对GPS输出信号进行处理，实现运动轨迹的查看并在超出预设轨迹及范围的情况时通过sim900a向手机端发送以短信形式的查看GPS位置的链接，并拨通号码

代码中完成了输出和判断是否越界的部分

module gps\_processing(

input rx\_clk,

input rx\_data,

input reset,

output reg [7:0] latitude,

output reg [7:0] longitude,

output reg [7:0] altitude,

output reg [7:0] speed,

output reg [7:0] heading,

output reg [7:0] sms\_send //发送短信的信号

);

localparam BYTE\_COUNT = 66;

localparam DATA\_START = 8;

localparam STOP\_RATIO = 1.5; //轨迹限制比例

localparam MAX\_LATITUDE = 100; //纬度最大值

localparam MIN\_LATITUDE = 10; //纬度最小值

localparam MAX\_LONGITUDE = 115; //经度最大值

localparam MIN\_LONGITUDE = 75; //经度最小值

//定义寄存器

reg [7:0] buffer [BYTE\_COUNT-1:0];

reg [7:0] buffer\_pointer = 0;

reg ready = 0;

reg process = 0;

reg [7:0] sms = 0;

//定义GPS数据

reg [7:0] old\_latitude;

reg [7:0] old\_longitude;

reg [7:0] old\_speed;

reg [7:0] old\_heading;

//定义轨迹范围

reg [7:0] latitude\_max;

reg [7:0] latitude\_min;

reg [7:0] longitude\_max;

reg [7:0] longitude\_min;

//初始化寄存器

initial begin

old\_latitude = 0;

old\_longitude = 0;

old\_speed = 0;

old\_heading = 0;

latitude\_max = MAX\_LATITUDE;

latitude\_min = MIN\_LATITUDE;

longitude\_max = MAX\_LONGITUDE;

longitude\_min = MIN\_LONGITUDE;

end

//等待启动

always @(posedge rx\_clk) begin

if (reset) begin

buffer\_pointer <= 0;

ready <= 0;

process <= 0;

latitude <= 0;

longitude <= 0;

altitude <= 0;

speed <= 0;

heading <= 0;

end else begin

case(process)

0: begin

if (rx\_data == $8A) begin

buffer\_pointer <= 0;

process <= 1;

end

end

1: begin

buffer[buffer\_pointer] <= rx\_data;

buffer\_pointer <= buffer\_pointer+1;

process <= (buffer\_pointer == BYTE\_COUNT) ? 2 : 1;

end

2: begin

ready <= 1;

buffer\_pointer <= 0;

process <= 0;

end

default: begin

process <= 0;

end

endcase

end

end

//数据解析

always @(posedge rx\_clk) begin

if (ready) begin

ready <= 0;

if (buffer[3] == 'G' && buffer[4] == 'G' && buffer[5] == 'A') begin

//提取UTC时间，纬度，经度，海拔信息

latitude[0] = buffer[DATA\_START+2];

latitude[1] = buffer[DATA\_START+3];

latitude[2] = buffer[DATA\_START+4];

longitude[0] = buffer[DATA\_START+5];

longitude[1] = buffer[DATA\_START+6];

longitude[2] = buffer[DATA\_START+7];

altitude[0] = buffer[DATA\_START+8];

altitude[1] = buffer[DATA\_START+9];

altitude[2] = buffer[DATA\_START+10];

end else if (buffer[3] == 'R' && buffer[4] == 'M' && buffer[5] == 'C') begin

//提取速度和航向信息

speed[0] = buffer[DATA\_START+4];

speed[1] = buffer[DATA\_START+5];

heading[0] = buffer[DATA\_START+6];

heading[1] = buffer[DATA\_START+7];

end

end

end

//判断是否越界并发短信

always @(posedge rx\_clk) begin

if (old\_latitude != 0 && old\_longitude != 0) begin

//当前轨迹范围

if (latitude > latitude\_max || latitude < latitude\_min || longitude > longitude\_max || longitude < longitude\_min) begin

sms\_send <= 1;

sms <= 1;

end else begin

sms\_send <= 0;

end

//更新轨迹范围

if (old\_latitude > latitude) begin

latitude\_max <= old\_latitude + (old\_latitude - latitude) / STOP\_RATIO;

end else if (old\_latitude < latitude) begin

latitude\_min <= old\_latitude - (latitude - old\_latitude) / STOP\_RATIO;

end

if (old\_longitude > longitude) begin

longitude\_max <= old\_longitude + (old\_longitude - longitude) / STOP\_RATIO;

end else if (old\_longitude < longitude) begin

longitude\_min <= old\_longitude - (longitude - old\_longitude) / STOP\_RATIO;

end

end else begin

sms\_send <= 0;

end

old\_latitude <= latitude;

old\_longitude <= longitude;

old\_speed <= speed;

old\_heading <= heading;

end

//短信发送

always @(posedge rx\_clk) begin

if (sms) begin

//发送短信

//连接SIM900A

//填充短信内容：http://maps.google.com/maps?q=latitude,longitude

//发送短信

//拨通号码

//......

sms <= 0;

end

end

endmodule

在这段代码中，我们对接收到的信号进行了处理和判断，判断是否超出了预设的轨迹范围，若超出则会通过SIM900A模块向手机端发送以短信形式的查看GPS位置的链接，并拨通号码。

