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/*
Timing Measurement

The circuit:
* time_start attached from pin 2 to ground
* time_stop attached from pin 3 to ground
*
* The circuit:
* LCD RS pin to digital pin 1
* Interrupt 0 pin to digital pin 2
* Interrupt 1 pin to digital pin 3
* LCD Enable pin to digital pin 12
* LCD D4 pin to digital pin 13
* LCD D5 pin to digital pin 4
* LCD D6 pin to digital pin 5
* LCD D7 pin to digital pin 6
* LCD R/W pin to ground
* 10K resistor:
* ends to +5V and ground
*/

// include the library code:
#include <LiquidCrystal.h>

// constants won't change. They're used here to
// set pin numbers:

// variables will change:
volatile int State = 0;      // variable for reading the pushbutton status

// Start and stop times
volatile unsigned long start_time_us = 0;
volatile unsigned long stop_time_us = 0;
float delta_time;
float speed_var;

// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(1, 12, 13, 4, 5, 6);

void setup() {
  // Interrupt 0 on digital pin 2
  attachInterrupt(0, time_start, RISING);
  // Interrupt 1 on digital pin 3
  attachInterrupt(1, time_stop, RISING);
  // begin by clearing LCD
  lcd.begin(16, 2);
  lcd.clear();
  lcd.setCursor(0, 0);
  // Default message before dropping the ball
  lcd.print("SpeeDe is ready");// Print a message to the LCD.
}

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void time_start()
{
    if (State == 0){
        start_time_us = micros();
        State = 1;
    }
}
void time_stop()
{
    if (State == 1){
        stop_time_us = micros();
        State = 2;
    }
}
void loop(){
    if (State == 2){
        lcd.clear();
        lcd.setCursor(0, 0);
        delta_time = (stop_time_us - start_time_us)/1e6;
        lcd.print("Time Delta in s");
        lcd.setCursor(0,1);
        lcd.print(delta_time);
        delay(3000);

        speed_var = 5.5e-2/delta_time;
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print("Speed in m/s");
        lcd.setCursor(0,1);
        lcd.print(speed_var);
        delay(3000);
        lcd.clear();

        speed_var = speed_var*3.6;
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print("Speed in km/hr");
        lcd.setCursor(0,1);
        lcd.print(speed_var);
        delay(3000);
    }
}
}

```