

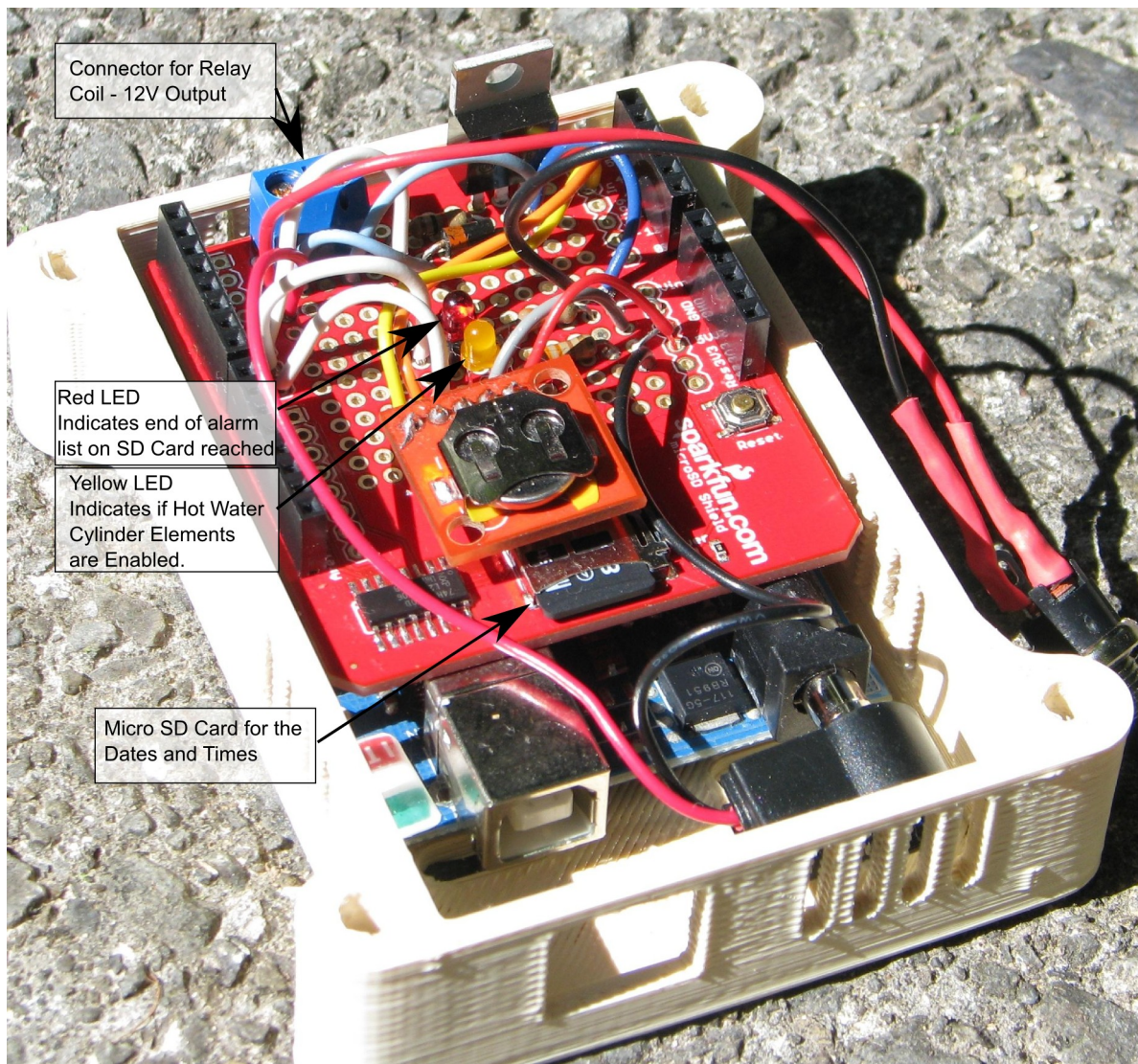
# Arduino Hot Water Cylinder Timer

The timer for the hot water cylinder is programmed to disable the hot water cylinder elements for a period spanning multiple days.

In the event that the controller is turned off it will run a catch-up routine to find the current time and set the alarms for the next available one. In the event that the power outage occurs during a holiday or weekend, it will sets its alarms for the NEXT holiday or weekend rather than finishing off the one that it was in.

Whether the Hot water cylinder is enabled or not is indicated by a yellow LED on the board. If the elements are enabled as would be typical for a weekday period the LED will be lit. If the LED is out then the relay has been opened and the Hot Water Cylinder elements will have been disabled.

A RED LED is mounted on the centre of the top board (there is a second smaller red LED that is always on so ignore that). This has the job of indicating when the controller has finished acting on the list of holidays and that the SD Card list needs to be updated. See below for instruction on updating the list. If the list of holidays has been exceeded (normally about 18 months worth) the controller will still continue to disable the hot water cylinder elements over weekend periods.



There are two Arduino sketches included on the SD card. One is for a NORMALLY CLOSED relay (**TimerDriverv3\_NC\_Variant**), the other is for a NORMALLY OPEN relay. Once set this should not need to be changed. There are programmes included on the SD Card to allow editing and reloading of the Arduino Sketch should that prove necessary.

## Setting up more alarms

The MicroSD Card has a spreadsheet (*EECA\_HWC\_TimerControllerv3.xls*) for creating the file that the Arduino uses to set up the alarms it uses. The file containing the alarms is called *times.csv*. The list is comprised of a two digit number specifying the number of useful dates available, and the list of dates in Unix format (seconds since midnight, first of January 1970). The spreadsheets allow you to add the dates in a more user friendly manner.

The spreadsheet is located in the folder *Alarm\_Setting\_Spreadsheets*.

### Step One.

Turn off power to the Arduino.

### Step Two.

Open the cover and remove the MicroSD Card.

### Step Three.

Use the MicroSD card adapter to connect the MicroSD Card to a computer. If you have not already got it, copy off the spreadsheet for setting the alarms from the relevant folder.

### Step Four.

Type in the new alarm dates being careful to use the correct format (DD/MM/YY hh:mm). Make sure your dates span the weekend around your holiday. For instance say it is Wellington Anniversary, in this case you would set the time to disable the alarm at 2:30pm on the Friday preceding the long weekend and then re-enable the elements at 4:30am in the morning of the first day back at work (Tuesday say).

Although they are present it is not necessary to update the dates of the next weekend as the Arduino will calculate that out based on a weekend period it can use as a starting point. The maximum number of holiday periods is 10. As single day holidays that are not part of a weekend are ignored, and Easter and Xmas/New Year are gathered into two long holiday periods, 10 holiday periods tends to cover about 18 months worth of holidays. Holiday dates can be found in the folder *Holiday\_Dates*.

Once you have updated the holidays, save your spreadsheet.

### Step Five.

Go to the spreadsheet tab called *CodedDates*.

Do a **SaveAs** and select a comma separated variable format and call this file *times.csv*.

### Step Six.

Copy the *times.csv* file back onto the MicroSD Card and remove the card from the computer.

### Step Seven

Reinstalled the microSD card in the Arduino and close the device cover.

### Step Eight

Reconnect the Power to the device.

There will be a short delay while the Arduino reads the MicroSD card and then updates its alarms to the correct dates and time. It's default starting condition is with the elements enabled. This will be shown by the yellow LED being lit. The Red LED in the centre of the board should not be lit.

If the Red LED is lit after updating the dates, turn off the device and check that you really did copy across the updated *times.csv* and that the filename is correct for spelling and case. Re-seat the MicroSD in its holder too. Failing that connect a USB connector to the device and using a Serial Monitor programme (9600 baud rate) see what messages are being broadcast from the device. If it puts out a list of numbers then it is all working but you may have missed your flip with something in the dates you have given it (ie past year's dates) and the program has jumped to the end of the list.

# Schematic

