

**NAME**

**busylight** – display busy/free status to passers-by

**SYNOPSIS**

**busylight** *state*

**busylightd**

**busylight-standalone** *color*

**upcoming**

**OPTIONS**

Each command that accepts command-line options is described below. Note that option names may be preceded by one or two hyphens (e.g., either **--mute** or **-mute**), but options may not be abbreviated or combined.

**busylight**

The **busylight** CLI tool signals the daemon to manually assume a state change according to the option provided. Multiple *state* options may be given in a single invocation, but note that the signal will only report the most immediately-relevant state at any given time. It is safe to include **--reload** with other states, but if two conflicting states are given (e.g., **--mute** and **--open**), it is undefined which will actually take effect.

- cal** Tell the daemon to return to reporting state based on calendar availability. (This signals that a Zoom call has ended.)
- kill** Tell the daemon to terminate immediately.
- mute** Tell the daemon that we are in a Zoom call with the microphone muted.
- open** Tell the daemon that we are in a Zoom call with the microphone open.
- reload** Force the daemon to re-poll the calendar service to get updates to the schedule rather than waiting for the next periodic poll time.
- urgent** Toggle flashing an urgent-status indication.
- zzz** Toggle the active state of the daemon. If it was active, it turns off the signal light and stops polling the calendar service. Otherwise, it resumes active state, polls the calendar service and updates the signal light appropriately.

**busylight-standalone**

The **busylight-standalone** program is intended more for testing the hardware than actual production use. It connects directly to a (hardcoded) port and commands the light device to display a color based on the option given, which must be one (and only one) of the following. Note that all other lights are turned off when making any of these changes.

- blud** Turn on the blue light.
- green** Turn on the green light.
- list** List the available ports on the system. (Currently it is necessary to change the target port in the source code.)
- red** Turn on the lower red light.
- red2** Turn on the upper red light.
- redblue** Flash the upper red light and the blue light alternately.
- redred** Flash both red lights alternately.
- reds** Turn on both red lights.
- off** Turn all lights off.
- yellow** Turn on the yellow light.

## DESCRIPTION

The tools described here control a hardware status signal attached to the computer's USB port. This is a custom hardware device which employs a simple serial protocol and is not necessarily compatible with anything else.

The normal course of operations is to start up the status monitor daemon, **busylightd**, in the background. This will poll the user's Google calendar(s) to see when they are busy or free, and will continue to poll every hour to keep up with changing schedules throughout the day.

The daemon also monitors the state of a video conferencing meeting such as Zoom, to arrange a set of signals to anyone in visual range of the light, such as:

green	Currently free, and able to be approached/interrupted at will.
yellow	Marked busy on a calendar, and thus may be working on something less amenable to interruption.
red	Actually joined a conference call via Zoom, etc., so should not be interrupted (and possibly on-camera so anyone who comes in camera range may be visible to meeting participants).
flashing red	In a conference call and the microphone is open, so any nearby sounds may be heard by all meeting participants.
flashing red/blue	Indicates an urgent need for help.

The actual monitoring of video meetings and microphone statuses is assumed to be done by some other automation which signals the daemon by sending signals to its process or running the **busylight** CLI tool. The author uses a `hammerspoon` script to accomplish this.

See the SIGNALS section below for a description of how sending signals to the daemon affect its operation. The **busylight** CLI program is simply a convenient way to inform the daemon of a status change. It locates the daemon process and sends signal(s) to it according to the command-line flags passed to it.

When the daemon starts, it flashes the blue light twice. When exiting, it flashes the red light twice and then turns the light off completely.

The **upcoming** program polls the Google calendars and displays to standard output the busy/free time ranges for the next 8 hours.

Finally, the **busylight-standalone** program provides a way to test the light hardware without the daemon running. It opens the port directly and sends hardware commands to set the light displays as desired.

## CONFIGURATION

These tools require a few files to be placed in the user's `~/.busylight` directory. The overall tool configuration will be in a file called **config.json** in that directory.

This file provides all of the configuration parameters needed for the ongoing operation of the system. As the name implies, it is in JSON format, as a single object with the following fields:

### Calendars

This is a map of Google calendar IDs to objects which describe those calendars. The data associated with each key is an object with the following fields:

#### Title

An arbitrary name for the calendar that will explain its purpose.

#### IgnoreAllDayEvents

A boolean value; if true, **busylightd** will ignore any busy periods for that calendar which span the entire 8-hour period being queried. Defaults to false.

The key **"primary"** may be used in place of the Google ID to refer to the user's primary calendar.

### TokenFile

The name of a file in which the program can cache authentication tokens to allow it to continue polling Google calendars. This should be a filename in the **.busylight** directory with restricted permissions to

avoid unauthorized viewing.

#### **CredentialFile**

The name of a JSON file containing the API access credentials obtained from Google.

#### **LogFile**

The name of a file into which **busylightd** should record a log of its activities.

#### **PidFile**

The name of the file **busylightd** should use to indicate its PID while running.

#### **Device**

The system device name of the busylight signal hardware.

#### **BaudRate**

The speed the hardware expects to be used to communicate with it.

An example configuration file would look like this:

```
{
  "Calendars": {
    "primary": {
      "Title": "My primary calendar"
    },
    "mycustomcalendar@group.calendar.google.com": {
      "Title": "Group calendar",
      "IgnoreAllDayEvents": true
    }
  },
  "TokenFile": "/Users/MYNAME/.busylight/auth.json",
  "CredentialFile": "/Users/MYNAME/.busylight/credentials.json",
  "LogFile": "/Users/MYNAME/.busylight/busylightd.log",
  "PidFile": "/Users/MYNAME/.busylight/busylightd.pid",
  "Device": "/dev/tty.usbmodem2101",
  "BaudRate": 9600
}
```

## **AUTHENTICATING**

In order to use the daemon to query Google calendar busy/free times, you first need to obtain an API key from Google. This will go in your `~/busylight/credentials.json` file (or whatever you named it in `~/busylight/config.json`). An example of this file is:

```
{
  "installed" : {
    "client_id": "...",
    "project_id": "...",
    "auth_uri": "https://accounts.google.com/o/oauth2/auth",
    "token_uri": "https://oauth2.googleapis.com/token",
    "auth_provider_x509_cert_url": "https://www.googleapis.com/oauth2/v1/certs",
    "client_secret": "...",
    "redirect_uris": ["urn:ietf:wg:oauth:2.0:oob", "http://localhost"]
  }
}
```

Next, you will need to manually authenticate to Google once before the daemon can continue to poll the calendar API on its own. To do this, run the **upcoming** program. If you already have valid access tokens cached, it will simply report your busy/free times for the next 8 hours. Otherwise, it will print a lengthy URL on its standard output and wait for your response.

Copy that URL into a web browser. This will take you to Google where it will ask you to log in to the Google account whose calendars you wish to have monitored. You will also be asked if you are sure you want to give permissions to the app to have access to all of your calendars. If you agree, Google will give

you an access token string.

Copy that string and paste it into the terminal where you are running **upcoming** so it is sent to **upcoming**'s standard input and press the return key.

This will authorize the client to access the calendar API, so **upcoming** will then print out its report of your upcoming appointment times. But in doing so it will also have cached your authentication token in the `~/busylight/auth.json` file (or whatever you named it in **config.json**), so the programs documented here may freely poll the calendar service using that token.

If the busylight tools suddenly stop being able to access the calendar, simply delete the **auth.json** file and repeat this process to get a new token cached.

### Security Implications

Protect the data in the **auth.json** file carefully. Any program with access to that data will have full rights to view and modify your Google calendars.

When you no longer wish to authorize these tools to access your calendars, you may go into your Google account settings on Google's website to revoke that authorization.

## SIGNALS

The **busylightd** daemon responds to the following signals:

- |               |   |
|---------------|---|
| <b>HUP</b>    | The video conference call is over. The daemon changes the light signal to reflect the user's busy/free status as understood from the last poll of the Google calendars.   |
| <b>INFO</b>   | The daemon will immediately poll the calendar API instead of waiting for the next scheduled poll time. This is useful if a last-minute change was made to the calendar. This does not otherwise alter the periodic polling schedule (e.g., if the daemon is polling at 5 minutes past each hour, and this signal is received at 3:45, the next poll will still take place at 4:05).   |
| <b>INT</b>    | Upon receipt of this signal, the daemon gracefully shuts down and terminates.   |
| <b>VTALRM</b> | Toggles urgent indicator status. Initially it makes the light signal display an urgent flashing pattern. When received again, the daemon resumes normal display.  |
| <b>USR1</b>   | The user is in a video conference with the microphone muted. The light signal is changed to reflect this.   |
| <b>USR2</b>   | The user is in a video conference with the microphone open. The light signal is changed to reflect this.  |
| <b>WINCH</b>  | Toggle whether the daemon is active or not. This is usually used to mark the start and end of the workday. When active, the daemon performs all of the functions documented here, polling the Google calendar hourly to pick up any changes to the schedule. When inactive, the light signal is shut off completely and the daemon stops polling the calendar service. Upon startup or resuming from inactive state, the daemon will immediately poll the calendar service, and will then poll again an hour after that, and every hour thereafter. |

## AUTHOR

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## PORTABILITY

The author's intended use for the daemon was on a Macintosh osx system, and the choice of signals was based on their availability on that platform. Other operating systems may not support all of those signals, so porting to those systems may involve a different selection of signals.

## BUGS

The **busylight-standalone** program is not intended for production use and thus still has some needed refactoring. In particular, the device port is hardcoded into it rather than using a configuration file as the other tools do.