

bunkers.c

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/*
 * bunkers.c
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 */
#include <stdio.h>
#include <stdint.h>
#include <stdbool.h>
#include "platform.h"
#include "xparameters.h"
#include "xaxivdma.h"
#include "xio.h"
#include "time.h"
#include "unistd.h"
#include "util.h"
#include "bunkers.h"

#define NUM_BUNKERS 4           // We have 4 bunkers
#define NUM_SQUARES 10         // Each bunker has 10 sections
#define NUM_SQUARES_IN_LINE 4 // In a line there are 4 sections
#define BUNKER_ROW 60          // Row the bunkers live on
#define LOC_BUNKER_ONE 60      // Where the first bunker is
#define SQUARE_INCREMENT 6     // Each section is this square
#define LEFT_STRUT_ROW 12       // The extra sections live here
#define LEFT_STRUT_COL 0        // and here
#define RIGHT_STRUT_ROW 12      // and here
#define RIGHT_STRUT_COL 18      // and here
#define BUNKER_ROWS 18          // How many rows each bunker has
#define BUNKER_COLS 24          // How many columns each bunker has
#define GREEN 0x0000FF00        // Hex value for green
#define BUNKER_ROW_LOC 175      // Where our bunker lives?
#define BUNKER_DAMAGE_1 1       // how
#define BUNKER_DAMAGE_2 2       // much
#define BUNKER_DAMAGE_3 3       // damage
#define BUNKER_DAMAGE_4 4       // we have
#define WHITE 0xFFFFFFFF         // These
#define BLACK 0x00000000         // are colors
#define ZERO_DAMAGE 0            // No damage!
#define BUFFER 1                 // One pixel buffer needed sometimes

// -----
// hardcoded static const stuff

// Necessary for storing bunker damage data
#define packword6(b5,b4,b3,b2,b1,b0) \
    ((b5 << 5 ) | (b4 << 4 ) | (b3 << 3 ) | (b2 << 2 ) | (b1 << 1 ) | (b0 << 0
) )

// Necessary for storing the bunker data
#define
packword24(b23,b22,b21,b20,b19,b18,b17,b16,b15,b14,b13,b12,b11,b10,b9,b8,b7,b6,b5,b4,b3,b2
,b1,b0) \
    ((b23 << 23) | (b22 << 22) | (b21 << 21) | (b20 << 20) | (b19 << 19) | (b18 <<
18) | (b17 << 17) | (b16 << 16) |
    (b15 << 15) | (b14 << 14) | (b13 << 13) | (b12 << 12) | (b11 << 11) | (b10
<< 10) | (b9 << 9 ) | (b8 << 8 ) |
    (b7 << 7 ) | (b6 << 6 ) | (b5 << 5 ) | (b4 << 4 ) | (b3 << 3 ) | (b2
<< 2 ) | (b1 << 1 ) | (b0 << 0 ) )

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// Shape of the entire bunker.
static const int32_t bunker_24x18[BUNKER_ROWS] = {
    packword24(0,0,0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,0,0),
    packword24(0,0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,0),
    packword24(0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0),
    packword24(1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,1,1,1,0,0,0,0,1,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,1,1,0,0,0,0,0,0,1,1,1,1,1),
    packword24(1,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,1,1,1,1),
    packword24(1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1),
    packword24(1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1),
    packword24(1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1),
    packword24(1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1),
    packword24(1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1),
    packword24(1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1)};

// First time a bunker is hit, the first damage that happens
static const int32_t bunkerDamage0_6x6[SQUARE_INCREMENT] = {
    packword6(0,1,1,0,0,0), packword6(0,0,0,0,0,1), packword6(1,1,0,1,0,0),
    packword6(1,0,0,0,0,0), packword6(0,0,1,1,0,0), packword6(0,0,0,0,1,0)};

// Second time a bunker is hit, this is its damage
static const int32_t bunkerDamage1_6x6[SQUARE_INCREMENT] = {
    packword6(1,1,1,0,1,0), packword6(1,0,1,0,0,1), packword6(1,1,0,1,1,1),
    packword6(1,0,0,0,0,0), packword6(0,1,1,1,0,1), packword6(0,1,1,0,1,0)};

// Third time a bunker is hit, this is its damage
static const int32_t bunkerDamage2_6x6[SQUARE_INCREMENT] = {
    packword6(1,1,1,1,1,1), packword6(1,0,1,1,0,1), packword6(1,1,0,1,1,1),
    packword6(1,1,0,1,1,0), packword6(0,1,1,1,0,1), packword6(1,1,1,1,1,1)};

// Fourth time a bunker is hit, this is its damage
static const int32_t bunkerDamage3_6x6[SQUARE_INCREMENT] = {
    packword6(1,1,1,1,1,1), packword6(1,1,1,1,1,1), packword6(1,1,1,1,1,1),
    packword6(1,1,1,1,1,1), packword6(1,1,1,1,1,1), packword6(1,1,1,1,1,1)};

// End hardcoded static const stuff
// -----

// -----
// Internal function declaration
void squares_init();
void bunker_degrade(uint32_t i, uint32_t j);
// end internal function declaration
// -----

struct bunker{
    uint32_t row;           // Our bunker
    uint32_t col;          // has a row
    struct squares{         // and a column
        uint32_t row;       // and 10 sections
        uint32_t col;       // Which have their rows
    };
};
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    uint32_t col;                // and columns
    uint32_t damage;            // and damage
} squares[NUM_SQUARES];
} bunker[NUM_BUNKERS];

uint32_t * frame;                // Variable to store the screen frame

// For debugging. Prints out a pixel for each section of bunker
void bunkers_debug_print(){
    int i,j;
    for(i=0;i<NUM_BUNKERS;i++){
        //xil_printf("Bunker %d: %d col\n\r", i, bunker[i].row, bunker[i].col);
        for(j=0;j<NUM_SQUARES;j++){
            //xil_printf("Bunker %d, square %d: %d row %d col\n\r", i, j,
bunker[i].squares[j].row,bunker[i].squares[j].col);
            util_draw_pixel(frame,SQUARE_INCREMENT+bunker[i].squares[j].row,
SQUARE_INCREMENT+bunker[i].squares[j].col, 0x00000FF);
            util_draw_pixel(frame,bunker[i].squares[j].row,bunker[i].squares[j].col,
0xFFFF0000);
        }
    }
}

// Initializes the bunkers
void bunkers_init(uint32_t * framePointer){
    int32_t i, loc = LOC_BUNKER_ONE;    //
    for(i = 0; i < NUM_BUNKERS ; i++){
        bunker[i].row = BUNKER_ROW_LOC; // Divided by 2 because screen is half
        bunker[i].col = loc;            // which column it is at
        loc += LOC_BUNKER_ONE;          // Add by the offset
    }
    bunkers_build(framePointer);        // Draw the bunkers on the screen

    squares_init(); // init the bunker squares
}

// Initializes the bunker sections
void squares_init(){
    uint32_t i, j, row_count, col_count;    // Var init
    row_count = 0;
    col_count = 0;
    for(i = 0; i < NUM_BUNKERS; i++){        // Go through all bunkers
        for(j = 0; j < NUM_SQUARES-2; j++){    // And all squares
            if(j == NUM_SQUARES_IN_LINE){
                row_count += SQUARE_INCREMENT;
                col_count = 0;
            }
            //// And give them addresses and damage
            bunker[i].squares[j].row = bunker[i].row + row_count;
            bunker[i].squares[j].col = bunker[i].col + col_count;
            bunker[i].squares[j].damage = ZERO_DAMAGE;
            col_count += SQUARE_INCREMENT;
        }
        // Now to initialize the last two sections
        bunker[i].squares[j].row = bunker[i].row + LEFT_STRUT_ROW;
        bunker[i].squares[j].col = bunker[i].col + LEFT_STRUT_COL;
        bunker[i].squares[j].damage = ZERO_DAMAGE;
    }
}

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        j++;
        bunker[i].squares[j].row = bunker[i].row + RIGHT_STRUT_ROW;
        bunker[i].squares[j].col = bunker[i].col + RIGHT_STRUT_COL;
        bunker[i].squares[j].damage = ZERO_DAMAGE;
        row_count = 0;
        col_count = 0;
    }
}

// Draws the bunkers
void bunkers_build(uint32_t * framePointer){
    frame = framePointer;
    int32_t row, col, b;
    for(row=0;row<BUNKER_ROWS;row++){
        // Declare loop vars
        // Go through rows
        for(col=0;col<BUNKER_COLS;col++){
            // Go through cols
            if ((bunker_24x18[row] & (1<<(BUNKER_COLS-col-1)))) { // if pixel
                for(b = 0; b < NUM_BUNKERS; b++){ // draw that pixel every time
                    util_draw_pixel(framePointer,row+bunker[b].row,col+bunker[b].col,GREEN);
                }
            }
        }
    }
}

// Is our bunker hit by something?
bool bunkers_detect_collision(uint32_t row, uint32_t col, bool forceDestroy){
    uint32_t i, j;
    for(i = 0; i < NUM_BUNKERS; i++){
        for(j=0; j < NUM_SQUARES; j++){
            if(bunker[i].squares[j].damage < 4 && bunker[i].squares[j].row +
                SQUARE_INCREMENT >= row&& bunker[i].squares[j].row <= row){
                // If we have been hit
                if((col <= bunker[i].squares[j].col + SQUARE_INCREMENT+BUFFER)
                    && (col >= bunker[i].squares[j].col-BUFFER)){
                    // and we have been hit
                    if(forceDestroy){
                        // an alien crashed into us
                        bunker_degrade(i,j); // completely
                        bunker_degrade(i,j); // destroy
                        bunker_degrade(i,j); // totally
                        bunker_degrade(i,j); //
                    }else {
                        // Just a bullet
                        bunker_degrade(i,j); // only one destroy
                    }
                    return true; // We have been hit!
                }
            }
        }
    }
    return false; // Noone got hit, sorry
}

void bunker_degrade(uint32_t i, uint32_t j){
    bunker[i].squares[j].damage++;
    int32_t r,c;
    for(r=0;r<SQUARE_INCREMENT;r++){
        // Go through rows

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    for(c=0;c<SQUARE_INCREMENT;c++){           // and columns
        if (bunker[i].squares[j].damage == BUNKER_DAMAGE_1 && (bunkerDamage0_6x6[r] &
(1<<(SQUARE_INCREMENT-c-1)))){
            // If we need to erase a pixel here, do so.
            util_draw_pixel(frame,r+bunker[i].squares[j].row,c+bunker[i].squares[j].c
ol, BLACK);
        }else if(bunker[i].squares[j].damage == BUNKER_DAMAGE_2 &&
(bunkerDamage1_6x6[r] & (1<<(SQUARE_INCREMENT-c-1)))){
            // If we need to erase a pixel here, do so.
            util_draw_pixel(frame,r+bunker[i].squares[j].row,c+bunker[i].squares[j].c
ol, BLACK);

        }else if(bunker[i].squares[j].damage == BUNKER_DAMAGE_3 // 2 damage level
            && (bunkerDamage2_6x6[r] & (1<<(SQUARE_INCREMENT-c-1)))){
            // If we need to erase a pixel here, do so.
            util_draw_pixel(frame,r+bunker[i].squares[j].row,c+bunker[i].squares[j].c
ol, BLACK);

        }else if(bunker[i].squares[j].damage == BUNKER_DAMAGE_4 // 3 damage level
            && (bunkerDamage3_6x6[r] & (1<<(SQUARE_INCREMENT-c-1)))){
            // If we need to erase a pixel here, do so.
            util_draw_pixel(frame,r+bunker[i].squares[j].row,c+bunker[i].squares[j].c
ol, BLACK);
        }
    }
}
}
}

```