# Home Automation - Dataflow Models

## Lighting Automation System

module lighting\_automation(  
 input wire motion\_sensor, // Motion sensor input  
 input wire light\_sensor, // Light sensor input  
 input wire manual\_override,// Manual override switch  
 output wire light // Light output  
);  
 // Dataflow model for lighting automation  
 assign light = manual\_override ? 1'b1 :  
 (!light\_sensor && motion\_sensor) ? 1'b1 : 1'b0;  
endmodule

## Heating Automation System

module heating\_automation(  
 input wire [7:0] temp\_sensor, // Temperature sensor input  
 input wire manual\_override, // Manual override switch  
 input wire heating\_enable, // Heating system enable  
 output wire heater // Heater output  
);  
 // Dataflow model for heating automation  
 assign heater = manual\_override ? 1'b1 :  
 (heating\_enable && (temp\_sensor < 8'd20)) ? 1'b1 : 1'b0;  
endmodule

## Home Security Automation System

module security\_automation(  
 input wire motion\_sensor, // Motion sensor input  
 input wire door\_sensor, // Door sensor input  
 input wire window\_sensor, // Window sensor input  
 input wire arm\_system, // System arm switch  
 output wire alarm // Alarm output  
);  
 // Dataflow model for security automation  
 assign alarm = arm\_system && (motion\_sensor || door\_sensor || window\_sensor);  
endmodule

## Sensors and Detectors Automation System

module sensors\_detectors\_automation(  
 input wire smoke\_sensor, // Smoke detector input  
 input wire gas\_sensor, // Gas leak detector input  
 input wire motion\_sensor, // Motion sensor input  
 input wire [7:0] temp\_sensor, // Temperature sensor input  
 output wire smoke\_alert, // Smoke alert output  
 output wire gas\_alert, // Gas alert output  
 output wire motion\_alert, // Motion alert output  
 output wire temp\_alert // Temperature alert output  
);  
 // Dataflow models for each alert  
 assign smoke\_alert = smoke\_sensor;  
 assign gas\_alert = gas\_sensor;  
 assign motion\_alert = motion\_sensor;  
 assign temp\_alert = (temp\_sensor > 8'd30);  
endmodule

## Smartphone/Tablet Controlled Automation System

module smartphone\_automation(  
 input wire [2:0] command, // Command input  
 output wire light\_control, // Light control output  
 output wire heating\_control, // Heating control output  
 output wire security\_control // Security control output  
);  
 // Dataflow model for smartphone-controlled automation  
 assign light\_control = (command == 3'b001);  
 assign heating\_control = (command == 3'b011);  
 assign security\_control = (command == 3'b101);  
endmodule