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// ***** sonic.c *****

// Project: Keil Labs and Project

// File: sonic.c

// Class: ENEL 351 Lab Works

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// Description: The project is based on the STM32F103RB that is being used in ENEL 351 Labs.

// It will also be used in the Project related to input and output of various sensors.


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// *****IMPORTANT*****

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// ***** Header Files *****

#include "stm32f10x.h"

#include "header.h"

#include <string.h>

#include <stdio.h>

#include <stdlib.h>

#include <math.h>


// ***** Timer Delay (Helper for Ultra Sonic)*****

void timerDelay(uint32_t delay)
{
    TIM2 -> ARR = (SystemCoreClock / 1000000) * delay - 1; // Timer in ms

    TIM2 -> CNT = 0; // Counter to zero

    TIM2 -> CR1 |= TIM_CR1_CEN; // Start

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while(!(TIM2->SR & TIM_SR_UIF)) // Wait
{
    TIM2 -> SR &= ~(TIM_SR_UIF); // Clear UIF flag (Update Interrupt Flag)
}

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float calculateDistance()
{
    GPIOB -> BSRR |= GPIO_BSRR_BR8; // PB8 = Low
    timerDelay(2); // Delay 2 microseconds
    GPIOB -> BSRR |= GPIO_BSRR_BS8; // PB8 = High
    timerDelay(10); // Delay 10 microseconds
    GPIOB -> BSRR |= GPIO_BSRR_BR8; // Set PB8 = Low
    uint32_t counter = 0;
    while(GPIOB -> IDR & GPIO_IDR_IDR9) // Input Read
    {
        counter++;
    }
    float timeSeconds = counter * (0.0625 / 1000000); // Time in Seconds
    float distanceCM = (timeSeconds * 343 / 2) * 100; // Distance in Centimeter
    return distanceCM;
}

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// =====
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