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// Stop Go C Example (Bitbanding)
// Jason Losh

//-----------------------------------------------------------------------------
// Hardware Target
//-----------------------------------------------------------------------------

// Target Platform: EK-TM4C123GXL Evaluation Board
// Target uC:       TM4C123GH6PM
// System Clock:    40 MHz

// Hardware configuration:
// Red LED:
//   PF1 drives an NPN transistor that powers the red LED
// Green LED:
//   PF3 drives an NPN transistor that powers the green LED
// Pushbutton:
//   SW1 pulls pin PF4 low (internal pull-up is used)

//-----------------------------------------------------------------------------
// Device includes, defines, and assembler directives
//-----------------------------------------------------------------------------

#include <stdint.h>
#include <stdbool.h>
#include "tm4c123gh6pm.h"

#define RED_LED      (*((volatile uint32_t *)(0x42000000 + (0x400253FC-0x40000000)*32 + 1*4)))
#define GREEN_LED    (*((volatile uint32_t *)(0x42000000 + (0x400253FC-0x40000000)*32 + 3*4)))
#define PUSH_BUTTON  (*((volatile uint32_t *)(0x42000000 + (0x400253FC-0x40000000)*32 + 4*4)))

//-----------------------------------------------------------------------------
// Subroutines
//-----------------------------------------------------------------------------

// Blocking function that returns only when SW1 is pressed
void waitPbPress()
{
    while(PUSH_BUTTON);
}

// Initialize Hardware
void initHw()
{
    // Configure HW to work with 16 MHz XTAL, PLL enabled, system clock of 40 MHz
    SYSCTL_RCC_R = SYSCTL_RCC_XTAL_16MHZ | SYSCTL_RCC_OSCSRC_MAIN | SYSCTL_RCC_USESYSDIV | (4
  << SYSCTL_RCC_SYSDIV_S);

    // Set GPIO ports to use AP (not needed since default configuration -- for clarity)
    SYSCTL_GPIOHBCTL_R = 0;

    // Enable GPIO port F peripherals
    SYSCTL_RCGC2_R = SYSCTL_RCGC2_GPIOF;

    // Configure LED and pushbutton pins
    GPIO_PORTF_DIR_R = 0x0A;  // bits 1 and 3 are outputs, other pins are inputs
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56    GPIO_PORTF_DR2R_R = 0x0A; // set drive strength to 2mA (not needed since default
  configuration -- for clarity)
57    GPIO_PORTF_DEN_R = 0x1A;  // enable LEDs and pushbuttons
58    GPIO_PORTF_PUR_R = 0x10;  // enable internal pull-up for push button
59}
60
61//-----------------------------------------------------------------------------
62// Main
63//-----------------------------------------------------------------------------
64
65int main(void)
66{
67    // Initialize hardware
68    initHw();
69
70    // Turn on red LED, turn off green LED
71    RED_LED = 1;
72    GREEN_LED = 0;
73
74    // Wait for PB press
75    waitPbPress();
76
77    // Turn off red LED, turn on green LED
78    RED_LED = 0;
79    GREEN_LED = 1;
80
81    // Endless loop
82    while(1);
83}
84
```