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/*
  Example 9.2

  tronixstuff.com/tutorials > Chapter 9
  based on code by Maurice Ribble
  17-4-2008 - http://www.glacialwanderer.com/hobbyrobotics
*/

#include "Wire.h"
#define DS1307_I2C_ADDRESS 0x68
#include <LiquidCrystal.h> // we need this library for the LCD commands
LiquidCrystal lcd(12,11,5,4,3,2);

// Convert normal decimal numbers to binary coded decimal
byte decToBcd(byte val)
{
  return ( (val/10*16) + (val%10) );
}

// Convert binary coded decimal to normal decimal numbers
byte bcdToDec(byte val)
{
  return ( (val/16*10) + (val%16) );
}

// 1) Sets the date and time on the ds1307
// 2) Starts the clock
// 3) Sets hour mode to 24 hour clock

// Assumes you're passing in valid numbers

void setDateDs1307(byte second,          // 0-59
  byte minute,          // 0-59
  byte hour,            // 1-23
  byte dayOfWeek,      // 1-7
  byte dayOfMonth,     // 1-28/29/30/31
  byte month,           // 1-12
  byte year)           // 0-99
{
  Wire.beginTransmission(DS1307_I2C_ADDRESS);
  Wire.send(0);
  Wire.send(decToBcd(second));    // 0 to bit 7 starts the clock
  Wire.send(decToBcd(minute));
  Wire.send(decToBcd(hour));
  Wire.send(decToBcd(dayOfWeek));
  Wire.send(decToBcd(dayOfMonth));
  Wire.send(decToBcd(month));
  Wire.send(decToBcd(year));
  Wire.send(0x10); // sends 0x10 (hex) 00010000 (binary) to control register - turns on square wave
  Wire.endTransmission();
}

// Gets the date and time from the ds1307
void getDateDs1307(byte *second,
  byte *minute,
  byte *hour,
  byte *dayOfWeek,
  byte *dayOfMonth,
  byte *month,
  byte *year)
{
  // Reset the register pointer
  Wire.beginTransmission(DS1307_I2C_ADDRESS);
  Wire.send(0);
  Wire.endTransmission();

  Wire.requestFrom(DS1307_I2C_ADDRESS, 7);

  // A few of these need masks because certain bits are control bits
  *second = bcdToDec(Wire.receive() & 0x7f);
  *minute = bcdToDec(Wire.receive());
  *hour = bcdToDec(Wire.receive() & 0x3f); // Need to change this if 12 hour am/pm
}
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*dayOfWeek = bcdToDec(Wire.receive());
*dayOfMonth = bcdToDec(Wire.receive());
*month      = bcdToDec(Wire.receive());
*year       = bcdToDec(Wire.receive());
}

int readdial(int rangemax, int dialpin)
// rangemax is the number of values in your range, e.g. if you want 0~9, set rangemax to be '10'
// dialpin is the analog pin number connected to the potentiometer to read
{
  int kv=0;
  int kr=0;
  int kb=0;
  float a=0;
  float rd=0;
  rd=1023/rangemax;
  kb=analogRead(dialpin); // read potentiometer connected to analog pin 1
  a=kb/rd;
  kr=int(a);
  if (kr>rangemax)
  {
    kr=rangemax;
  }
  return kr;
}

void displaymenu()
// display the menu options, selectable by using the knob
{
  delay(300); // for debounce
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Turn knob slowly");
  lcd.setCursor(0,1);
  lcd.print("to select option");
  while (digitalRead(8)==LOW)
  {
    if      (readdial(8,1)==0) {lcd.clear(); lcd.setCursor(0,0); lcd.print("  Set hours   "); }
    else if (readdial(8,1)==1) {lcd.clear(); lcd.setCursor(0,0); lcd.print("  Set minutes "); }
    else if (readdial(8,1)==2) {lcd.clear(); lcd.setCursor(0,0); lcd.print(" 12 or 24h time?"); }
    else if (readdial(8,1)==3) {lcd.clear(); lcd.setCursor(0,0); lcd.print("Set day of month"); }
    else if (readdial(8,1)==4) {lcd.clear(); lcd.setCursor(0,0); lcd.print("  Set month   "); }
    else if (readdial(8,1)==5) {lcd.clear(); lcd.setCursor(0,0); lcd.print("  Set year    "); }
    else if (readdial(8,1)==6) {lcd.clear(); lcd.setCursor(0,0); lcd.print(" Set Mon~Sun  "); }
    else if (readdial(8,1)==7) {lcd.clear(); lcd.setCursor(0,0); lcd.print("  exit menu   "); }
    delay(100); // stop screen flicker
  }
}

void setup()
{
  byte second, minute, hour, dayOfWeek, dayOfMonth, month, year;
  Wire.begin();
  second = 0;
  minute = 23;
  hour = 23;
  dayOfWeek = 4;
  dayOfMonth = 19;
  month = 5;
  year = 10;
  // setDateDs1307(second, minute, hour, dayOfWeek, dayOfMonth, month, year);

  lcd.begin(16, 2); // tells Arduino the LCD dimensions
  lcd.setCursor(0,0);
  lcd.print("tronixstuff.com"); // print text and move cursor to start of next line
  lcd.setCursor(0,1);
  lcd.print("* example 9.2 * ");
  delay(5000);
  lcd.clear(); // clear LCD screen
  pinMode(8, INPUT);
}

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```
void loop()
{
  byte second, minute, hour, dayOfWeek, dayOfMonth, month, year;
  getDateDs1307(&second, &minute, &hour, &dayOfWeek, &dayOfMonth, &month, &year);
  lcd.clear(); // clear LCD screen
  lcd.setCursor(0,0);
  lcd.print(" ");
  lcd.print(hour, DEC);
  lcd.print(":");
  if (minute<10)
  {
    lcd.print("0");
  }
  lcd.print(minute, DEC);
  lcd.print(":");
  if (second<10)
  {
    lcd.print("0");
  }
  lcd.print(second, DEC);

  lcd.setCursor(0,1);
  lcd.print(" ");
  switch(dayOfWeek){
  case 1:
    lcd.print("Sun");
    break;
  case 2:
    lcd.print("Mon");
    break;
  case 3:
    lcd.print("Tue");
    break;
  case 4:
    lcd.print("Wed");
    break;
  case 5:
    lcd.print("Thu");
    break;
  case 6:
    lcd.print("Fri");
    break;
  case 7:
    lcd.print("Sat");
    break;
  }
  lcd.print(" ");
  lcd.print(dayOfMonth, DEC);
  lcd.print("/");
  lcd.print(month, DEC);
  lcd.print("/20");
  lcd.print(year, DEC);

  if (digitalRead(8)==HIGH)
  // has the user pressed the button? If so, display the menu
  {
    delay(200); // for debounce
    Serial.print(" pressed ");
    displaymenu();
  }
  delay(500);
}
```