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/*
  Digital LCD clock using
  LCD shield and DS1307 shield
  tronixstuff.com

  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());
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*hour      = bcdToDec(Wire.receive() & 0x3f); // Need to change this if 12 hour am/pm
*dayOfWeek = bcdToDec(Wire.receive());
*dayOfMonth = bcdToDec(Wire.receive());
*month      = bcdToDec(Wire.receive());
*year       = bcdToDec(Wire.receive());
}

void setup()
{
  byte second, minute, hour, dayOfWeek, dayOfMonth, month, year;
  Wire.begin();
  Serial.begin(9600);

  // Change these values to what you want to set your clock to.
  // You probably only want to set your clock once and then remove
  // the setDateDs1307 call.

  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(" DS1307 shield ");
  delay(5000);
  lcd.clear(); // clear LCD screen
}

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");
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    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);
delay(1000);
}
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