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module VGA_Control (
    input [11:0] Frog_Position,
    input [11:0] Tree1Row,
    input [11:0] Tree2Row,
    input [11:0] Tree3Row,
    input [11:0] Tree1Col,
    input [11:0] Tree2Col,
    input [11:0] Tree3Col,
    input [11:0]currentHCount,
    input [11:0]currentVCount,
    output [3:0] Red,
    output [3:0] Green,
    output [3:0] Blue,
    output AddOne,
    output HIT
    );

parameter Frog_WIDTH  = 16;  // 120 -> 136
parameter Tree_Width  = 40;  // X -> X + 40
parameter Tree_Height = 96;  // Y -> Y + 96
parameter Frog_Start = 120;
assign Red   = (Frog_Position <= currentVCount) & (currentVCount <=
Frog_Position+Frog_WIDTH) & (Frog_Start <= currentHCount) & (currentHCount <=
Frog_Start+Frog_WIDTH)    ? 4'hf : 4'h0;


assign Green = (Frog_Position <= currentVCount) & (currentVCount <=
Frog_Position+Frog_WIDTH) & (Frog_Start <= currentHCount) & (currentHCount <=
Frog_Start+Frog_WIDTH)                      ? 4'hf :
               (currentVCount-Tree_Height <= Tree1Row) & (Tree1Row <=
currentVCount)   & (currentHCount <= Tree1Col)   & (Tree1Col <=
currentHCount+Tree_Width) & (currentHCount < 639)      ? 4'hf :
               (currentVCount-Tree_Height <= Tree2Row) & (Tree2Row <=
currentVCount)   & (currentHCount <= Tree2Col)   & (Tree2Col <=
currentHCount+Tree_Width) & (currentHCount < 639)      ? 4'hf :
               (currentVCount-Tree_Height <= Tree3Row) & (Tree3Row <=
currentVCount)   & (currentHCount <= Tree3Col)   & (Tree3Col <=
currentHCount+Tree_Width) & (currentHCount < 639)      ? 4'hf : 4'h0;


assign Blue  = (Frog_Position <= currentVCount) & (currentVCount <=
Frog_Position+Frog_WIDTH) & (Frog_Start <= currentHCount) & (currentHCount <=
Frog_Start+Frog_WIDTH)   ? 4'hf :   //Frog
                     (currentVCount-Tree_Height <= Tree1Row) & (Tree1Row <=
currentVCount)   & (currentHCount <= Tree1Col)   & (Tree1Col <=
currentHCount+Tree_Width)     ? 4'h0 :
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                    (currentVCount-Tree_Height <= Tree2Row) & (Tree2Row <=
currentVCount)   & (currentHCount <= Tree2Col)   & (Tree2Col <=
currentHCount+Tree_Width)     ? 4'h0 :
                    (currentVCount-Tree_Height <= Tree3Row) & (Tree3Row <=
currentVCount)   & (currentHCount <= Tree3Col)   & (Tree3Col <=
currentHCount+Tree_Width)     ? 4'h0 :


                  (240 <= currentVCount) & (currentVCount <= 256) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b1111 :
                  (257 <= currentVCount) & (currentVCount <= 273) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b1100 :
                  (274 <= currentVCount) & (currentVCount <= 290) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b1011 :
                  (240 <= currentVCount) & (currentVCount <= 307) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b1010 :
                  (308 <= currentVCount) & (currentVCount <= 324) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b1001 :
                  (325 <= currentVCount) & (currentVCount <= 341) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b1000 :
                  (240 <= currentVCount) & (currentVCount <= 358) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0111 :
                  (359 <= currentVCount) & (currentVCount <= 375) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0110 :
                  (376 <= currentVCount) & (currentVCount <= 392) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0101 :
                  (393 <= currentVCount) & (currentVCount <= 409) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0100 :
                  (410 <= currentVCount) & (currentVCount <= 426) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0011 :
                  (427 <= currentVCount) & (currentVCount <= 443) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0010 :
                  (444 <= currentVCount) & (currentVCount <= 460) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0001 :
                  (461 <= currentVCount) & (currentVCount <= 479) & (0 <=
currentHCount) & (currentHCount <= 639)   ? 4'b0000 : 4'h0;


 wire [11:0] Frog_top_leftRow = Frog_Position;
 wire [11:0] Frog_top_leftCol = Frog_Start;

 wire [11:0] Frog_top_rightRow = Frog_Position;
 wire [11:0] Frog_top_rightCol = Frog_Start + Frog_WIDTH; //fixed point

 wire [11:0] Frog_bottom_rightRow = Frog_Position + Frog_WIDTH;
 wire [11:0] Frog_bottom_rightCol = Frog_Start + Frog_WIDTH;      //fixed point
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 wire [11:0] Frog_bottom_leftRow = Frog_Position + Frog_WIDTH;
 wire [11:0] Frog_bottom_leftCol = Frog_Start;          //fixed point


 assign HIT = (Tree1Row <= Frog_top_rightRow)     & (Frog_top_rightRow <= Tree1Row +
Tree_Height)      & (Tree1Col-Tree_Width <= Frog_top_rightCol)    &
(Frog_top_rightCol <= Tree1Col) |  //head on with top right corner hit
              (Tree1Row <= Frog_bottom_rightRow)  & (Frog_bottom_rightRow <=
Tree1Row + Tree_Height)   & (Tree1Col-Tree_Width <= Frog_bottom_rightCol) &
(Frog_bottom_rightCol <= Tree1Col)  |   //hit head on with the bottom left corner

              //Plant 2
              (Tree2Row <= Frog_top_rightRow)     & (Frog_top_rightRow <= Tree2Row +
Tree_Height)      & (Tree2Col-Tree_Width <= Frog_top_rightCol)    &
(Frog_top_rightCol <= Tree2Col) |  //head on with top right corner hit
              (Tree2Row <= Frog_bottom_rightRow)  & (Frog_bottom_rightRow <=
Tree2Row + Tree_Height)   & (Tree2Col-Tree_Width <= Frog_bottom_rightCol) &
(Frog_bottom_rightCol <= Tree2Col)  |   //hit head on with the bottom left corner

              //Plant 3
              (Tree3Row <= Frog_top_rightRow)     & (Frog_top_rightRow <= Tree3Row +
Tree_Height)      & (Tree3Col-Tree_Width <= Frog_top_rightCol)    &
(Frog_top_rightCol <= Tree3Col) |  //head on with top right corner hit
              (Tree3Row <= Frog_bottom_rightRow)  & (Frog_bottom_rightRow <=
Tree3Row + Tree_Height)   & (Tree3Col-Tree_Width <= Frog_bottom_rightCol) &
(Frog_bottom_rightCol <= Tree3Col)  |   //hit head on with the bottom left corner




              (Tree1Row <= Frog_top_leftRow)     & (Frog_top_leftRow <= Tree1Row +
Tree_Height)      & (Tree1Col-Tree_Width <= Frog_top_leftCol)    & (Frog_top_leftCol
<= Tree1Col) |  //head on with top right corner hit
              (Tree1Row <= Frog_bottom_leftRow)  & (Frog_bottom_leftRow <= Tree1Row
+ Tree_Height)   & (Tree1Col-Tree_Width <= Frog_bottom_leftCol) &
(Frog_bottom_leftCol <= Tree1Col)  |   //hit head on with the bottom left corner

              //Plant 2
              (Tree2Row <= Frog_top_leftRow)     & (Frog_top_leftRow <= Tree2Row +
Tree_Height)      & (Tree2Col-Tree_Width <= Frog_top_leftCol)    & (Frog_top_leftCol
<= Tree2Col) |  //head on with top right corner hit
              (Tree2Row <= Frog_bottom_leftRow)  & (Frog_bottom_leftRow <= Tree2Row
+ Tree_Height)   & (Tree2Col-Tree_Width <= Frog_bottom_leftCol) &
(Frog_bottom_leftCol <= Tree2Col)  |   //hit head on with the bottom left corner
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              //Plant 3
              (Tree3Row <= Frog_top_leftRow)     & (Frog_top_leftRow <= Tree3Row +
Tree_Height)       & (Tree3Col-Tree_Width <= Frog_top_leftCol)    & (Frog_top_leftCol
<= Tree3Col) |  //head on with top right corner hit
              (Tree3Row <= Frog_bottom_leftRow)  & (Frog_bottom_leftRow <= Tree3Row
+ Tree_Height)   & (Tree3Col-Tree_Width <= Frog_bottom_leftCol) &
(Frog_bottom_leftCol <= Tree3Col)  ;   //hit head on with the bottom left corner



 assign AddOne = (Frog_Start-1 <= Tree1Col) & (Tree1Col <= Frog_Start+1) |  //range
for one frame
                (Frog_Start-1 <= Tree2Col) & (Tree2Col <= Frog_Start+1) |
                (Frog_Start-1 <= Tree3Col) & (Tree3Col <= Frog_Start+1) ;









endmodule
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