Industrial Logic Controllers

Using both the Advanced AXC PLCs, with PC Worx, and the Nano Line PLCs, with Nano Navigator Suite, we created circuits that interfaced with the real world.

Shown to the left is a circuit that uses an ATX power SUPPLY and A Nano PLC to turn on a light bulb in different ways. Using the Advanced AXC PLCs, we did labs we did labs using circuitry similar to logisim and ISE and ladder logic.

Our machine has 26 unique instructions that can be programmed into an embedded code stack to allow for autonomous execution using a finite state machine. Once the machine has been programmed through the stack, the machine can be set to run autonomously run through the program as expected from any other computer.

Feild Programmable Gate Arrays

Using ATLYS FPGAs, we were able to implement simple variants of the cores. Utilizing the ISE Suite, we designed the circuits required for these cores and physically interacted with them using the ATLYS FPGAs. This allowed us to have hands on interaction with our circuit.

Project Goals

Use Logisim to create a quad core vector array and neuron processor with an embedded code stack. The processor controlled by a program counter with a master control unit and a finite state machine that implements the simple pipeline of fetch, decode, execute, and write-back plus any special states.

Our machine needed to be able to process a set of basic instructions in addition to vector mathematics and a neuron transfer function. The computer has 6 registers that act as memory for the machine. Using the inputs Ri and Rj, in addition to 2 counters, the machine can do basic mathematics and logic. This machine also has the ability to do math with vectors using the vector registers Vi and Vj.

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Physical Circuits

Our earlier labs had us implementing simple parts of the cores in a physical model. These circuits had counters and could do basic math. In a later lab, we used an ATX power supply to power portions of the NanoPLC. We found the hard way that these ATX power supplies have to have a dummy load to work correctly. That circuit is shown to the left.

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Vector Array / Neuron Processor Design

and other design projects

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