

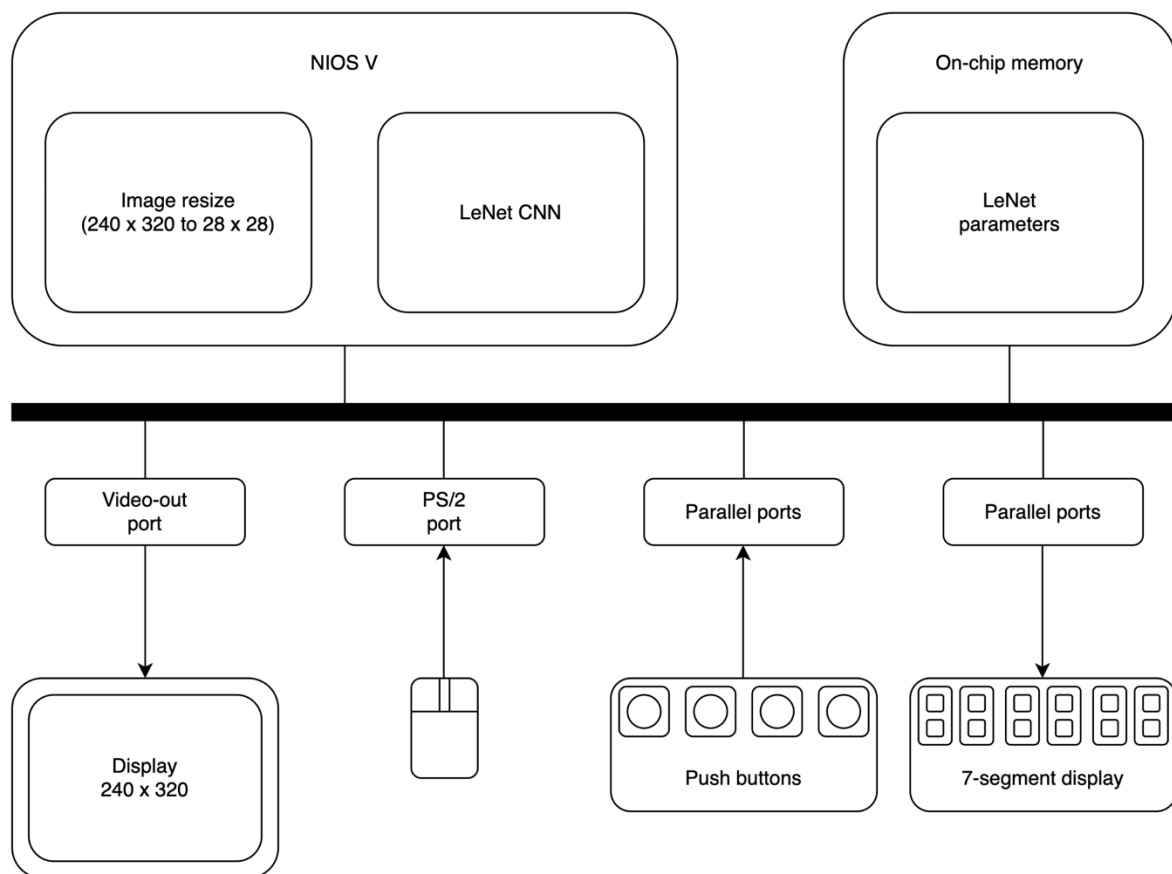
ECE243 project – week 1

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Project Description:

This project implements a handwritten digit recognition system on the DE1-SoC FPGA using the NIOS V soft processor. Users can draw digits (0-9) on a VGA display using a PS/2 mouse. The drawn image is processed and down sampled to a 28x28 grayscale image, which is then passed through a LeNet-5 CNN model for classification. The predicted digit is displayed on a seven-segment HEX display. Push buttons are used to reset the display and capture new input images.

Block Diagram:



User Input:

- PS/2 Mouse: Used for drawing digits on the VGA display.
- Push Buttons: Used to reset or capture the image.

Display Interface

- VGA Controller: Displays the drawing canvas and feedback to the user.

Processing System

- LeNet CNN Inference Engine: Classifies the digit using pre-trained weights.
- Memory (On-chip RAM): Stores the captured image and CNN model parameters.

- Resize Module: Downsamples and normalizes the image to 28x28 for CNN input.

Output Display

- HEX Display: Shows the predicted digit (0-9).

Week 1 progress:

- Trained CNN model with MNIST dataset
- Extract model parameters and stored into .h file
- Completed inference model in C
- Finished Hex Display module

Week 2 plan:

- Draw on VGA display with keyboard / mouse
- Make C code work on CPUlator and monitor program
- Merge code (if ahead of schedule)