

## Course Outline

Topics	Assignments	Hardware
Arduino Development <ul style="list-style-type: none"> <li>• Board basics</li> <li>• Power, reset</li> <li>• IDE</li> <li>• Sketch Structure</li> <li>• Serial Debug</li> <li>• Boot loader, USB comm.</li> </ul>	<ul style="list-style-type: none"> <li>• “Hello World” serial</li> <li>• Blink LED</li> </ul>	<ul style="list-style-type: none"> <li>• Arduino Board (w/ USB cable)</li> <li>• Computers w/ IDE</li> </ul>
Digital I/O <ul style="list-style-type: none"> <li>• Pins</li> <li>• High/Low</li> <li>• Pull-ups</li> <li>• Active high vs active low</li> </ul> Electricity Basics <ul style="list-style-type: none"> <li>• Resistors</li> <li>• Ohm’s Law</li> <li>• Breadboarding</li> </ul>	<ul style="list-style-type: none"> <li>• 2 buttons, 2 LEDs blink LED when button pressed</li> <li>• Cylon lights</li> <li>• 7-segment LED display</li> <li>• 7-segment clock</li> </ul>	<ul style="list-style-type: none"> <li>• Breadboard</li> <li>• Buttons (Bump sensor)</li> <li>• LEDs</li> <li>• Resistors?</li> <li>• Wire</li> <li>• 7-segment display</li> </ul>
Delay/Audio	<ul style="list-style-type: none"> <li>• Simple “keyboard” (speaker)</li> </ul>	<ul style="list-style-type: none"> <li>• Speaker/piezo buzzer</li> </ul>
Serial Comm (RX/TX) LCD Basics	<ul style="list-style-type: none"> <li>• Echo to LCD from serial input</li> </ul>	<ul style="list-style-type: none"> <li>• LCD Module</li> </ul>
3-Wire sensors Analog Input	<ul style="list-style-type: none"> <li>• Read sensor, echo to serial</li> <li>• Calibrate?</li> </ul>	<ul style="list-style-type: none"> <li>• Hall effect</li> <li>• Temperature</li> <li>• IR</li> <li>• PING?</li> <li>• Light</li> <li>• Line</li> <li>• Color</li> <li>• Compass</li> <li>• Potentiometer</li> </ul>
<ul style="list-style-type: none"> <li>• DC motors</li> <li>• H-Bridge</li> <li>• Transistors</li> <li>• PWM</li> </ul>	<ul style="list-style-type: none"> <li>• Input-based motor control</li> <li>• Serial/Bluetooth</li> <li>• Buttons</li> <li>• LED dimming</li> </ul>	<ul style="list-style-type: none"> <li>• Motor shield, H-Bridge, or Romeo</li> <li>• Motors/mobility platform</li> <li>• Batteries, clip, recharger</li> </ul>
Servo motors Continuous/180	<ul style="list-style-type: none"> <li>• Turn to position based on external input (speedometer)</li> <li>• Potentiometer?</li> </ul>	<ul style="list-style-type: none"> <li>• Servo motors</li> </ul>
Stepper motors	<ul style="list-style-type: none"> <li>• Turn a given amount/number of rotations or to given angle</li> </ul>	<ul style="list-style-type: none"> <li>• Stepper Motors</li> </ul>

## Other Topics

- 2-wire interface (I2C)
- RFID
- Bluetooth
- RF serial
  - Error checking
  - Multi-drop
- IR communication
- Zigbee

- Multiplexing, charlieplexing
- History/Intro to robotics
- Other robotics concepts?
- Robotic arm?

### **Other Hardware**

- RS-232 converter
- RS-485 converter
- RFID hardware
- Bluetooth hardware
- RF hardware
- IR comm. Hardware
- LED array
- Robotic arm
- Zigbee hardware
- Bump sensors

### **Robot Project Idea**

- Line following
- Tape racetrack
- Avoid walls
- Walled race track
- Robotic arm
- Sumo robots
- Collaborative robots
- Remote-controlled robot
- Light-seeking
- Follower robot

### **Other Project Ideas**

- LED matrix
- Wireless (temp) sensor