Going Pro with Arduino!

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What is Arduino?

- Microcontroller
- Open source

- Great for making electronics projects
Objectives

Cover
- Setting up
- Basic Arduino components
- Simple projects
- Debugging common issues
- Laying foundation for projects

Not Cover
- Electric engineering (beyond basic)
- Working with different types of Arduino boards
- Integration with external hardware (possible)
Topics to Cover

1. Setting Up
2. Using the IDE
3. Basic electrical engineering
4. Basic Stuff (LEDs)
5. Input reading (Buttons, Pot, Ultrasonic sensor)
6. Outputs (Terminal, Servo)
7. Debugging Common Issues
Materials

Arduino Uno (x1)  
Breadboard

Wires (a lot)  
Cable

LEDs (x1)  
220

Resistor (x1)  
Push-Button (x1)

10k Resistor (x1)  
Ultrasonic sensor (x1)

10k Potentiometer (x1)

90-degree servo (x1)
Setup

• Best run on computer

• Installing Arduino
  https://www.arduino.cc/en/Main/Software

• Arduino Web Editor (Cloud Version)
The IDE

```cpp
void setup() {
  // put your setup code here, to run once:
}

void loop() {
  // put your main code here, to run repeatedly:
}
```
Basic Electrical Engineering

I. Flow from positive → negative → ground
II. Must flow to the same ground
III. Same wire, same rail, same flow
IV. Don’t exceed the voltage
V. Ohm’s Law: V = IR
LED

- `pinMode(pinNumber, OUTPUT);`
- `digitalWrite(pinNumber, HIGH/LOW);`
Button

- `digitalRead(pinNumber)`
- `boolean debounce (bool last)`
Potentiometer (Pot)

- `analogRead(pinNumber);`
- `map(input, minInputVal, maxInputVal, minOutputVal, maxOutputVal)`
- `Serial.begin(baudRate);`
- `Serial.print(string);`
Ultrasonic Sensor

- `pulseIn(\\textit{echoPin}, \text{HIGH})`
Servo

- `#include <Servo.h>`
- `Servo myServo;`
- `myServo.attach(pinNumber);`
- `myServo.write(angle);`
- `myServo.read();`
Debugging Common Issues

I. Circuit not wired properly
   A. Positive $\rightarrow$ Negative $\rightarrow$ Ground

II. Drawing too much current
   A. Add a new power source

III. Wrong board selected

IV. Port not selected (uploading code)
Resources

- *Exploring Arduino* by Jeremy Blum
- Fritzing (documenting schematics)
  - [http://fritzing.org/home/](http://fritzing.org/home/)
- Arduino Project Ideas
  - [https://www.robjmal.com/arduino-ideas](https://www.robjmal.com/arduino-ideas)