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## What is an FPGA? What is an ASIC?

FPGA stands for **F**ield **P**rogrammable **G**ate **A**rray. An FPGA is a component that can be thought of as a giant ocean of digital components (gates, look-up-tables, flip-flops) that can be connected together by wires. **The code that you write makes real physical connections with wires to perform the function that you need. What makes FPGAs and ASICs special is that they are very good at performing a large number of operations in parallel (at the same time). They are used in high-speed, high-performance tasks such as image processing, telecommunications, digital signal processing, high-frequency stock market trading, and many others.**

FPGAs are also fun to design with! The code that you write is at the lowest possible level; you are literally describing gates and flip-flops with your code. They are an excellent way for a student to become familiar with hardware programming techniques and apply the knowledge learned in a digital electronics course to the real world. The information on this site should help you to become a confident digital designer.

Here are some examples of designs that are possible with FPGAs:

- [Face detection and tracking on an FPGA](#)
- [Demonstration of a few FPGA projects](#)
- [Creation of an FPGA based oscilloscope](#)

### What is an FPGA? Intro for Beginners



ASIC stands for **A**pplication **S**pecific **I**ntegrated **C**ircuit. An ASIC is similar in theory to an FPGA, with the exception that it is fabricated as a custom circuit. This means that – unlike FPGAs – it is not reprogrammable, so you had better get it right the first time! Since ASICs are custom circuits, they are very fast and use less power than an FPGA. This can be critical in power-sensitive applications such as cell phones, mp3 players, and other battery-operated devices.

The biggest drawback to an ASIC is cost. To get a company to build an ASIC for you will cost hundreds of thousands of dollars as an initial investment!

Both FPGAs and ASICs are designed with a Hardware Description Language (HDL). The two most popular hardware description languages are VHDL and Verilog. Browse the navigation panel to learn more. And have fun!

[Learn about the basics of Digital Design, what is a Digital Designer?](#)

Or if you want to get right into learning how to program:

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