SHOP

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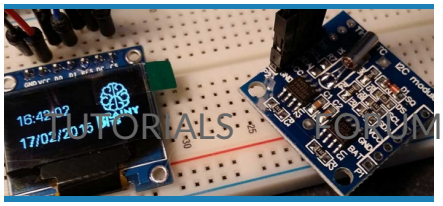
TUTORIAL



Let your Arduino know what time and day it is using the DS1307 RTC module.

VIDEO

OVERVIEW

Being able to know the time and date is something you'll probably need sooner or later in some of your Arduino projects. Thankfully this can be easily achieved by using the DS1307 RTC module.

The DS1307 real time clock module uses the I2C bus so we will only need 2 pins to retrieve the date and time and display the results on the OLED display that we used in our last tutorial.

This module as a small battery to keep time clock ticking when you Arduino loses power or goes to sleep.

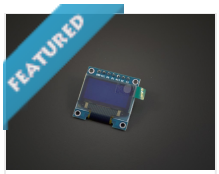
The type of battery that is required is a LIR2032, which is a rechargeable battery and can be hard to find sometimes, but the CR2032 is very common and easy to find, but is not rechargeable and cannot be used by default, so we will modify our module by removing the charging components on the module.

How to co...

Of course if you have a LIR2032 battery you don't need to do this.

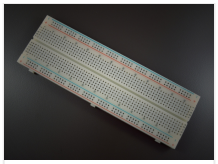
We didn't have one on hand when we started doing this tutorial, so we modified our little module so we could use a CR2032 instead.

PARTS USED



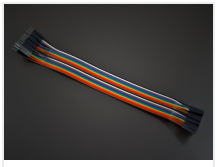
.96" OLED display module

$7.75



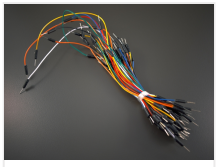
Full size Breadboard

$6.95



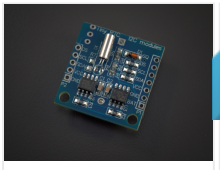
Jumper Wires male to female 20pcs

$2.75

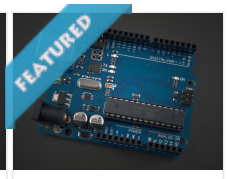


Jumper Wires male to male – 65pcs

$3.50



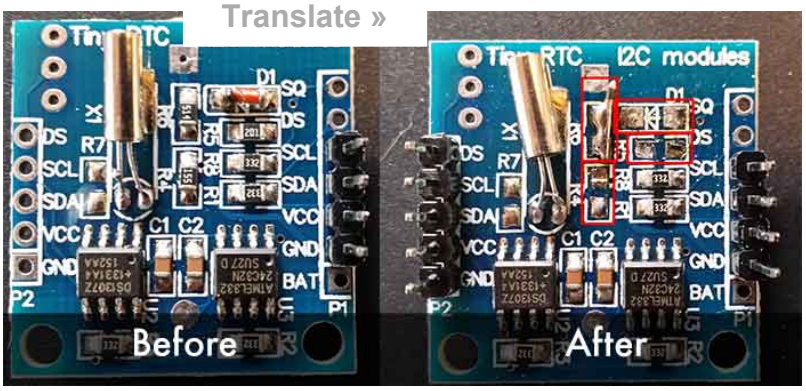
Real Time Clock DS1307 mini-breakout board



UNO R3

$16.75–$17.95

DS1307 MODIFICATION



To use the CR2032 battery instead we will remove some components on the DS1307 module.

Being surface mount components, they are very small and using a magnifying glass with tweezers will almost be a requirement if you want to do this easily.

The way we do it is by getting a hold of the component we want to remove with tweezers, then heat one side of the component with the soldering iron then move to the other side until the component is removed.

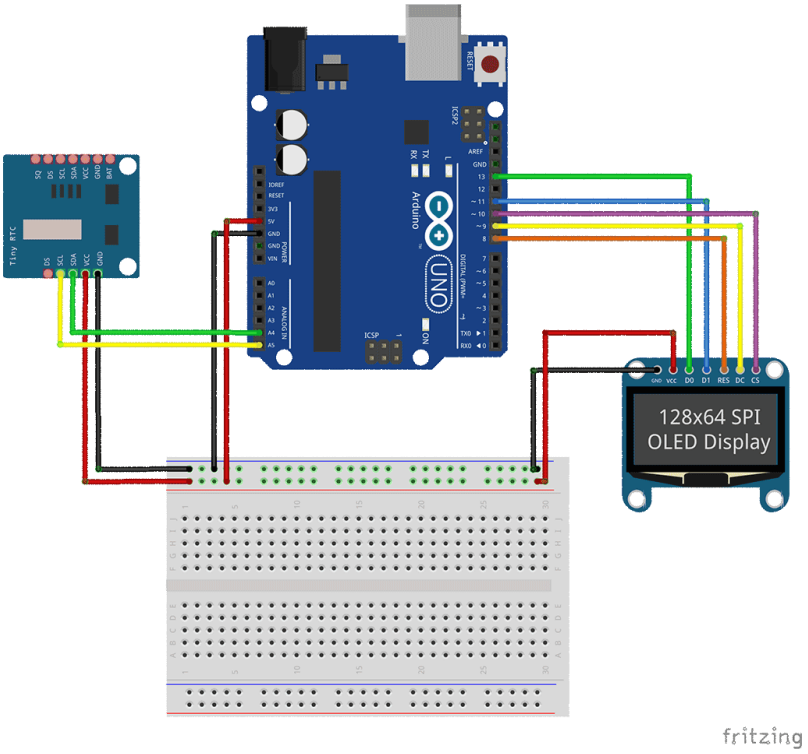
As you can see in the before and after pictures, we removed : D1, R4, R5 and R6.

We then soldered a small wire to connect the pads of R6 together.

Now we can use a CR2032 battery with our module.

SCHEMATIC

$2.50



Our OLED display uses the SPI Bus and the DS1307 uses the I2C Bus.
The OLED is connected to pins 9 through 13 and the DS1307 is connected to pin A4(SDA) and A5(SCL).
We use a breadboard to connect the VCC and Ground to both modules from our UNO.

THE CODE

We are using a couple of libraries in this tutorial:

The u8glib for the OLED display and the DSRTC1307 Arduino Library for the DS1307.
We also include the Wire.h and Time.h library for the I2C Bus and Time manipulation.

First thing we need to do is initialize our DS1307 module with the current date and time.
We do this by running the “SetTime” sketch that comes with the DSRTC1307 library.

After this, we will upload the main code that will display the Time and Date on our OLED display.

As always please watch our Tutorial video for more information.

```
#include <U8glib.h>  // OLED
#include <Wire.h>  // I2C
#include <Time.h>  // Time Manipulation
#include <DS1307RTC.h>  // DS1307 RTC

char timebuf[10];  // Time
char datebuf[10];  // Date
int year2digit;  // 2 digit year
int year4digit;  // 4 digit year


U8GLIB_SH1106_128X64 u8g(13, 11, 10, 9, 8);  // DO=1

const uint8_t brainy_bitmap[] PROGMEM = {
 0x00, 0x00, 0x03, 0xB0, 0x00, 0x00, 0x00, 0x00, 0xC
0x00, 0x00, 0x00, 0x00, 0xFC, 0x47, 0xC0, 0x00, 0x0C
0x02, 0x58, 0x30, 0x00, 0x00, 0x03, 0x02, 0x58, 0x1C
0x00, 0x03, 0x06, 0x4C, 0x18, 0x00, 0x00, 0x07, 0x04
0x3C, 0x00, 0x00, 0x09, 0xC0, 0x40, 0xE6, 0x00, 0x0C
0x0C, 0x4E, 0x02, 0x00, 0x00, 0x1F, 0x86, 0x4C, 0x7E
0x00, 0x18, 0x43, 0xF8, 0x82, 0x00, 0x00, 0x10, 0x06
0x01, 0x00, 0x00, 0x30, 0x18, 0x46, 0x01, 0x00, 0x0C
0x10, 0x43, 0x03, 0x00, 0x00, 0x1C, 0x70, 0x41, 0x86
0x00, 0x09, 0x1E, 0x4F, 0x06, 0x00, 0x00, 0x08, 0x3C
0x86, 0x00, 0x00, 0x06, 0x60, 0x40, 0x8C, 0x00, 0x0C
0xE0, 0x41, 0xF0, 0x00, 0x00, 0x00, 0x38, 0xE3, 0x0C
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x1F, 0xCF, 0x82
0xC6, 0xEE, 0x1C, 0xEC, 0xC7, 0x0C, 0xE6, 0x7C, 0x1C
0x8D, 0xCC, 0xDE, 0x38, 0x1D, 0xCD, 0xDF, 0xCC, 0xCE
0x1F, 0xEC, 0x08, 0x0C, 0xC2, 0x18, 0x1C, 0xEC, 0x0C
0x00, 0x00, 0x1C, 0xFC, 0x63, 0x00, 0x00, 0x00, 0x1C
0x60, 0xC0, 0x00, 0x00, 0x1F, 0xCC, 0x63, 0xC0, 0x0C
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x0C
0x42, 0x38, 0x7B, 0xEA, 0x86, 0xB2, 0x28, 0xC7,

};

void draw(void) {
  u8g.drawBitmapP( 78, 5, 6, 50, brainy_bitmap);  //
  u8g.setFont(u8g_font_fur11);  // select font
  u8g.setPrintPos(0, 30);  // set position
  u8g.print(timebuf);  // display time
  u8g.setPrintPos(0, 55);  // set position
  u8g.print(datebuf);  // display date

}

void setup(void) {
}

void loop(void) {


  tmElements_t tm;
    if (RTC.read(tm)) {
        year2digit = tm.Year - 30;  // 2 digit year
   //   year4digit = tm.Year + 1970;  // 4 digit yea

      sprintf(timebuf, "%02d:%02d:%02d",tm.Hour, tm.
      sprintf(datebuf, "%02d/%02d/%02d",tm.Day, tm.M

      u8g.firstPage();  // Put information on OLED
      do {
        draw();
      } while( u8g.nextPage() );

  }

```

```
69    delay(1000);  // Delay of 1sec
70
71  }
```

DOWNLOAD

Download the RTC1307 library here: DS1307RTC.zip
Download the U8GLib library here: u8glib_arduino_v1.17.zip
Download the Time library here: Time_library.zip
Download the Tutorial Sketch here: DS1307_Tutorial.zip

Share This Tutorial, Choose Your Platform!

16 Comments

raajjesh March 27, 2015 at 21:11

Sir could u pls tell me ,which software u r using to burn the library files & the link to download that . thnx

Yvan March 27, 2015 at 21:24

The library doesn't need to be burned on the Arduino chip, you just download the library on this page in the Download section.
Then extract the library inside your Arduino IDE software library folder.
Watch the Tutorial video on this page to see more information on where to extract the library on your computer.
Hope this helps, please let us know if you need more information.

Bern March 30, 2015 at 15:51

the temp and humidty & the time date program are good thankyou, would it be possible to combine the programs to dispay onto the oled , is there enough room if so could you let me know how to compile/combine the codes

Yvan March 30, 2015 at 15:58

Hi Bern, well I think we already done a tutorial doing what you asked
Have a look here : https://brainy-bits.com/tutorials/connect-and-use-a-spi-oled-display/
Let me know if that's what you were looking for!

Yvan March 30, 2015 at 16:01

Sorry, I reread your comment, and I think you want to display the Time/Date AND the Humidity/Temp correct?
If so, then you just need to modify the code a little to include all that information, and play around with the u8g.setPrintPos(x, y) to make all that information fit!

Yvan March 30, 2015 at 16:08

To include All the information you will need to do something like this :

```
u8g.setPrintPos(0, 0); // set position
u8g.print(timebuf); // display time
u8g.setPrintPos(0, 15); // set position
u8g.print(datebuf); // display date
u8g.drawStr(0, 30, "Temp: "); // put string of display at position X, Y
u8g.drawStr(0, 45, "Hum: ");
u8g.setPrintPos(44, 30); // set position
u8g.print(DHT.temperature, 0); // display temperature from DHT11
u8g.drawStr(60, 30, "c ");
u8g.setPrintPos(44, 45);
u8g.print(DHT.humidity, 0); // display humidity from DHT11
u8g.drawStr(60, 45, "% ");
```

Of course you also need to includes the necessary librairies and variables.
Give it a try and let me know if you have any problems.

Bern March 30, 2015 at 16:17

Thanks Yvan I'll give it a go and let you know

Bern March 31, 2015 at 05:43

Hi Yvan , I'm a newby , I tried to combine your two codes but it failed compile ie.

```
TempHum.01.ino:9:1: error: expected initializer before 'char'
TempHum.01.ino: In function 'void draw()':
TempHum.01.ino:50:13: error: 'DHT' was not declared in this scope
TempHum.01.ino:56:13: error: 'timebuf' was not declared in this scope
TempHum.01.ino: In function 'void loop()':
```

Ive commented your brainy logo out for now but I think it will fit bottom right with new coordinates.

```
#include
#include
#include
#include
#define dht_apin A0
dht DHT
char timebuf[10]; // Time
char datebuf[10]; // Date
int year2digit; // 2 digit year
int year4digit; // 4 digit year
U8GLIB_SH1106_128X64 u8g(13, 11, 10, 9, 8); // D0=13, D1=11, CS=10, DC=9, Reset=8
//const uint8_t brainy_bitmap[] PROGMEM = {
//0x00, 0x00, 0x03, 0xB0, 0x00, 0x00, 0x00, 0x00, 0x07, 0xFC, 0x00, 0x00, 0x00, 0x00, 0x0C,
0x46,
//0x00, 0x00, 0x00, 0x00, 0xFC, 0x47, 0xC0, 0x00, 0x00, 0x01, 0xCE, 0x4C, 0x60, 0x00, 0x00,
0x03,
//0x02, 0x58, 0x30, 0x00, 0x00, 0x03, 0x02, 0x58, 0x10, 0x00, 0x00, 0x02, 0x02, 0x58, 0x18,
0x00,
//0x00, 0x03, 0x06, 0x4C, 0x18, 0x00, 0x00, 0x07, 0x04, 0x44, 0x18, 0x00, 0x00, 0x0D, 0x80,
0x40,
//0x3C, 0x00, 0x00, 0x09, 0xC0, 0x40, 0xE6, 0x00, 0x00, 0x18, 0x78, 0x47, 0xC2, 0x00, 0x00,
0x18,
//0x0C, 0x4E, 0x02, 0x00, 0x00, 0x1F, 0x86, 0x4C, 0x7E, 0x00, 0x00, 0x0E, 0xC6, 0xE8, 0xEE,
0x00,
//0x00, 0x18, 0x43, 0xF8, 0x82, 0x00, 0x00, 0x10, 0x06, 0x4C, 0x03, 0x00, 0x00, 0x30, 0x0C,
0x46,
//0x01, 0x00, 0x00, 0x30, 0x18, 0x46, 0x01, 0x00, 0x00, 0x10, 0x18, 0x43, 0x03, 0x00, 0x00,
0x18,
//0x10, 0x43, 0x03, 0x00, 0x00, 0x1C, 0x70, 0x41, 0x86, 0x00, 0x00, 0x0F, 0xE0, 0x40, 0xFE,
0x00,
//0x00, 0x09, 0x1E, 0x4F, 0x06, 0x00, 0x00, 0x08, 0x30, 0x43, 0x86, 0x00, 0x00, 0x0C, 0x20,
0x41,
//0x86, 0x00, 0x00, 0x06, 0x60, 0x40, 0x8C, 0x00, 0x00, 0x07, 0x60, 0x40, 0xB8, 0x00, 0x00,
0x01,
//0xE0, 0x41, 0xF0, 0x00, 0x00, 0x00, 0x38, 0xE3, 0x00, 0x00, 0x00, 0x00, 0x0F, 0xBE, 0x00,
0x00,
//0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x1F, 0xCF, 0x82, 0x0C, 0x86, 0x46, 0x1F, 0xEF, 0xC3,
0x0C,
//0xC6, 0xEE, 0x1C, 0xEC, 0xC7, 0x0C, 0xE6, 0x7C, 0x1C, 0xED, 0x8D, 0x8C, 0xFE, 0x38, 0x1C,
0xED,
//0x8D, 0xCC, 0xDE, 0x38, 0x1D, 0xCD, 0xDF, 0xCC, 0xCE, 0x38, 0x1F, 0x8C, 0xF8, 0xEC, 0xC6,
0x38,
//0x1F, 0xEC, 0x08, 0x0C, 0xC2, 0x18, 0x1C, 0xEC, 0x00, 0xC0, 0x00, 0x00, 0x1C, 0xFD, 0xFB,
0xC0,
```

```
//0x00, 0x00, 0x1C, 0xFC, 0x63, 0x00, 0x00, 0x00, 0x1C, 0xEC, 0x63, 0xC0, 0x00, 0x00, 0x1F,
0xEC,
//0x60, 0xC0, 0x00, 0x00, 0x1F, 0xCC, 0x63, 0xC0, 0x00, 0x00, 0x1F, 0x0C, 0x63, 0x00, 0x00,
0x00,
//0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x28, 0x2B, 0x4F,
0x67,
//0x42, 0x38, 0x7B, 0xEA, 0x86, 0xB2, 0x28, 0xC7,
//};
void draw(void) {
//u8g.drawBitmapP( 76, 5, 6, 50, brainy_bitmap); // put bitmap
u8g.setFont(u8g_font_unifont); // select font
u8g.drawStr(0, 40, "Temp: "); // put string of display at position X, Y
u8g.drawStr(0, 55, "Hum : ");
u8g.drawStr(0, 10, "Time: ");
//u8g.drawStr(44, 10, "HH.MM.SS");
u8g.drawStr(0, 25, "Date: ");
// u8g.drawStr(44, 25, "DD.MM.YYYY");
u8g.setPrintPos(44, 40); // set position
u8g.print(DHT.temperature, 0); // display temperature from DHT11
u8g.drawStr(60, 40, "c ");
u8g.setPrintPos(44, 55);
u8g.print(DHT.humidity, 0); // display humidity from DHT11
u8g.drawStr(60, 55, "% ");
u8g.setPrintPos(44, 10); // set position
u8g.print(timebuf); // display time
u8g.setPrintPos(44, 55); // set position
u8g.print(datebuf); // display date
}
void setup(void) {
}
void loop(void) {
//Comment DHT11 or DH22
DHT.read22(dht_apin); // Read apin on DHT22
//DHT.read11(dht_apin); // Read apin on DHT11
u8g.firstPage();
do {
draw();
} while( u8g.nextPage() );
tmElements_t tm;
if (RTC.read(tm)) {
year2digit = tm.Year – 30; // 2 digit year variable
// year4digit = tm.Year + 1970; // 4 digit year variable
sprintf(timebuf, "%02d:%02d:%02d",tm.Hour, tm.Minute, tm.Second); // format time
sprintf(datebuf, "%02d/%02d/%02d",tm.Day, tm.Month, year2digit); // format date
```

```
u8g.firstPage(); // Put information on OLED
do {
draw();
} while( u8g.nextPage() );
}
delay(1000); // Delay of 1sec
//delay(5000); // Delay of 5sec before accessing DHT11 or DHT22 (min – 2sec)
}
```

Bern March 31, 2015 at 06:50

I dont know why the full libraries dont copy u8glib.h dht.h Time.h & DS1307.h

Yvan March 31, 2015 at 11:10

Hi Bern,
You are missing some information in your example, if the libraries name don't copy over, you can just type their name in yourself.
I will try to make an example of combining the two Sketches and let you know here.
Check back here later today.

Bern April 1, 2015 at 15:49

Hi Yvan,,,I,ve had several tries at this with no luck cant see where I'm going wrong , have you had time to look at were I've gone wrong,,,Bern

Yvan April 1, 2015 at 15:56

Hi Bern,
We had a website problem yesterday and we had to move the site to another Hosting provider, which was not fun let me tell you
But we managed to make the move and not lose any data, so all is good now.
I will take some time tomorrow to create the sketch to include the Temp,Humidity,Time and Date, and will post it here as a Download item so you can get it.
Thanks for understanding.

Bern April 1, 2015 at 17:17

Glad to hear you have your website up and running ,,,regards Bern

Johan Valencia May 13, 2015 at 23:52

Man i would be glad if you answer me this question: Can i do this whit an LCD sreen?

Yvan May 14, 2015 at 00:51

Sure, you would just have to modify the code to use a Character LCD instead of the OLED display.
Check out this tutorial here: https://brainy-bits.com/tutorials/connect-a-character-lcd-using-the-i2c-bus/
I'm guessing this is what you meant by LCD screen? If not, let me know more details!
Thanks for the comment!

Neuro fuse May 18, 2015 at 22:25

I'm really enjoying the design and layout of your website.
It's a very easy on the eyes which makes it much more enjoyable for me to come here and visit more often. Did you hire out a designer to create your theme?
Exceptional work!

[If you have questions or would like to discuss this tutorial, click here to go to the Brainy-Bits Forum.]

" It's supposed to be automatic, but actually you have to push this button. "
— John Brunner