

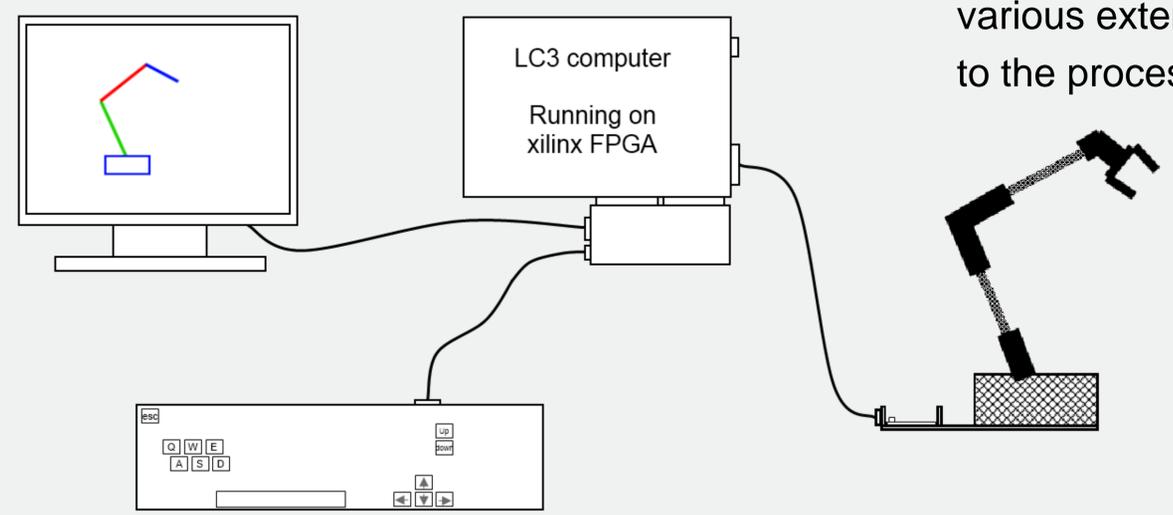
LC3PO \leftarrow LC3-processor + Robot-arm

THE MAKING OF A ROBOT

As part of the course in Hardware/Software-programming, we have been assigned a 3 week project. In this project we decided to make a robot-arm, that will be controlled by our very own computer processor.

The setup

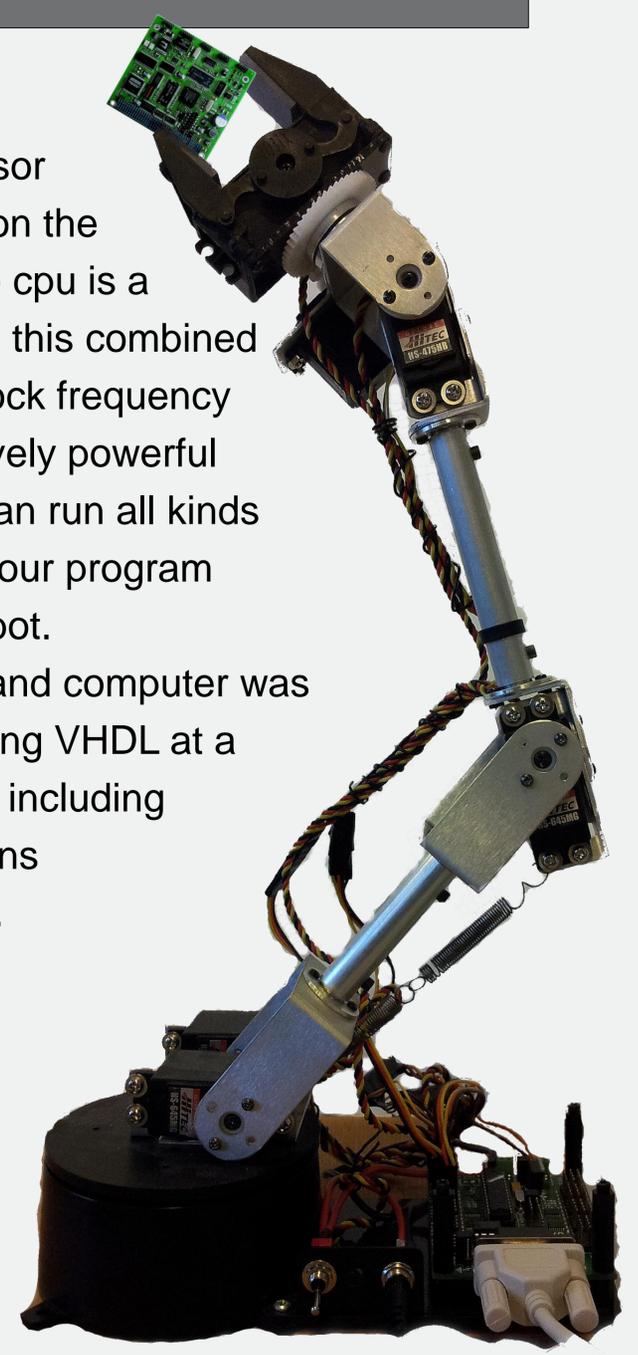
For controlling the robot-arm we have built a computer, based on our own LC3 processor. The computer is programmed to control the robot-arm via commands from the keyboard or other devices, like playstation controllers.



PROCESSOR (CPU) MADE FROM SCRATCH

The brain

Our LC3 processor is implemented on the Xilinx FPGA, the cpu is a 16 bit processor, this combined with a 50Mhz clock frequency gives us a relatively powerful processor that can run all kinds of software, like our program to control the robot. The processor and computer was implemented using VHDL at a behavioral level, including various extensions to the processor.



COMPUTER CONTROLLED ROBOT-ARM

The robotic arm

The robot-arm has 6 servo motors which are controlled by a microchip. We are sending control signals to the microchip and through that controlling the motors. The commands we send are generated by the software we have programmed for our LC3 computer.

A graphical representation

We have implemented a graphical robot-arm, by creating a hardware implementation of the Bresenham Line Algoritmen and using a VGA monitor. The software will use vector algebra to calculate how the lines are rotated, witch gives a highly dynamic real-time representation of the robotic arm

