

Circuits

Circuits are the foundation of all computers and electronics. While circuits can get extremely complex, they all have to exhibit a few important features. To understand these key features, let's think about a similar situation, a water tower. You may have a water tower in your town. They store water in a tank high above the ground.

Now, if we want to keep that water fresh, we have to constantly be cycling new water from the ground into the tank. Since the tank has a higher potential energy than the ground, we need some energy source to move the water up. So we use a pump. This would solve our water freshness problem, except for there's no room in the tank for this new water. So we install a drain valve to let water flow out of the tank. This water returns to ground level, where it can later be pumped back into the tank.

So now let's connect this to the concept of an electrical circuit. In order for electricity to do any work, electrons have to be flowing. They have to be moving. So we solve this problem the same way we solved the water tower problem. Every circuit has three main components. Just as with the water tank, we need an energy supply to keep the electrons flowing. We call that energy supply the source. The source in a circuit is usually a battery or a wall outlet.

Next, every circuit needs something that will use this flow of electricity. We call this the load. The load might be a motor or a light or another resistor of some type. This is the part of the circuit that uses up electrical potential energy.

Lastly, in order for the electrons to flow, we need a path for the electrons to take. Just like with the water tower, though, we need a path for the electrons to get to the load as well as a path away from the load back to the source. When this circular path is created, electricity can flow and do work, like turning on a light. If, somehow, the circuit gets broken, say by flipping a switch or a wire getting cut, the electrons stop flowing, and the circuit goes dead.
