`timescale 1ns/1ps

module gesture\_recognition (

input wire clk,

input wire rst,

input wire [7:0] acc\_x,

input wire [7:0] acc\_y,

input wire [7:0] acc\_z,

output reg [2:0] gesture\_id,

output reg gesture\_valid

);

parameter THRESH\_X = 8'd50;

parameter THRESH\_Y = 8'd50;

parameter THRESH\_Z = 8'd100;

always @(posedge clk or posedge rst) begin

if (rst) begin

gesture\_id <= 3'b000;

gesture\_valid <= 1'b0;

end else begin

gesture\_id <= 3'b000;

gesture\_valid <= 1'b0;

if (acc\_x > THRESH\_X && acc\_y < THRESH\_Y) begin

gesture\_id <= 3'b001; // Swipe

gesture\_valid <= 1'b1;

end else if (acc\_y > THRESH\_Y && acc\_z < THRESH\_Z) begin

gesture\_id <= 3'b010; // Tap

gesture\_valid <= 1'b1;

end else if (acc\_z > THRESH\_Z) begin

gesture\_id <= 3'b011; // Shake

gesture\_valid <= 1'b1;

end

end

end

endmodule