go to the code sample on the next page and copy it EXACTLY

Additionally, please download the accompanying tutorial
(“[learningtocodeonarduino.pdf](#)”)
 3. Create a folder and save your code in this folder
 4. Connect an LED to PIN 5 (think back to your electronics knowledge for doing this)
 5. Hit the run button in Arduino IDE software to **Compile** the code
 6. Enjoy the blinky light
- What does it do?
 - How do you think you could change the code to make it do something different?



firstCode §

```
int ledPinJason = 5;
int ledPinJasonVal = 0;

void setup() {
  pinMode(ledPinJason, OUTPUT);
}

void loop() {
  digitalWrite(ledPinJason, HIGH);
  delay(100);
  digitalWrite(ledPinJason, LOW);
  delay(100);
}
```

Let's look at the Code

- What does it do?
- How do you think you could change the code to make it do something different?

Quick recap before I set you free

- ▶ House keeping
 - ▶ Make sure connected to right COM port
 - ▶ keep code saved in an organized folder
 - ▶ Keep papers answer sheets saved in the cloud (google drive)
 - ▶ reset button
 - ▶ Blinking without USB (battery powered)
 - ▶ Addressing syntax errors/debugging
- ▶ What we just did was more similar to Computer Engineering (more emphasis on hardware), where as what we will be doing for the next few days is more similar to Computer Science (purely software)

Getting started

We will now be learning basic programming in C/C++ through an online tutorial

- ▶ Go to the tutorial link on my blog and follow along with the lessons
- ▶ As you work through the tutorial, answer the questions/challenges on the word document on my blog (titled: [startingelectronics_parts1-4.docx](#))
 - ▶ For security of your work, I recommend submitting your word document to the accompanying google form every day

Closing

- ▶ Thinking into the far distant future and assuming limitless resources, what is an example of something which you could create with an Arduino?