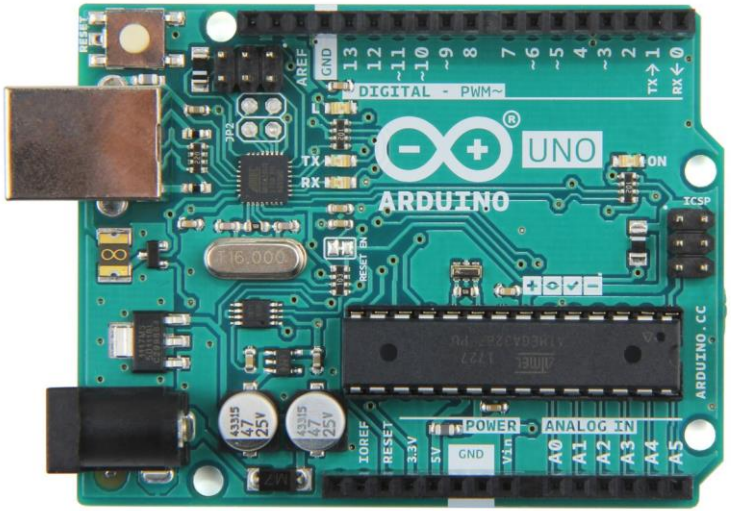
Arduino

Kevin Nguyen
Steven Steele
Daniel Banuelos

What is Arduino

●A microcontroller that contains the necessary hardware/software for a user to program and upload the code to the board.



Strengths and Weaknesses of arduino

Strengths

- Easy to use
- Big source of library
- Big Community

Weaknesses

- Limitations
- Cost
- Debugging

Easy to use

●Ideal for beginners/hobbyists/anyone who wants to do a project
●It comes with the basic necessities so the user can go straight into the programming and uploading it into the microcontroller.

Library

- Arduino’s IDE comes with a lot of examples for users to choose from.
- Users would have to learn the entire process for other microcontrollers
- Arduino keeps it simple for the user

Community

- Arduino has a large community since it’s open-source.
- Forums, documentation, help, everything is free game.
- Useful for beginners to get help with

Limitations

●Although easy to use, arduino isn’t really meant for those who want to gain a better understanding of microcontrollers.

●Arduinos hides the complicated stuff making it difficult for users who want to understand microcontrollers better

Cost

●Most arduino are fairly cheap ranging from $10 - $40 dollars

●Single buys aren’t that bad but if a company had to buy a large quantity of it, the cost would be too high.

No debugger

- Arduino doesn’t come with an internal/official debugger in Arduino’s IDE
- A workaround is to send the output back to the computer while the microcontroller is connected to see the output.

性格是懒

Character is lazy

Usage of Arduino

- Robust, open source IDE
- IDE supported on multiple platforms
  - Windows
  - Mac
  - Linux
- Programmed with a stripped down version of C++

Arduino IDE Features

- Syntax highlighting
- Error checking
- Autocomplete
- Auto-formatting

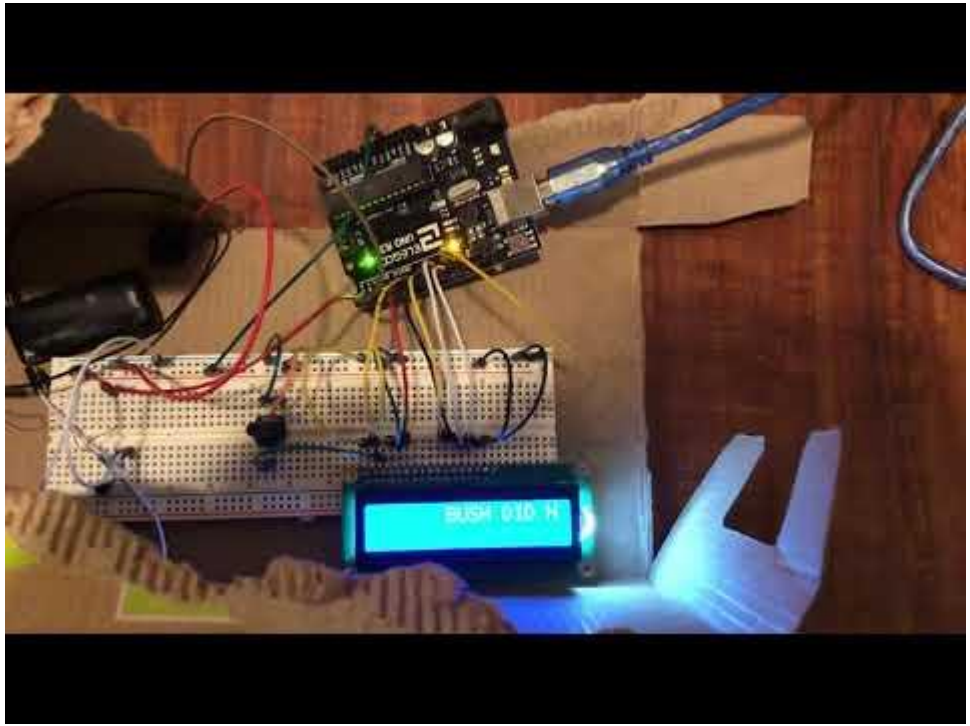
Usage of IDE

- IDE cross-compiles into source code targeting the Arduino
- Executable easily uploaded to Arduino over USB
- No debugging, however the IDE can display serial data (good old fashioned print statement debugging)
- Single main() function executes over and over again.
- Only about 31.5 KB’s of usable flash memory for programs

Easily Interfaces With Other Components

- The included library includes functions for many off-the-shelf components
  - Light/Temperature/Humidity/Barometric Pressure Sensors
  - RF transmitters and receivers
  - Many, many others
- Easily interface with components
- Good for rapid prototyping

So easy, even I can do it



Compare and Contrast

- Open-Source
- Grading Criteria
- Alternatives

Open-Source

- Open-source refers to when the original source of software/hardware is made freely available and can be redistributed and or modified
- How does this pertain to Arduino?
  - Arduino is an open-source electronics-based platform.
  - Its model isn’t unique and can be replicated or modified. (Tons of microcontrollers)

Grading Criteria

- Four factors to compare Arduino to other boards.
  - Power Consumption
  - Speed
  - Versatility
  - Price

Power Consumption & Speed

- Power Consumption
  - Beneficial for long durations or simple programs.
  - CPU correlates to power consumption
  - Arduino runs on an 8-bit CPU
  - MSP430 Launchpad(16-bit)
- Speed
  - Beneficial for running heftier/complex programs
  - Clock speed(MHz) correlates to speed
  - Arduino models generally have a clock speed of 20 MHz
  - Teensy 3.6 (180MHz)

Versatility & Price

- Versatility
  - Well-versed board. Not specific to any needs.
  - Arduino is a balanced microcontroller. Perfect for beginners.
  - STM32 aka Blue Pill.
- Price
  - Arduino also excels in this category, as mentioned, they range from $10-$40.
  - The good thing is that microcontrollers can be purchased from as low as $2.
  - Keep in mind that you are getting what you pay for, so most of the time they are fragile.
  - NodeMCU

Credits

-Pictures used from https://twitter.com/jokanhiyou?lang=en

-Arduino.cc. (2019). *Arduino - Software*. [online] Available at: https://www.arduino.cc/en/Main/Software [Accessed 15 Oct. 2019].

-“Arduino Comparison Guide.” Standard Arduino Comparison Guide - SparkFun Electronics, https://www.sparkfun.com/standard_arduino_comparison_guide.

-Badamasi, Y. (2019). *The working principle of an Arduino - IEEE Conference Publication*. [online] Ieeexplore.ieee.org. Available at: https://ieeexplore.ieee.org/abstract/document/6997578 [Accessed 15 Oct. 2019].

Credits

-Buckley, Ian. “6 Best Arduino Alternative Microcontrollers.” *MakeUseOf*, 2 Feb. 2018, https://www.makeuseof.com/tag/best-arduino-alternative-microcontrollers/.

-Sarwar, Ismail, et al. “Advantages and Disadvantages of Using Arduino.” *Engineer Experiences*, 1 Oct. 2016, http://engineerexperiences.com/advantages-and-disadvatages.html. [Accessed 14 Oct. 2019]

-Store.arduino.cc. (2019). *Arduino Uno Rev3*. [online] Available at: https://store.arduino.cc/usa/arduino-uno-rev3 [Accessed 15 Oct. 2019].

Credits

-Torrone, Phillip. “Why the Arduino Won and Why It's Here to Stay: Make:” *Make*, 10 Feb. 2011,

https://makezine.com/2011/02/10/why-the-arduino-won-and-why-its-here-to-stay/.

-Zait, Anat. “4 Simple Steps for Debugging Your Arduino Project.” *Circuito.io Blog*, 2 Apr. 2018,

https://www.circuito.io/blog/arduino-debugging/. [Accessed 14 Oct. 2019]

Q&A

- Thank you for your time. We will now answer any questions you may have.