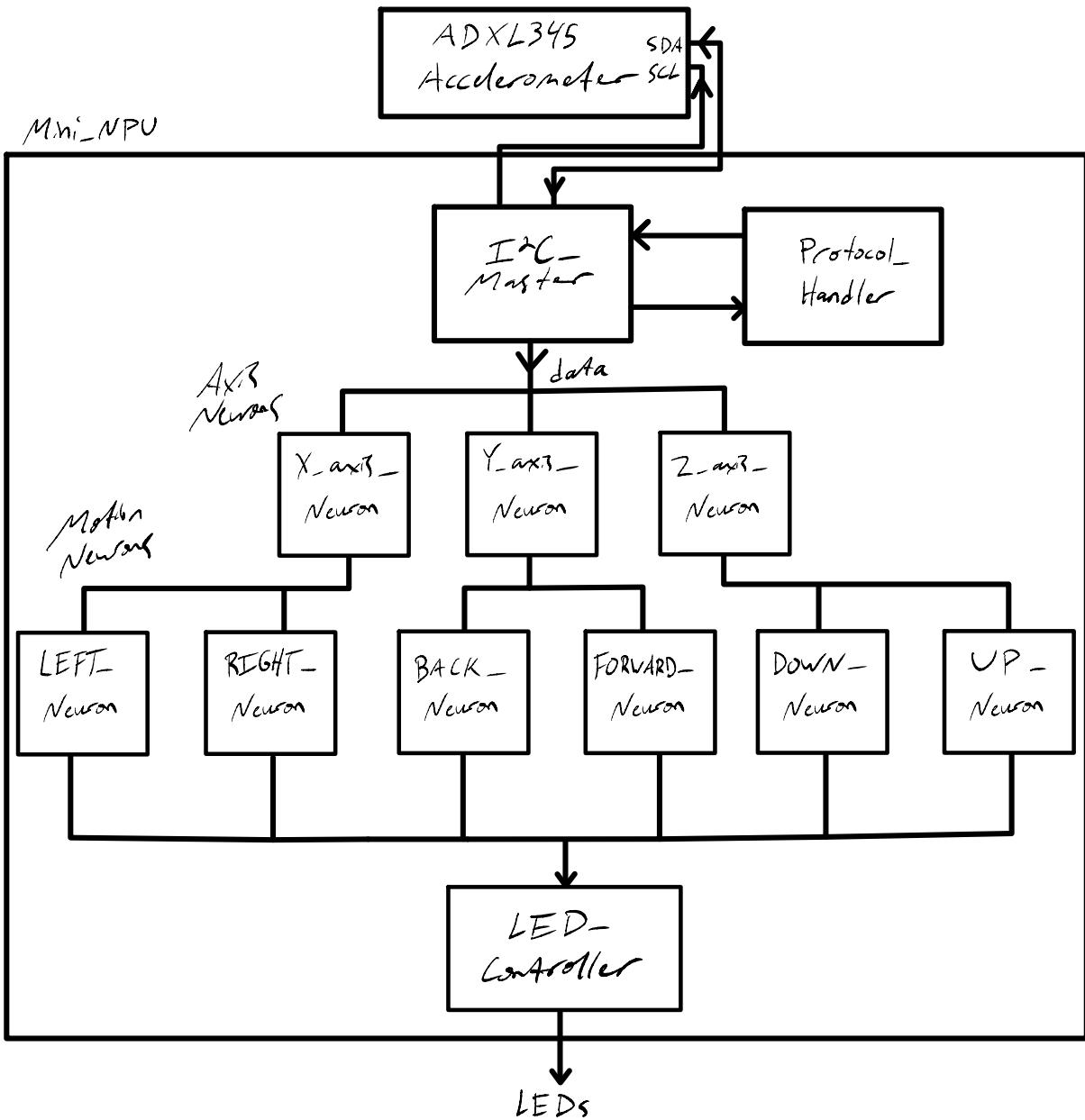


Christian Cherry
18-224
Semester Project

Mini_NPU Design Schematics



Testbench Overview

Testbench will act as the accelerometer and generate a series of serial I₂C data transactions corresponding to physical motions to replicate the data transfer of the ADXL345 Accelerometer. The design will output a 3x4 array corresponding to what motion it thinks it saw, and the TB will take this output and compare it against the actual motion of input to the dut.

Protocol Handler

Inputs

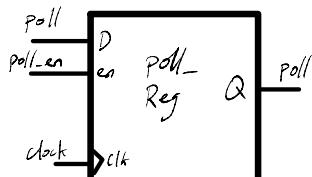
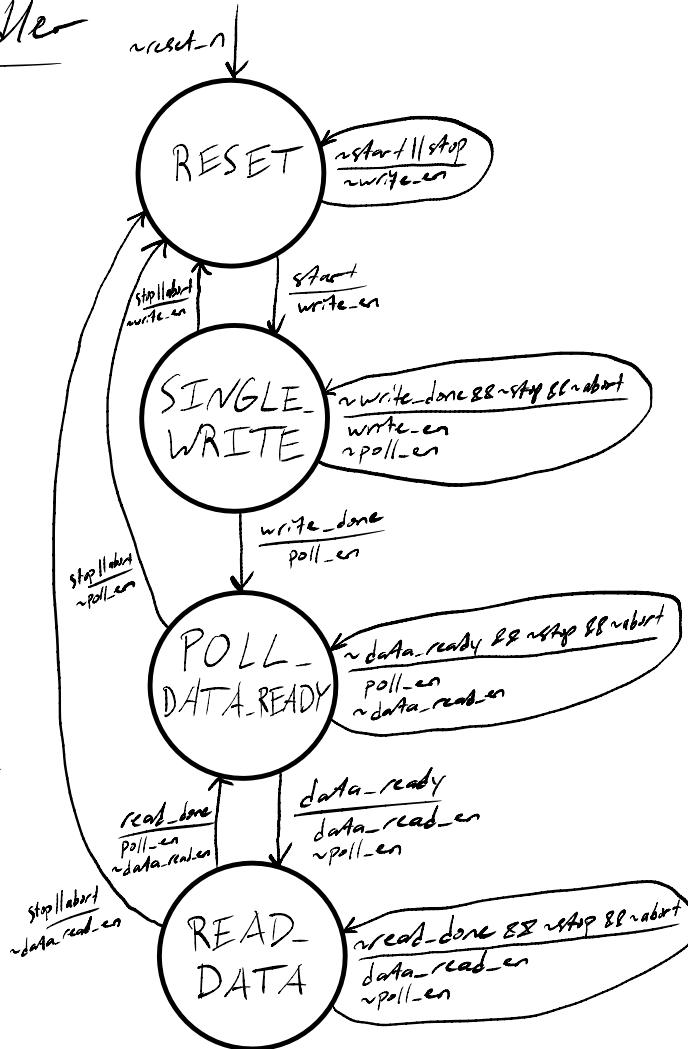
clock (TB)
 reset_n (TB)
 start (TB)
 stop (TB)
 abort
 write_done
 data_ready
 read_done

Outputs

write
 poll
 data_read

Control Signals

write_en
 poll_en
 data_read_en



I²C Master

Inputs

reset_n (T8)
 Clock (T8)
 Stop (T8)
 SDA
 write
 poll
 data_ready

Status Signals

[1:0] iferat^{9^n}
 [3:0] count
 [5:0] data_count

Outputs

SCL

wrMe_done
 data_ready
 read_done
 abort
 data_avail

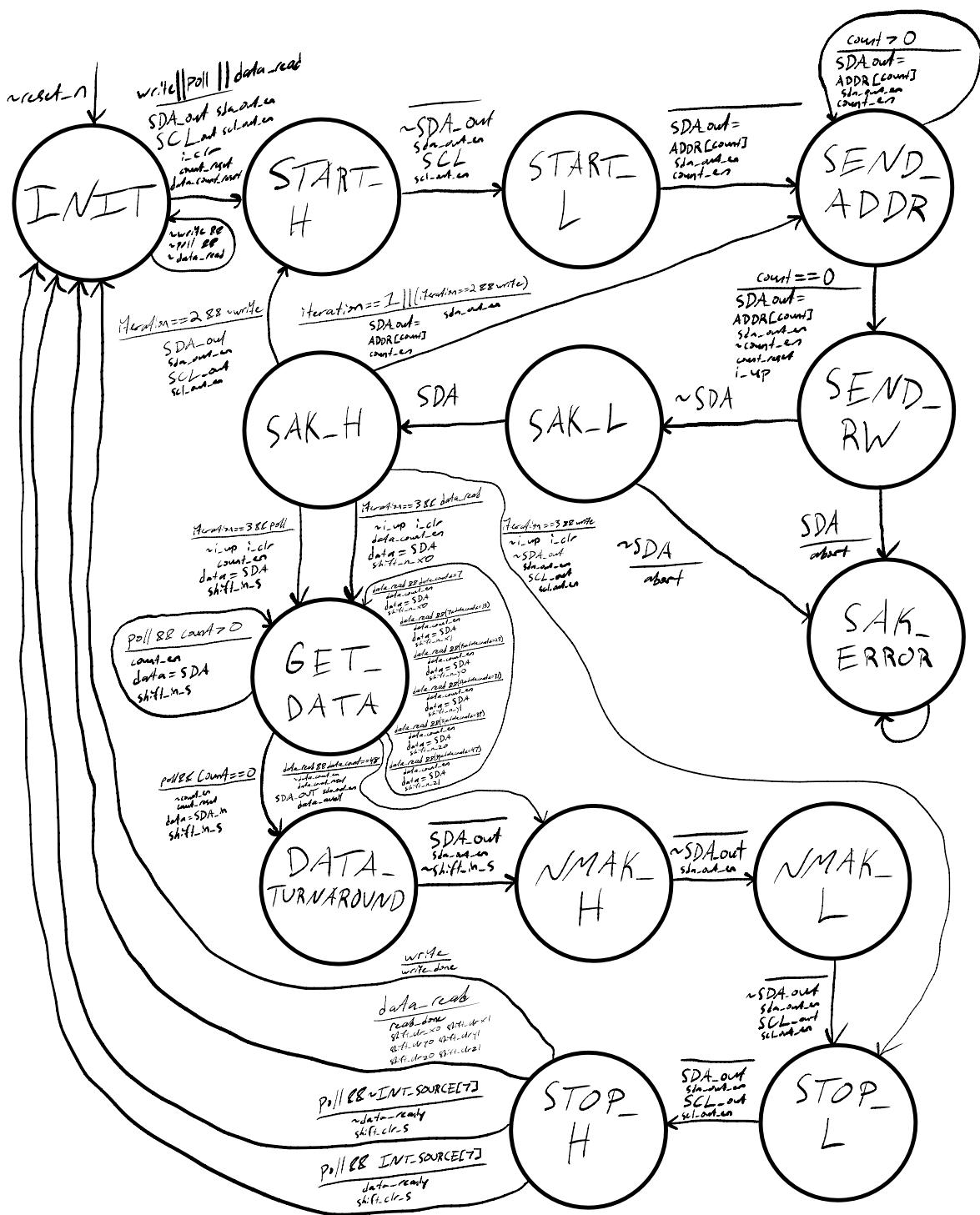
[15:0] X_DATA = {X1_DATA, X0_DATA}
 [15:0] Y_DATA = {Y1_DATA, Y0_DATA}
 [15:0] Z_DATA = {Z1_DATA, Z0_DATA}

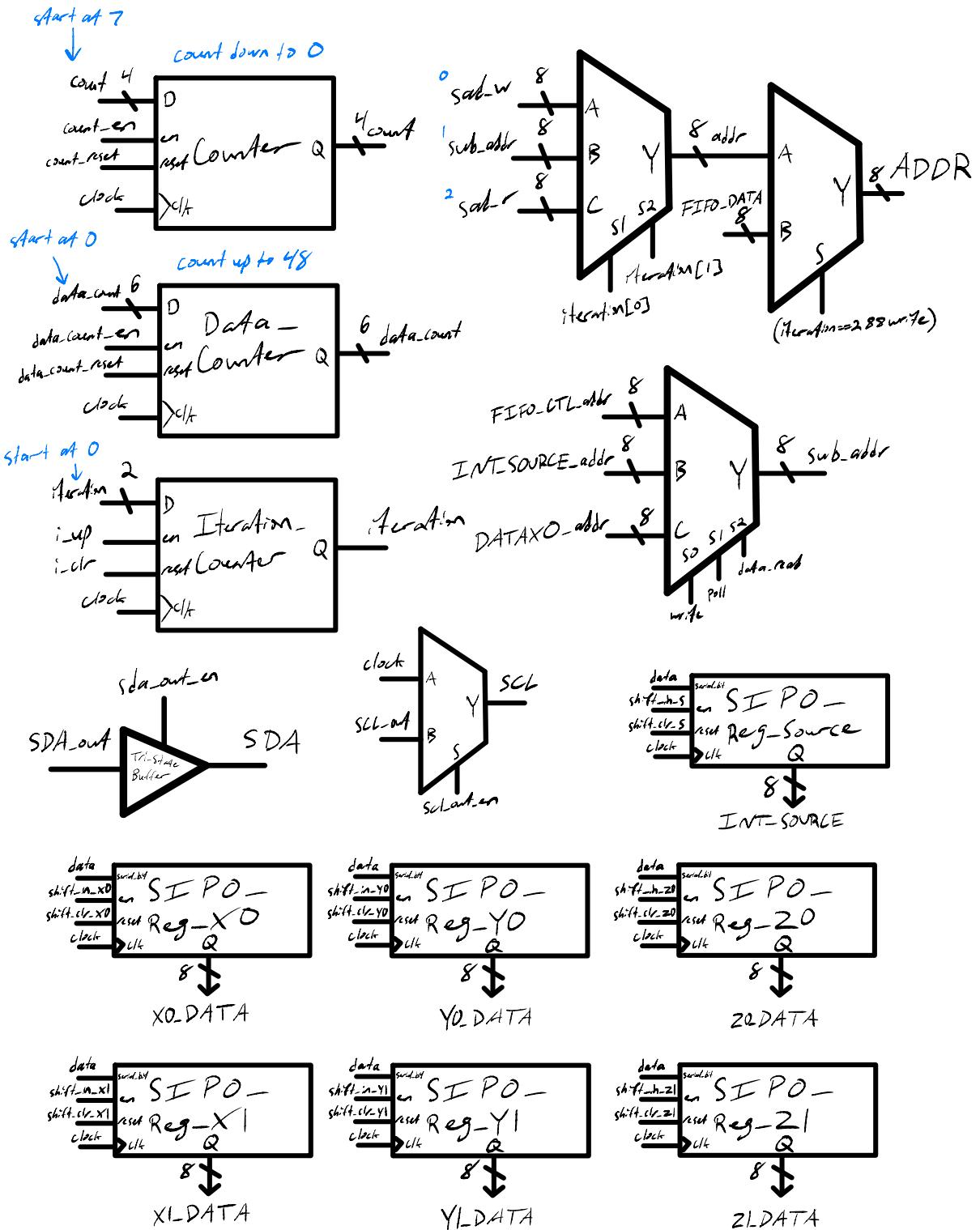
Local

SDA_out
 SDA_out_en
 [7:0] ADDR
 [7:0] abbr
 [7:0] sub_addr
 [7:0] Sd-W = 0x3A
 [7:0] Sd-R = 0x3B
 [7:0] INT_SOURCE_addr = 0x80
 [7:0] DATA_X0_addr = 0x32
 [7:0] FIFO_CTL_addr = 0x38
 [7:0] X0_DATA
 [7:0] X1_DATA
 [7:0] Y0_DATA
 [7:0] Y1_DATA
 [7:0] Z0_DATA
 [7:0] Z1_DATA
 [7:0] FIFO_DATA = 01100000
 [7:0] INT_SOURCE
 [3:0] count
 [5:0] data_count
 data

Control Signals

i-up
 i-clr
 count_en
 count_reset
 data_count_en
 data_count_reset
 shift_n-X0 shift_n-X1
 shift_clr-X0 shift_clr-X1
 shift_n-Y0 shift_n-Y1
 shift_clr-Y0 shift_clr-Y1
 shift_n-Z0 shift_n-Z1
 shift_clr-Z0 shift_clr-Z1
 shift_n-S shift_clr-S





Ax3 Numa

Inputs

reset_n (TB)
clock (TB)
stop (TB)
abort

[15:0] data
data_avail

Outputs

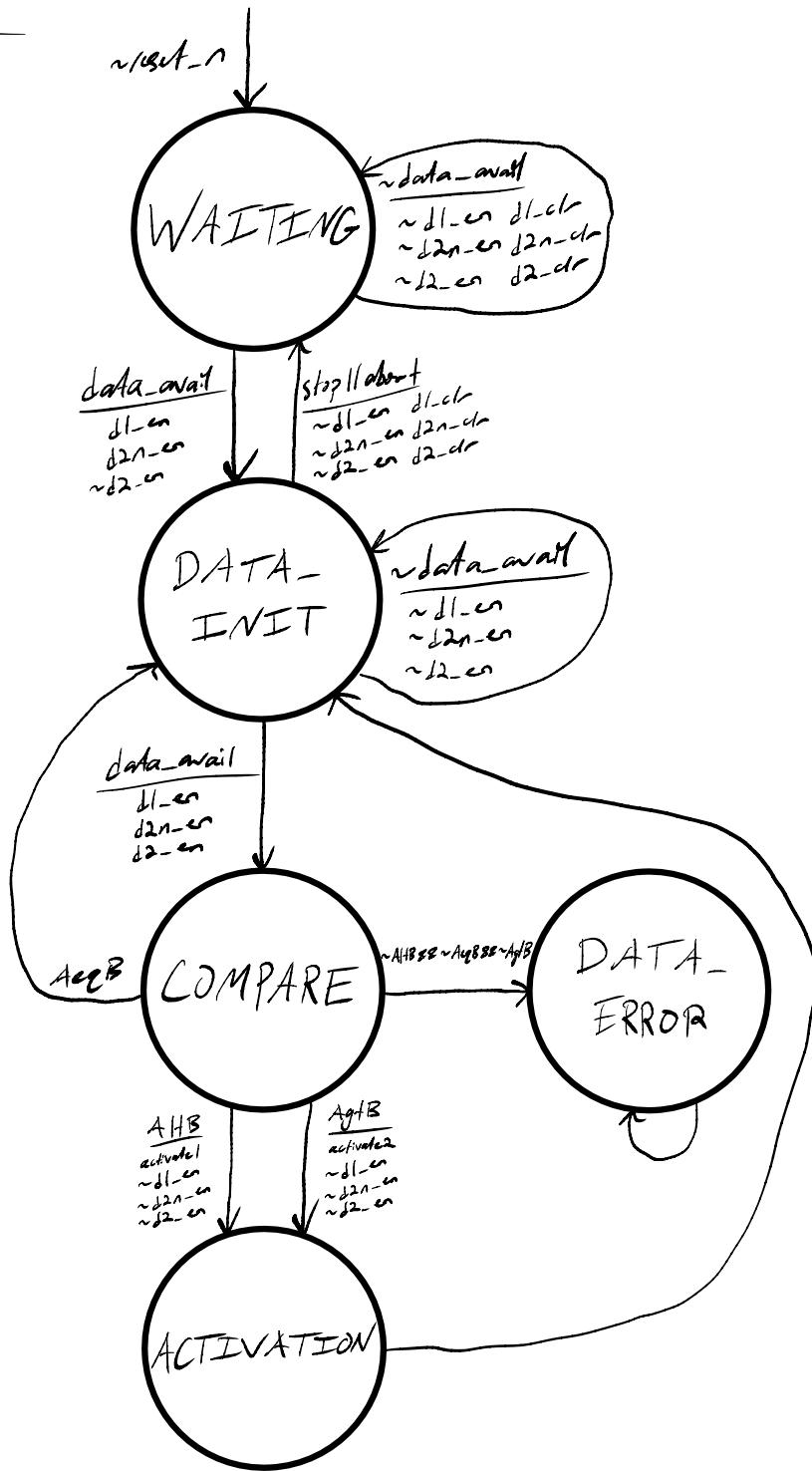
activated
activated2

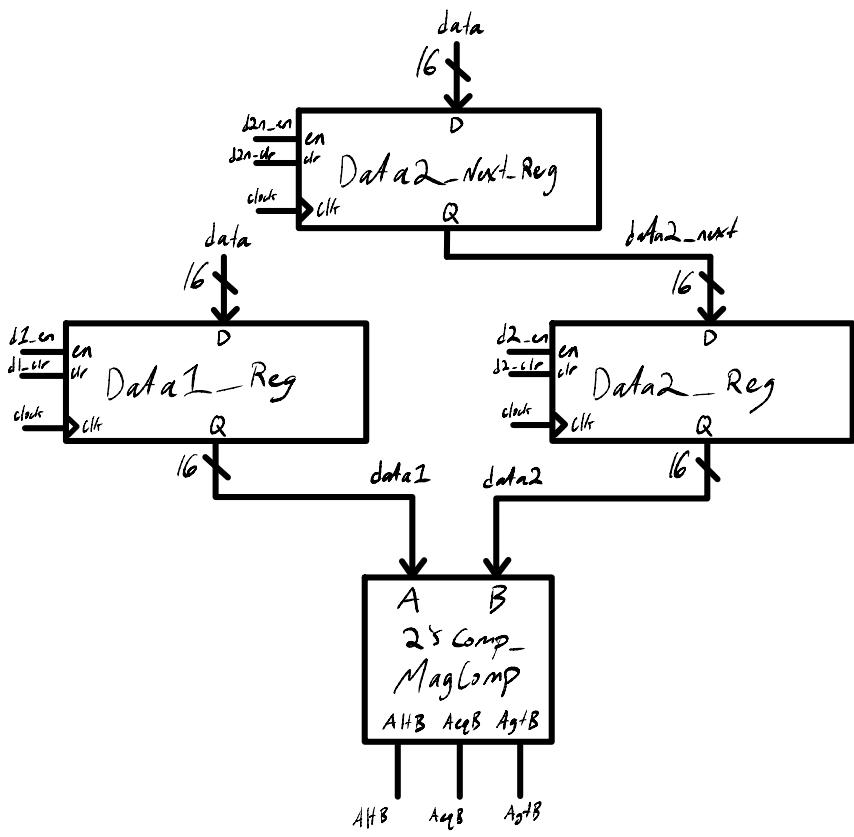
Status Signals

A1#B
Aq#B
Ag#B

Control Signals

d1_en
d2_en
d2n_en
d1_clr
d2n_clr
d2_clr





Motion Neuron

Inputs

reset-n
clock
activated

Outputs

fire

Local Signals

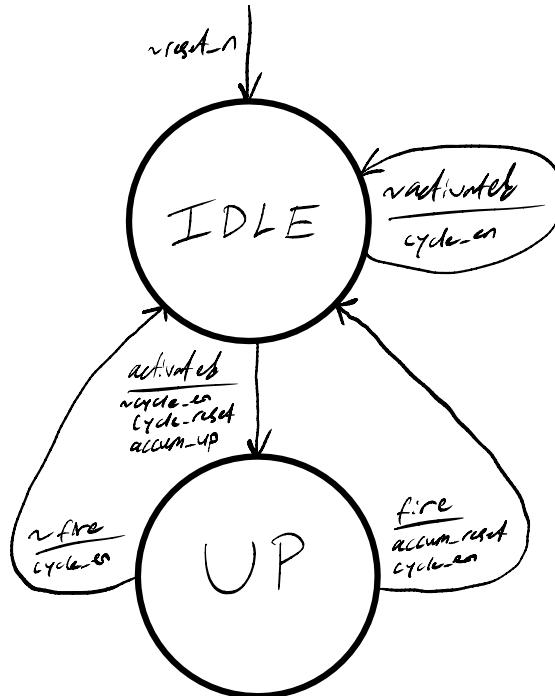
[23:0] cycle
[6:0] accum
accum-down

Control Signals

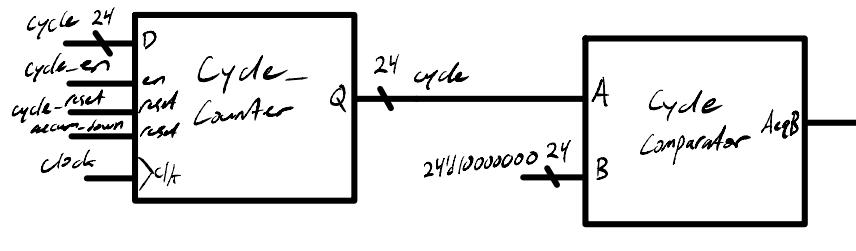
cycle-en
cycle-reset
accum-up
accum-reset

Status Signals

fire

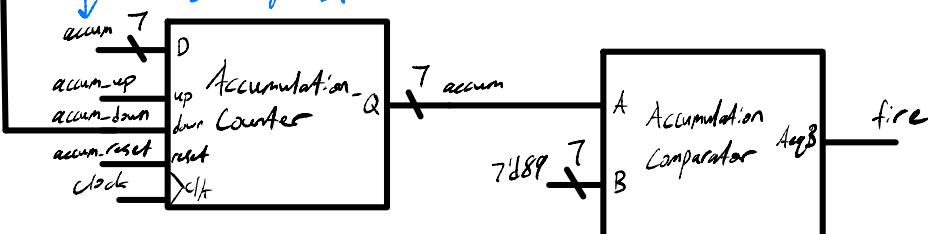


Start at 0



Start at 0

Count up to 89



LED_Controller

Inputs

clock (TB)
reset_n (TB)

[7:0] fire_array

Outputs

[7:0] LEDs

Status Signals

count_done

Control Signals

count_down
count_reset
led_en
led_reset

