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// Simple clock using DS1307 RTC chip, Arduino and
// MAX7219 LED display driver
// more information at http://wp.me/pQmjR-BK

#include "Wire.h"
#define DS1307_I2C_ADDRESS 0x68
#include "LedControl.h" // need the library

byte second, minute, hour, dayOfWeek, dayOfMonth, month, year;
float t=0;
int a,b;

LedControl lc=LedControl(12,11,10,1); // lc is our object
// pin 12 is connected to the MAX7219 pin 1
// pin 11 is connected to the CLK pin 13
// pin 10 is connected to LOAD pin 12
// 1 as we are only using 1 MAX7219

// 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);
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// 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
*dayOfWeek = bcdToDec(Wire.receive());
*dayOfMonth = bcdToDec(Wire.receive());
*month = bcdToDec(Wire.receive());
*year = bcdToDec(Wire.receive());
}

void setup()
{
  // the zero refers to the MAX7219 number, it is zero for 1 chip
  lc.shutdown(0,false);// turn off power saving, enables display
  lc.setIntensity(0,8);// sets brightness (0~15 possible values)
  lc.clearDisplay(0);// clear screen

  byte second, minute, hour, dayOfWeek, dayOfMonth, month, year;

  Wire.begin();

  // 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 = 56;
  hour = 9;
  dayOfWeek = 5;
  dayOfMonth = 9;
  month = 7;
  year = 10;
  // setDateDs1307(second, minute, hour, dayOfWeek, dayOfMonth, month, year);
}

void loop()
{
  lc.setChar(0,2,'-',false);
  lc.setChar(0,5,'-',false);
  getDateDs1307(&second, &minute, &hour, &dayOfWeek, &dayOfMonth, &month, &year);
  if (hour<10)
  {
    lc.setDigit(0,0,0,false);
    lc.setDigit(0,1,hour,false);
  } else if (hour>=10)
  {
    t=hour/10;
    a=int(t);

    lc.setDigit(0,0,a,false);
    t=hour%10;
    lc.setDigit(0,1,t,false);
  }
  if (minute<10)
  {
    lc.setDigit(0,3,0,false);
    lc.setDigit(0,4,minute,false);
  } else if (minute>=10)
  {
    t=minute/10;
    a=int(t);
    lc.setDigit(0,3,a,false);
    t=minute%10;
    lc.setDigit(0,4,t,false);
  }
  if (second<10)
  {
    lc.setDigit(0,6,0,false);
    lc.setDigit(0,7,second,false);
  }
}
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```
} else if (second>=10)
{
  t=second/10;
  a=int(t);
  lc.setDigit(0,6,a,false);
  t=second%10;
  lc.setDigit(0,7,t,false);
}
}
```