Notes

- The basics for this assignment, including the Fritzing schematic and pictorial, can be found at http://www2.beens.org/computer-technology/arduino/activities/blinking-led.
- This lesson plan can be found at http://goo.gl/M03YN7 as a Google Doc.
- The five questions are included in the Consolidation section of the lesson plan.
- The source code for this assignment can be found at http://www2.beens.org/computer-technology/arduino/activities/blinking-led/code.

Assignment Requirements

- Write a tutorial for a microcontroller circuit.
    - based on Arduino, Stamp or PicAxe
    - shows input - process - output
    - beginner level, may be completed by a grade 10 student in 1 period
    - include schematic, pictorial (fritzing) and code (with comments)
    - include some discussion
    - example
    - include extension suggestions
    - include 5 questions
    - submit as document or web page

Lesson Title

Arduino Blinking LED Circuit

Lesson Overview

Students will create a circuit using an Arduino, an LED, and a resistor; and write a program that blinks the LED at a predetermed rate.

Learning Goals

- I will learn what an Arduino is.
- I will write an Arduino program that blinks an LED at a rate specified by the instructor.
- I will breadboard a simple LED circuit.

Expectations

- A1.1 identify basic electronic components and describe their functions;
- B2.1 safely construct and test electronic circuits, using both breadboard and soldering techniques to connect discrete components and/or integrated circuits;

- B2.3 describe and build an interface to connect a computer to a simple peripheral or robotic device;
- B5.1 use a procedural programming language to define constants and variables, write expressions and assignment statements, and specify the order in which the operations are performed in a program;
- B5.2 use input and output statements in a program;
- B5.4 use a design process to plan, write, and test a computer program to control a simple robot or peripheral device.

Resources

- Blinking LED Assignment Page
  http://www2.beens.org/computer-technology/arduino/activities/blinking-led
- Hardware:
  - Arduino
  - USB Cable
  - Breadboard
  - LED
  - 330 ohm resistor
- PC with Arduino IDE software
- Video: How Arduino is open-sourcing imagination
  https://www.ted.com/talks/massimo_banzi_how_arduino_is_open_sourcing_imagination
- Video: “Tutorial 01 for Arduino: Getting Acquainted with Arduino”
  https://www.youtube.com/watch?v=fCxzA9_kg6s

Prior Knowledge

No prior knowledge is assumed.

Accomodations

Students may work in groups, but are encouraged to do this subsequent assignments independently.

Minds on

1. Show the students an Arduino and mention some of the “cool” projects that have been created with one.
2. Discuss how Arduinos are replacing customized electronics circuits.
3. Watch “How Arduino is open-sourcing imagination” at
   https://www.ted.com/talks/massimo_banzi_how_arduino_is_open_sourcing_imagination

Action

1. As a class, watch the video “Tutorial 01 for Arduino: Getting Acquainted with Arduino” at https://www.youtube.com/watch?v=fCxzA9_kg6s.
2. Demonstrate the activities that were shown in the video.
3. Have the students independently watch the video again, this time following the steps to breadboard the circuit and load the program.
4. Important! Have the students show you the circuit before they hook the Arduino up to the computer.
5. Test the circuit and troubleshoot (with the student) if necessary. Share any troubleshooting experiences with the class.

Extension Activity

Experiment with your program to determine the minimum delay you can have before the LED no longer appears to be blinking? What "rate" does this correspond to?

Consolidation

- Questions:
    - What is an Arduino?
    - What counts as the “input” for this assignment?
    - What is the “output”
    - If the delay is changed to 500 milliseconds, what is the flashing rate?
    - How would you modify your program to use a different pin as the output?
- Ask the students what can be improved in this unit for future students.