# SIT107 - Software Engineering 1: Connecting The Cyber And Physical Worlds

## Using the Real Time Clock Activity Sheet

## Hardware Required

Arduino Board

USB cable

Adafruit Assembled Data Logging Shield for Arduino

(https://tronixlabs.com.au/arduino/shields/sd-card/adafruit-assembled-data-logging-shield-for-arduino-australia/ )

CR1220 Coin Cell Battery

(https://tronixlabs.com.au/power/battery/non-rechargeable/cr1220-coin-cell-battery-australia/ )

## Pre-requisites: You must do the following before this task

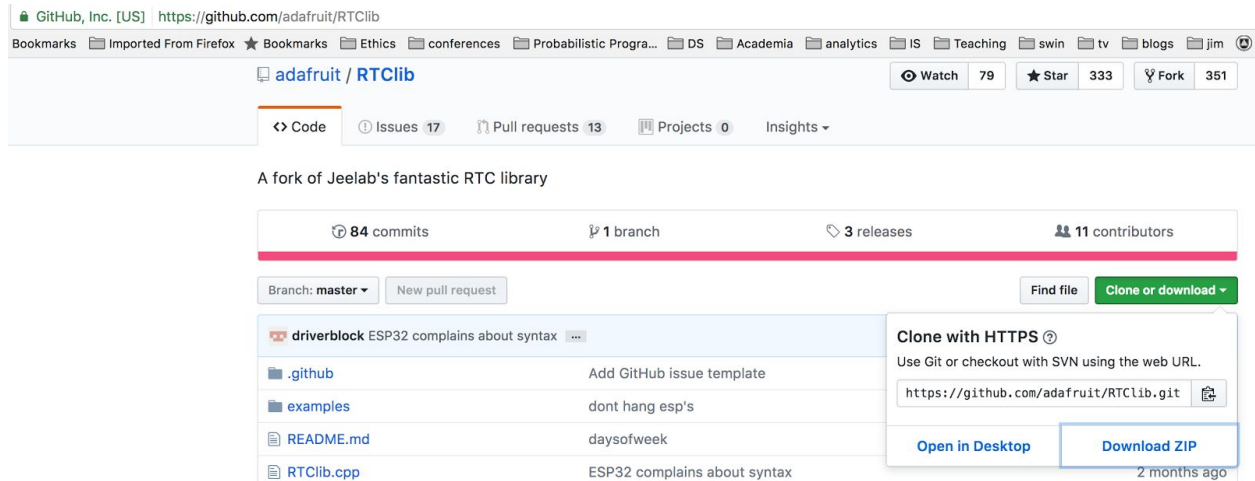**Read this sheet from top to bottom**
**Setting Up The SD Card Activity**

## Steps
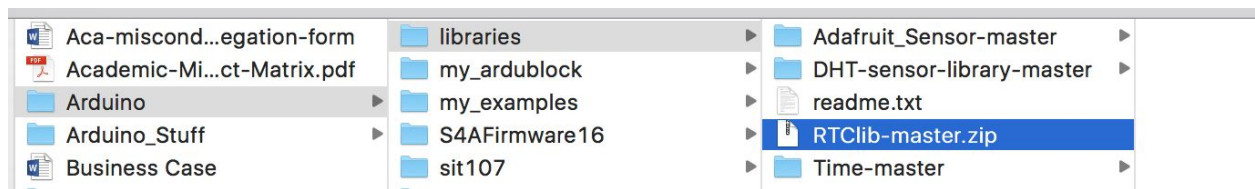
1. Take the coin cell battery and insert it to the data logger shield as below. Make sure you insert the (+) side of the battery on top.

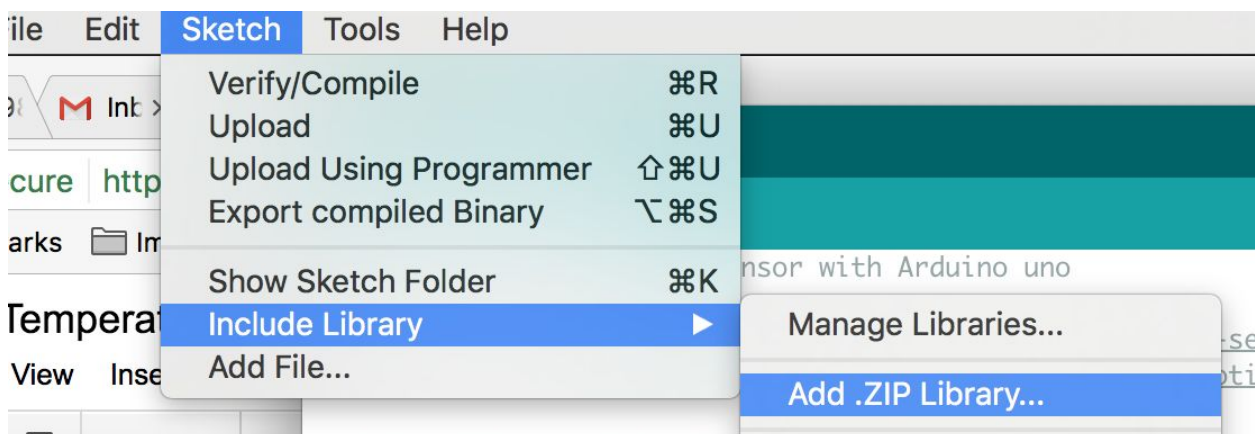Insert battery here->
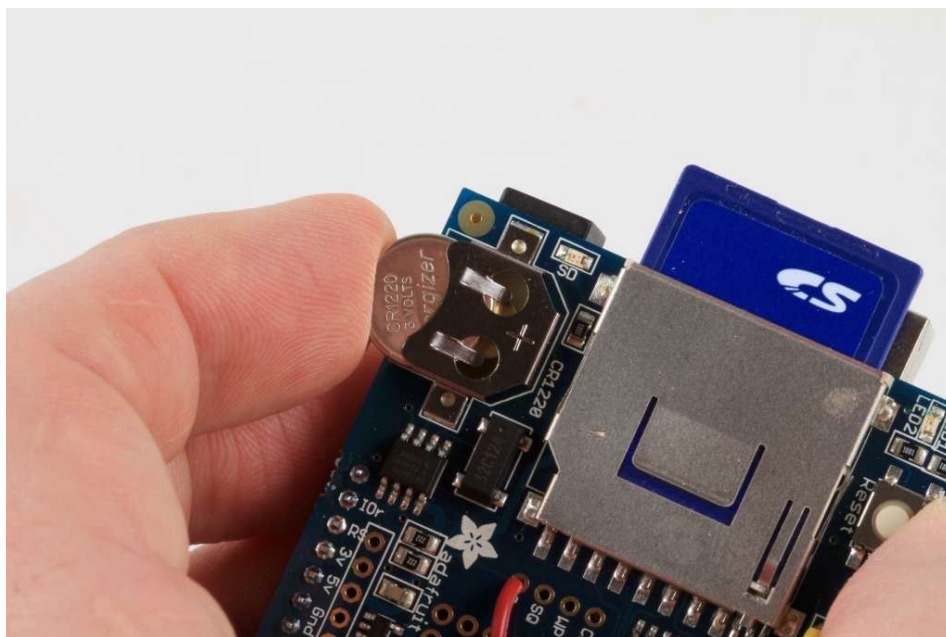


2. The first thing we'll demonstrate is a test sketch that will read the time from the RTC once every 3 seconds.
3. Go to https://github.com/adafruit/RTClib and download the library to your computer by clicking 'Download ZIP'.

GitHub, Inc. [US] | https://github.com/adafruit/RTClib

Bookmarks  Imported From Firefox  ★ Bookmarks  Ethics  conferences  Probabilistic Progra...  DS  Academia  analytics  IS  Teaching  swin  tv  blogs  jim

adafruit / **RTClib**

⊙ Watch 79 | ★ Star 333 | Fork 351

<> Code | ⊙ Issues 17 | Pull requests 13 | Projects 0 | Insights ▾

A fork of Jeelab's fantastic RTC library

⊙ 84 commits | 1 branch | 3 releases | 11 contributors

Branch: master ▾ | New pull request | Find file | Clone or download ▾

driverblock ESP32 complains about syntax  ...

| .github | Add GitHub issue template |
| examples | dont hang esp's |
| README.md | daysofweek |
| RTClib.cpp | ESP32 complains about syntax |

Clone with HTTPS ⊙
Use Git or checkout with SVN using the web URL.

https://github.com/adafruit/RTClib.git

Open in Desktop | Download ZIP

2 months ago

4. Save your Arduino libraries in one location, such as inside Documents/Ardiuno/Libraries

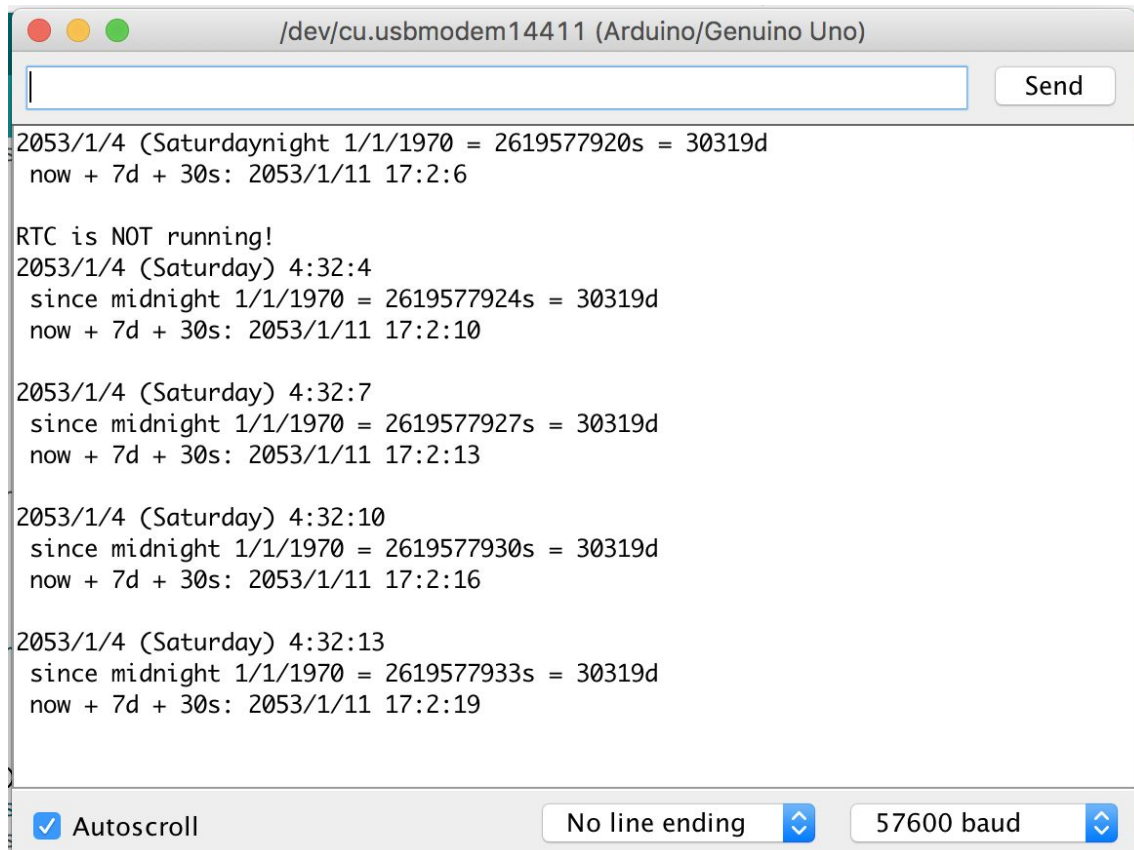| Aca-miscond...egation-form | libraries ▸ | Adafruit_Sensor-master ▸ |
| Academic-Mi...ct-Matrix.pdf | my_ardublock ▸ | DHT-sensor-library-master ▸ |
| Arduino ▸ | my_examples ▸ | readme.txt |
| Arduino_Stuff ▸ | S4AFirmware16 ▸ | RTClib-master.zip |
| Business Case | sit107 ▸ | Time-master ▸ |

5. Go to Arduinio IDE & add this downloaded library. To do this, select 'Sketch' on the top menu bar -> Select 'Include Library' -> Select 'Add .ZIP library'. A dialog will open asking you to select the zip library. Select the zip file we just downloaded.

| ile | Edit | **Sketch** | Tools | Help |

| Verify/Compile | ⌘R |
| Upload | ⌘U |
| Upload Using Programmer | ⇧⌘U |
| Export compiled Binary | ⌥⌘S |
| Show Sketch Folder | ⌘K |
| Include Library | ▶ |
| Add File... | |

nsor with Arduino uno

Manage Libraries...

Add .ZIP Library...

Select a zip file or a folder containing the library you'd like to add

📁 libraries

| Name | Date Modified |
|---|---|
| 📁 Adafruit_Sensor-master | Saturday, 13 May 2017 6:47 PM |
| 📁 DHT-sensor-library-master | Saturday, 13 May 2017 6:43 PM |
| 📄 readme.txt | Monday, 24 April 2017 4:11 PM |
| 🗜 RTClib-master.zip | Tuesday, 13 June 2017 9:56 AM |
| 📁 Time-master | Sunday, 14 May 2017 12:35 PM |

File Format: ZIP files or folders

Cancel    Choose

6.  In the Arduino IDE, open **File-> Examples->RTClib->pcf8523**

7.  Now open up the Serial Console and make sure the baud rate is set correctly at 57600 baud you should see the following:



/dev/cu.usbmodem14411 (Arduino/Genuino Uno)

Send

```
2053/1/4 (Saturdaynight 1/1/1970 = 2619577920s = 30319d
 now + 7d + 30s: 2053/1/11 17:2:6

RTC is NOT running!
2053/1/4 (Saturday) 4:32:4
 since midnight 1/1/1970 = 2619577924s = 30319d
 now + 7d + 30s: 2053/1/11 17:2:10

2053/1/4 (Saturday) 4:32:7
 since midnight 1/1/1970 = 2619577927s = 30319d
 now + 7d + 30s: 2053/1/11 17:2:13

2053/1/4 (Saturday) 4:32:10
 since midnight 1/1/1970 = 2619577930s = 30319d
 now + 7d + 30s: 2053/1/11 17:2:16

2053/1/4 (Saturday) 4:32:13
 since midnight 1/1/1970 = 2619577933s = 30319d
 now + 7d + 30s: 2053/1/11 17:2:19
```

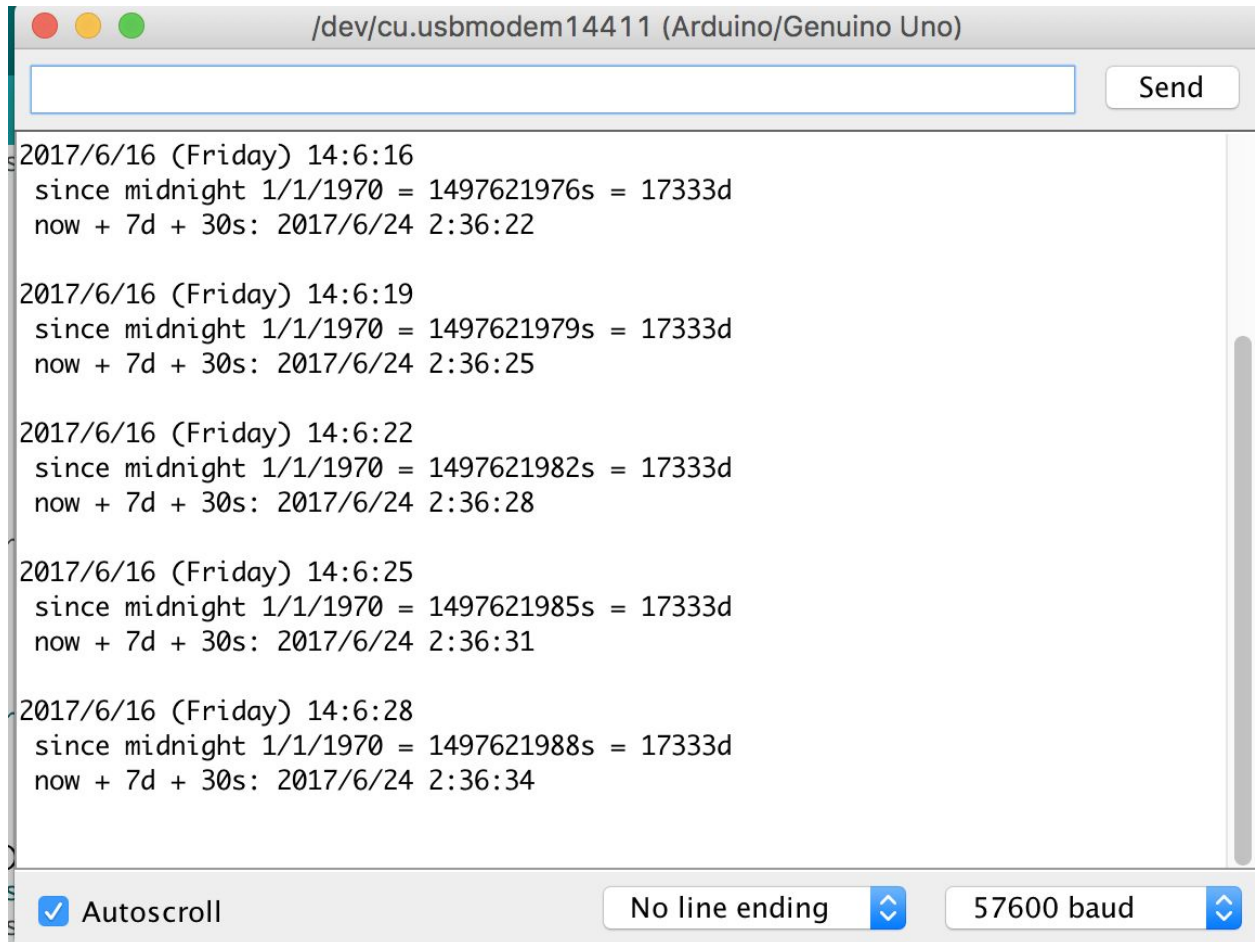☑ Autoscroll          No line ending          57600 baud

8. Whenever the RTC chip loses all power (including the backup battery) it will reset to an earlier date and report the time as 0:0:0 or similar. Whenever you set the time, this will kickstart the clock ticking. So, basically, you should never ever remove the battery once you've set the time.

9. You would have noticed that the time printed on the Serial monitor is not the correct date/time. This is what we are going to set in this step. With the same sketch loaded, uncomment the line that starts with **RTC.adjust** like so:

```
if (! rtc.initialized()) {
  Serial.println("RTC is NOT running!");
  // following line sets the RTC to the date & time this sketch was compiled
  rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));
  // This line sets the RTC with an explicit date & time, for example to set
  // January 21, 2014 at 3am you would call:
  // rtc.adjust(DateTime(2014, 1, 21, 3, 0, 0));
}
}
```

What it does is take the Date and Time according the computer you're using (right when you compile the code) and uses that to program the RTC. You must press the Verify button to compile and then immediately Upload. If you compile and then upload later, the clock will be off by that amount of time.

10. Then open up the Serial monitor window to show that the time has been set.

```
●  ●  ●              /dev/cu.usbmodem14411 (Arduino/Genuino Uno)

┌─────────────────────────────────────────────────────────┬──────────┐
│                                                         │   Send   │
└─────────────────────────────────────────────────────────┴──────────┘

 2017/6/16 (Friday) 14:6:16
  since midnight 1/1/1970 = 1497621976s = 17333d
  now + 7d + 30s: 2017/6/24 2:36:22

 2017/6/16 (Friday) 14:6:19
  since midnight 1/1/1970 = 1497621979s = 17333d
  now + 7d + 30s: 2017/6/24 2:36:25

 2017/6/16 (Friday) 14:6:22
  since midnight 1/1/1970 = 1497621982s = 17333d
  now + 7d + 30s: 2017/6/24 2:36:28

 2017/6/16 (Friday) 14:6:25
  since midnight 1/1/1970 = 1497621985s = 17333d
  now + 7d + 30s: 2017/6/24 2:36:31

 2017/6/16 (Friday) 14:6:28
  since midnight 1/1/1970 = 1497621988s = 17333d
  now + 7d + 30s: 2017/6/24 2:36:34


 ☑ Autoscroll            No line ending  ⇕    57600 baud  ⇕
```

From now on, you won't have to ever set the time again (unless you take the battery out!): the battery will last 5 or more years.

# References

https://learn.adafruit.com/adafruit-data-logger-shield/using-the-real-time-clock