

HackBI VIII – Engineering Circuits Workshop Script

- Introduction
 - Introduce the workshop leaders.
 - Introduce circuits.
 - A circular flow of electricity that travels out of a power source and performs tasks before returning to the source.
 - Introduce the activity.
 - Participants will solder a mini-car powered by a small circuit; participants will learn about the various parts of the circuit during the workshop.
- Voltage, Current, and Resistance
 - Introduce voltage.
 - Voltage is the difference in electric potential energy per unit charge.
 - Voltage is displayed in volts.
 - Introduce current.
 - Current indicates the rate of electron flow.
 - Voltage is displayed in amperes.
 - Introduce resistance.
 - Resistance limits the flow of current.
 - Resistance is displayed in Ohms.
 - Introduce the voltage formula ($V = IR$).
- Series and Parallel Circuits

- Introduce series circuits.
 - Series circuit power runs from component to component and loses power along the way.
- Introduce parallel circuits.
 - Parallel circuit power allows the components to experience the same power.
- Capacitors
 - Introduce capacitors.
 - Capacitors are electronic components that can store charge.
 - Capacitors are used for sensing, energy storage, motor starters, and more.
- Comparators and Gates
 - Introduce comparators.
 - Comparators “compare” two input voltages, determining which is higher (0 or 1, binary).
 - Introduce Logic Gates.
 - Logic gates perform Boolean (T/F, 0 or 1) logic operations on one or multiple binary inputs, producing a single binary input.
 - Introduce AND, OR, and NOT gates.
- Relate to the Activity

- Inform participants that the circuit powering the car (which will be made during the activity) contains all the aforementioned components.
- Soldering Tutorial
 - Play the tutorial on the slideshow.
 - Note tips and safety hazards.
 - Solder several times in front of the audience so they can grasp what to do.
- Activity
 - Hand out mini-cars and let participants work on the activity.
 - Walk around and assist if necessary.

** The car mentioned (activity) is one we (the workshop leaders) may purchase independently or through the budget. It is a soldering kit that constructs a mini car.

<https://www.amazon.com/Vogurtime-Soldering-Educational-Electronic-Practicing/dp/B07K5G97JG?th=1>