

Dynamic Robotic Arm Control

Interfacing with N64 Controllers and the Human Arm

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Member Task Distribution

Our project was split into three definable sections: the robotic arm interface, the accelerometer and pressure sensor interfaces, and the N64 interface. Our team divided tasks along these lines.

Neal Parker:

Tasked with designing the hardware and software interfaces to our robotic arm. The robotic arm consists of 5 servo motors that must each be individually controlled with a PWM signal. These signals were routed through the FPGA, requiring use of Verilog and schematics in Xilinx. He was to write functions to control these motors in both C and assembly.

Edwin Tay:

Tasked with the development of a human interface via accelerometers and pressure sensors. Specifically there is a glove with one accelerometer and an armband with another. One pressure sensor is located on the glove's index finger and one on the middle finger. He designed the FPGA interface and routed analog to digital conversion signals. To turn these inputs into useful data he was to write functions that take ADC information and convert it to degrees of change that could be interpreted by the motor controller functions.

Brad Freyberg:

Tasked with the interface and testing of the N64 controller. This required serial to parallel data conversion, circuit design, and synchronization between the FPGA and controller. It was to be built in a way that software could read information independent of timing constraints.

Member Contribution:

All three members are also enrolled in EECS 482: Introduction to Operating Systems and often worked concurrently on both final projects. This led to a more even distribution of work between members, spending all times either in the 373 lab or across the hall in the CAEN lab.

Neal Parker 33%:

Executed all tasks. Also instrumental in software development of interpretation of N64 controller. Also spent significant time testing and tweaking software for human interface devices.

Edwin Tay 33%:

Executed all tasks. Also spent significant time writing code that uses human interface devices to operate in coordinate system as opposed to direct control but the math behind the conversion was devised too late to be implemented in time for the demonstration.

Brad Freyberg 33%:

Executed all tasks. After completion of N64 hardware development used time to tweak code, especially concentrating on sensitivity and smoothing the robotic arm response. Also had a lot of fun soldering.