# Task Break Down - ELE8307 Project (Group 3)

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## 1 Task Break Down

We decided to design a simple SIMD processor specialized in vector calculations. The project will consist of a communication circuit interfaced with the accelerator, a processing element and a controller to manager the data flow between the processing elements and the communication unit. The following shows the task break down for the ELE8307 project.

### 1.1 Designing Circuitry to Communicate with HPS (Nathan)

Figure 1 illustrates the circuitry needed for the HPS to communicate with the accelerator. We are considering a mailbox format to transmit the messages, namely, `READ_WEIGHTS` , `READ_X` , `WIRTE_OUTPUT` , `DONE` . Nathan has accepted to do this part for the project.

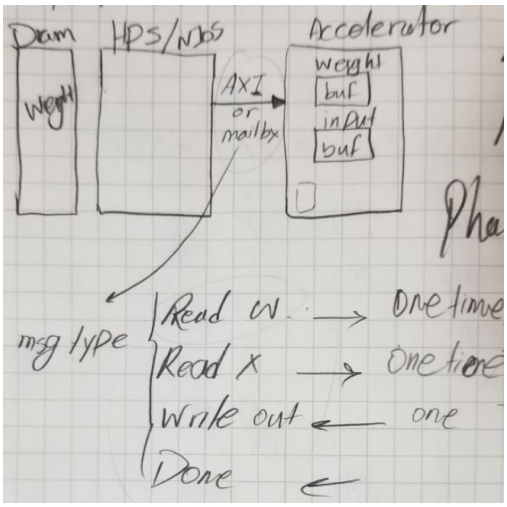


Figure 1: Communication Unit that talks to HPS using AXI or mailbox

### 1.2 Designing Circuitry for Processing Elements (Alex)

We also going to need a circuit to do basic calculations. Specifically, a circuit to do a vector inner product. We call this unit a Processing Element or PE in short. Figure 2 shows the required module.

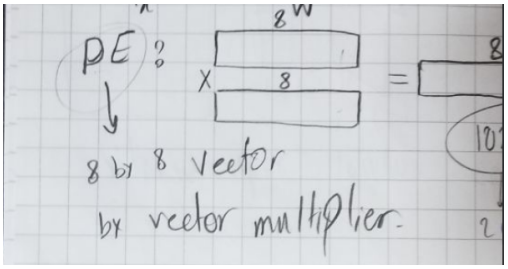


Figure 2: This figure illustrates an 8 by 8 vector inner product.

To do a matrix multiplication, we will design another circuit that instantiates multiple of these PEs. Figure 3 illustrates the matrix-matrix multiplier designed with PEs. Alex has accepted to do this part.

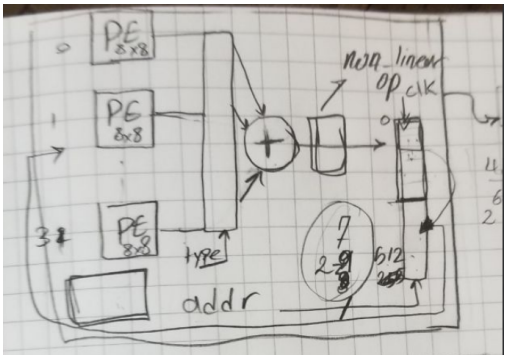


Figure 3: Connecting multiple PEs to perform a matrix multiplication.

### 1.3 Designing Circuitry for the System Controller (Hossein)

Finally, we will need a controller to manage data communication between PEs and the HPS. The controller will do both time management and data management so that the calculation will happen on the right data at the right time.

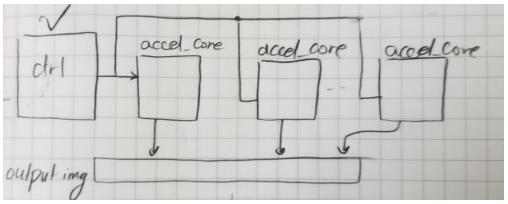


Figure 4: Preliminary design of the controller