Introduction For Students

This workshop will help you learn about computers – but not how to *use* computers. Rather, when we are finished, you will understand a little bit about how and why computers really do work and get answers to math problems. To get to that goal, you'll need to learn some new topics in math, and learn about electricity. You'll also need to learn about basic *electronic components*, too. These are the small pieces that are used together in *circuits* to do useful things with electricity. When assembled, circuits (whether simple or complex) enable electricity to do all the things we can make electricity do, like light our homes, play music on the radio, find directions with a GPS, run a gasoline engine, or show you a web page.

Computers are wonderful, multipurpose machines. But computers can't add or subtract the way you do. They can't read the way you do. They don't think. Really, *they only do math.* Everything computers do is controlled by a series of instructions that *all boil down to math and logic,* even if it looks like magic (even if it is AI!). The way computers do all the things they do can always be described as a series of instructions. Each of these actions can be performed by some combination of special circuit types, and each circuit is made up of basic electronic components. You can learn enough about each basic component to understand what it does, without needing to do a bunch of math. And, you can understand all the individual instructions, even if you don't want to build your own computer!

The workshop will help you to make, from the most basic electronic components, a simple digital calculator that can add two numbers and correctly display the result, or tell you whether or not two numbers are equal. Along the way you'll see how each piece works, and how to put the pieces together. Some workshops will also teach you how to solder components, so you can actually *make* some of the building blocks of computers. There are follow-on discussions about other topics like subtraction and using circuits to store information so a computer can use it later.

This time together should be fun! You can help make it fun for everyone by asking questions and by telling the instructor what you think about the parts of this course. It's not easy to teach this material, so your feedback will help the authors improve this course over time, as the feedback from many people has already improved this workshop.

I'm so glad you're interested in computers. It makes me feel good when people learn things and have fun with this course. Thank you!

Jesse