**2025 SoutheastCon Circuit**

**Homework Challenges**

The 2025 SoutheastCon Circuit Challenge will be based on an Arduino Mega 2560 and will include both digital and analog circuitry, and Arduino programming.

To better prepare for the challenges, the teams are offered the following ‘homework exercises’ that will be beneficial to solving the contest challenges this year. These exercises are not required to be completed, nor are they judged, or result in any points for the challenges. However, each team should be able to complete them in advance before the competition.

**The homework challenges are:**

1. Install the Arduino IDE and configure for the Arduino ATMEGA 2560
   * Goal: Install the IDE in advance of the competition and learn how to use it
   * There are lots of good websites and Youtube videos on how to complete this step
   * Components: None, although access to an Arduino 2560 will help in the following challenges
2. Blinking LED (Hello World of Arduino)
   * Goal: Learn how to hook up and program the Arduino, and some basic digital I/O
   * Components: LED, resistor (220Ω)
3. Modifyng the blink rate with a potentiometer
   * Goal: Learn to read and use the A/D values on the Arduino 2560
   * Read the A/D value from one of the Arduino 2560 A/D ports
   * Starting with the code in exercise #1, use the A/D value to control the blink rate of the LED
   * Components: exercise #1 components, and potentiometer for Analog Input
4. Display the potentiometer value on the 16x2 LCD screen
   * Goal: Learn how to output data to the 16x2 LCD screen
   * Starting with the the code in exercise #2 above, output the current A/D value to the LCD screen
   * Components: exercise #2 components and LCD 1602 Display (I2C module included)
5. Read analog input and send plot the data in real time
   * Goal: Read and plot multiple analog inputs (e.g., 2 potentiometers)
   * Read the A/D value from a different Arduino 2560 A/D port and potentiometer
   * Plot the two A/D values in an automatic scrolling display
   * Tip: Open Tools > Serial Plotter in the Arduino IDE to visualize the data

**Each team will have access to the following items during the competition:**

**Team supplied items**

Each team is expected to bring one (or more) laptops with internet access, to onnect to the conference WiFi, to provide access to documentation for the Arduino 2560, Elegoo MEGA kit, KEYESTUDIO 48-in-1 sensors kit, and to provide assistance during the competition. Teams are able, and are expected, to take advantage of this access during the competition (remember, Google can be your friend).

**Conference supplied inventory**

Each team will be provided access to the same set of parts and tools. While teams may bring in additional tools (oscilloscopes, meters, etc), they are NOT allowed to use any outside parts during the competition challenge.

**The following items will be available at each team workstation**

Elegoo MEGA 2560 kit

https://www.amazon.com/EL-KIT-008-Project-Complete-Ultimate-TUTORIAL/dp/B01EWNUUUA

https://www.elegoo.com/blogs/arduino-projects/elegoo-mega-2560-the-most-complete-starter-kit-tutorial

KEYESTUDIO 48-in-1 Sensors Modules Starter Kit for Arduino

https://www.amazon.com/dp/B07K6L2VRB

**Additional conference supplied inventory**

In addition to the items at each team’s station, the following items are available on loan from the contest organizers:

DSO-TC3 scope/multimeter

http://amazon.com/dp/B0C8D6VJ1L

Scissors, strippers, wire cutters, and an assortment of wires, resistors, capacitors, op-amps, PNP and NPN transistors, diodes, 555 timers, and other components