

## 1001-act3 Introduction to Electronics

<b>Activity</b>	What Electronics is Made of: Components
<b>Student Guide</b>	<a href="#">1001-act3-stg-pdf-tmt3NngN</a> <b>Note:</b> Student version is optional. Mainly useful for remote students.
<b>Teacher Guide</b>	<a href="#">1001-act3-tcg-pdf-tmt3NngL</a>
<b>Summary</b>	<p>The purpose of this activity is to introduce the idea that electronics is the basis of coding and robotics because all code or programs must run on some kind of electronic device. By covering this early, students can learn that there is more to robotics than just code and that their code can be more useful and fun if they combine it with electronics, rather than simply running a program or application.</p> <p>This is why we start the course by looking at electronics instead of coding.</p> <p>We start by showing students some electronic components used in electronics and that electronics is about controlling electric currents in circuits. We will give each student some components, explain what they are and do and then have them find the components on the JackBord TOP.</p>
<b>Principals Covered</b>	<ul style="list-style-type: none"> <li>● All code must run on some form of electronics</li> <li>● Electronics is about components used to control currents in circuits</li> <li>● Circuits are collections of components</li> <li>● The basic components are resistors, capacitors, light emitting diodes etc</li> </ul>
<b>Learning Outcomes</b>	<ul style="list-style-type: none"> <li>● Understand computers, tablets etc rely on electronics to run code</li> <li>● Electronics is a collection of components connected together with wires along which currents flow</li> <li>● Identify the basic electronic components on the JackBord TOP</li> </ul>
<b>Achievement Standards</b>	
<b>Equipment/ Resources</b>	<p>Each student will need one of the following:</p> <ul style="list-style-type: none"> <li>● Printed copy of the student guide pdf</li> <li>● 1 x JackBord TOP</li> <li>● 1 x Resistor</li> <li>● 1 x Light dependent resistor (LDR)</li> <li>● 1 x Capacitor</li> <li>● 1 x LED</li> <li>● 1 x Diode</li> <li>● 1 x Transistor</li> </ul> <p><b>Note:</b> The electronic components for this activity are available from <a href="http://www.JackBord.com">www.JackBord.com</a></p>
<b>Preparation</b>	<ul style="list-style-type: none"> <li>● Prepare the components to make it easy to hand them out to the students</li> <li>● Print enough student guides so each student gets one</li> </ul>

**Instructions****1. Pass out the Student Guide & Components**

Give each student:

- 1 x Student guide sheet
- 1 x JackBord TOP
- 1 x Resistor
- 1 x Light dependent resistor (LDR)
- 1 x Capacitor
- 1 x LED
- 1 x Diode
- 1 x Transistor

## 2. Introduce the Components

Once the students have the components, introduce each one in the order shown below.

	<p><b>Resistor</b></p> <p>A resistor impedes the flow of electrons or current in an electrical conductor or wire. In many ways this is very similar to the effect of squeezing a water hose. The tighter the hose is squeezed the lower the flow of water or in the case of resistor the lower the current. Thus the greater the value of the resistor the more it limits the flow of current.</p>
	<p><b>Variable Resistor or Potentiometer</b></p> <p>A variable resistor is a resistor whose value can be changed by turning a shaft. The shaft usually has a knob on it.</p>
	<p><b>Light dependent resistor LDR</b></p> <p>A light dependent resistor (LDR) is a type of resistor whose value of resistance changes with the amount of light falling on it. These allow the amount of light to be measured, for example in a night light.</p>
	<p><b>Capacitor</b></p> <p>A capacitor is like a battery in that it can store electricity for short periods of time. But unlike a battery it leaks and so any charge stored escapes quickly. Which is why you don't use them as batteries. But they can release their charge very very rapidly which can be very useful in things like lasers and railguns.</p>
	<p><b>Light Emitting Diode (LED)</b></p> <p>Light emitting diodes or LEDs are a special type of diode that emits light when a current is passed through them. These are used in all sorts of electronic devices from radios televisions to computers.</p>
	<p><b>Diode</b></p> <p>A diode only allows current to flow in one direction. The band on the end indicates the direction in which the current will flow. In the example on the left the current will flow from the left to the right.</p>
	<p><b>Switch</b></p> <p>A switch is simply a means of bringing two conductors or wires together so that current may flow. When you have two pieces of wire and you touch them together that is a switch.</p>
	<p><b>Transistor</b></p> <p>A transistor is a type of electronic switch in which there are no moving parts. These are much smaller and much more reliable than a physical mechanical switch. They can also switch on and off very very quickly, in the case of computers, millions of times per second.</p>
	<p><b>Wire</b></p> <p>Electrical wire is a conductor made of copper which is protected by a plastic cover. Wires carry electric current in circuits. The TOP does not have wires on it, but the tracks on the TOPs circuit board do the same job. These are the lines on the back of the TOP.</p>

### 3. Identifying Parts on the JackBord TOPs

Once the components have been introduced, ask the students to locate and identify each of the parts on their JackBord TOPs.

For each component, have them count the number they find on the TOP and record the totals in the **My Parts Count** on their student guide sheet.

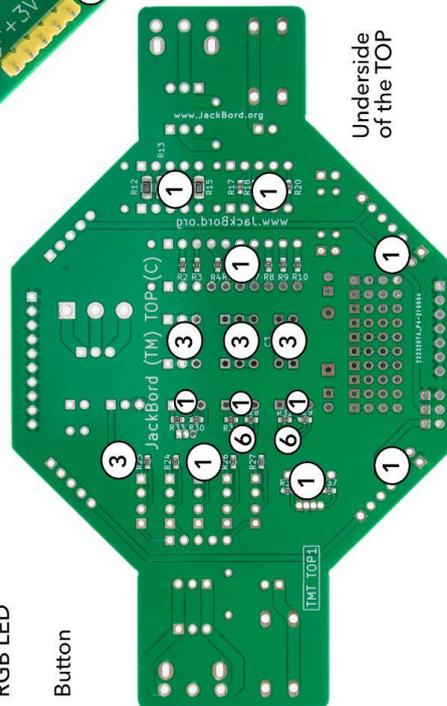
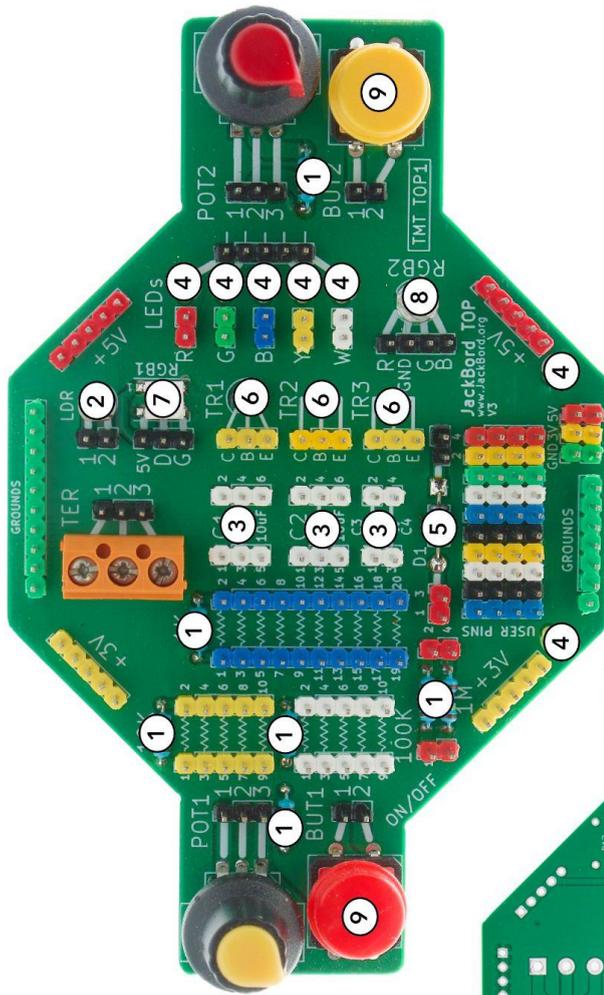
Once they have recorded their totals give them the results from the table below. The second column is the total that most students find, the last column is the actual number of each part on the JackBord TOP.

Part	Student Count	Actual Count	Notes
Resistor	~5	~33	The missing resistors are the surface mount or SMD ones located on the underside of the JackBord TOP.
LDR	1	1	
Capacitor	0	4	These are surface mount and are all located on the underside of the JackBord TOP.
LED	7	9	There are the 5 LEDs on the right, the red and yellow power LEDs, the RGB LED and the smart RGB LED.
Diode	1	1	
Transistor	1	3	The two other transistors are surface mount types and are located on the underside of the TOP.

**Note:** the Actual Count on a TOP may vary slightly.

#### 4. Locations of the Various Components on the TOP:

The pictures below show the location and number of each component on the TOP. Where needed we show the locations on the upper and lower surfaces of the TOP.



- ① Resistors
- ② Light dependent resistor (LDR)
- ③ Capacitors (underside)
- ④ Light emitting diodes (LEDs)
- ⑤ Diode
- ⑥ Transistors  
One above, two below
- ⑦ Smart RGB LED
- ⑧ RGB LED
- ⑨ Button

Have them record in their books what each of the parts is called. No real need for them to know what they do as we will cover that next time.

**Notes**

**Extension**

**Additional Resources**