// PROJECT  :LCDTMP36

// PURPOSE  :Monitor the readings from a TMP36 on an LCD Screen

// COURSE   :ICS3U

// AUTHOR   :C. D'Arcy

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// MCU      :328P

// STATUS   :Working

// REFERENCE:LCD: https://www.arduino.cc/en/Reference/LiquidCrystal

//          :LCD: https://www.arduino.cc/en/Tutorial/HelloWorld

//          :HD44780U: http://darcy.rsgc.on.ca/ACES/Datasheets/HD44780.pdf

//          :TMP36: http://darcy.rsgc.on.ca/ACES/Datasheets/TMP35\_36\_37.pdf

**#include <LiquidCrystal.h>**  //Adafruit's LCD Library...

//Pin assignments below are RPN Calculator Backplane-compatible

uint8\_t RS = 9, EN = 8, D4 = 7, D5 = 6, D6 = 5, D7 = 4;

**LiquidCrystal lcd(RS, EN, D4, D5, D6, D7);**

#define LCD\_COLUMNS 16      //number of columns in Character LCD screen

#define LCD\_ROWS 2          //number of rows on LCD screen

#define DEGREE 0xDF         //Code for degree symbol (see HD44780U Datasheet)

#define TMP36 A5            //ADC pin for sensor

#define VREF 5.0            //improved accuracy for this particular sensor (TMP36)

void setup() {

  lcd.begin(LCD\_COLUMNS, LCD\_ROWS);   //initialize the LCD screen

  lcd.clear();                        //erase the LCD screen and send cursor home

  lcd.print("TMP36 SENSOR");          //provide a title for the first row

  lcd.setCursor(0, 1);                //position the cursor at start of second row

  lcd.print("C:    ");                //a label

  lcd.write(DEGREE);                  //display the degree symbol

  lcd.setCursor(LCD\_COLUMNS>>1, 1);   //position the cursor for another label halfway across

  lcd.print("F:    ");                //display another label

  lcd.write(DEGREE);                  //display the degree symbol

}

void display(float c, float f) {      //great code is modular...

  char buffer[6];                     //storage for float converted to a string

  lcd.setCursor(2, 1);                //prepare to update the data

  dtostrf(c, 4, 1, buffer);           //convert float (celsius) to string

  lcd.print(buffer);                  //display it

  lcd.setCursor(10, 1);               //position cursor

  dtostrf(f, 4, 1, buffer);           //convert float (fahrenheit) to string

  lcd.print(buffer);                  //display it

}

void loop() {

  uint16\_t reading = analogRead(TMP36);         //obtain sensor (pot) ADC reading

  float voltage = reading \* VREF / 1024;        //obtain voltage value if interested

  float celsius = (voltage \* 1000 - 500) / 10;  //convert voltage to celsius equivalent

  float fahrenheit = celsius \* 1.8 + 32;        //determine fahrenheit equivalent

  display(celsius, fahrenheit);                 //display results on the LCD screen

}