

```

module Plants(
    input Rungame,
    input Framerate,
    input INIT,
    input [11:0] INITPosition,
    input FirstPlant,
    input ThreePixFrameClk,
    input ResetPlant,
    input clk,
    output [11:0] Row,
    output [11:0] Col
);
wire dtc1, dtc2;

wire Reset = (Col == 4079); //when to reset the tree to the other side
wire [11:0] PlantPosition = INIT ? INITPosition : 12'b001011010101;
    countUD4L plantcount1 (.Up(1'b0), .Dw(ThreePixFrameClk & Rungame),
.LD(INIT | Reset | ResetPlant), .Reset(1'b0), .Q(PlantPosition[3:0]), .clk(clk),
.DTC(dtc1), .Qout(Col[3:0])); //counters for the columns of the plants
    countUD4L plantcount2 (.Up(1'b0), .Dw(ThreePixFrameClk & Rungame & dtc1),
.LD(INIT | Reset | ResetPlant), .Reset(1'b0), .Q(PlantPosition[7:4]), .clk(clk),
.DTC(dtc2), .Qout(Col[7:4]));
    countUD4L plantcount3 (.Up(1'b0), .Dw(ThreePixFrameClk & Rungame & dtc1 & dtc2),
.LD(INIT | Reset | ResetPlant), .Reset(1'b0), .Q(PlantPosition[11:8]), .clk(clk),
    .Qout(Col[11:8])); //the Q bits reset the plants to 680

//All these numbers are WTR 232
parameter pos1 = 156, pos2 = 160, pos3 = 164, pos4 = 168, pos5 = 172, pos6 =
176, pos7 = 180, pos8 = 184;
parameter pos9 = 188, pos10 = 192, pos11 = 196, pos12 = 200, pos13 = 216, pos14
= 232, pos15 = 236;

//This randomly choses a row to start off on
wire [3:0]rand;
wire getRandRow = (Col == 680);
LFSR randNumGen (.clk(clk), .GetNum(getRandRow), .Q(rand));

wire initHold;
FDRE #(.INIT(1'b0) ) ff1 (.C(clk), .R(Reset), .CE(INIT|Reset), .D(INIT),
.Q(initHold)); //if we started with an initial position (only the first plant) it
should hold until the next value

assign Row = FirstPlant & initHold ? pos8:
                (rand == 0) ? pos1 :
                (rand == 1) ? pos2 :
                (rand == 2) ? pos3 :

```

```
(rand == 3) ? pos4 :  
(rand == 4) ? pos5 :  
(rand == 5) ? pos6 :  
(rand == 6) ? pos7 :  
(rand == 7) ? pos8 :  
(rand == 8) ? pos9 :  
(rand == 9) ? pos10 :  
(rand == 10) ? pos11 :  
(rand == 11) ? pos12 :  
(rand == 12) ? pos13 :  
(rand == 13) ? pos14 :  
(rand == 14) ? pos15 : pos8;    //to further randomize
```

```
endmodule
```