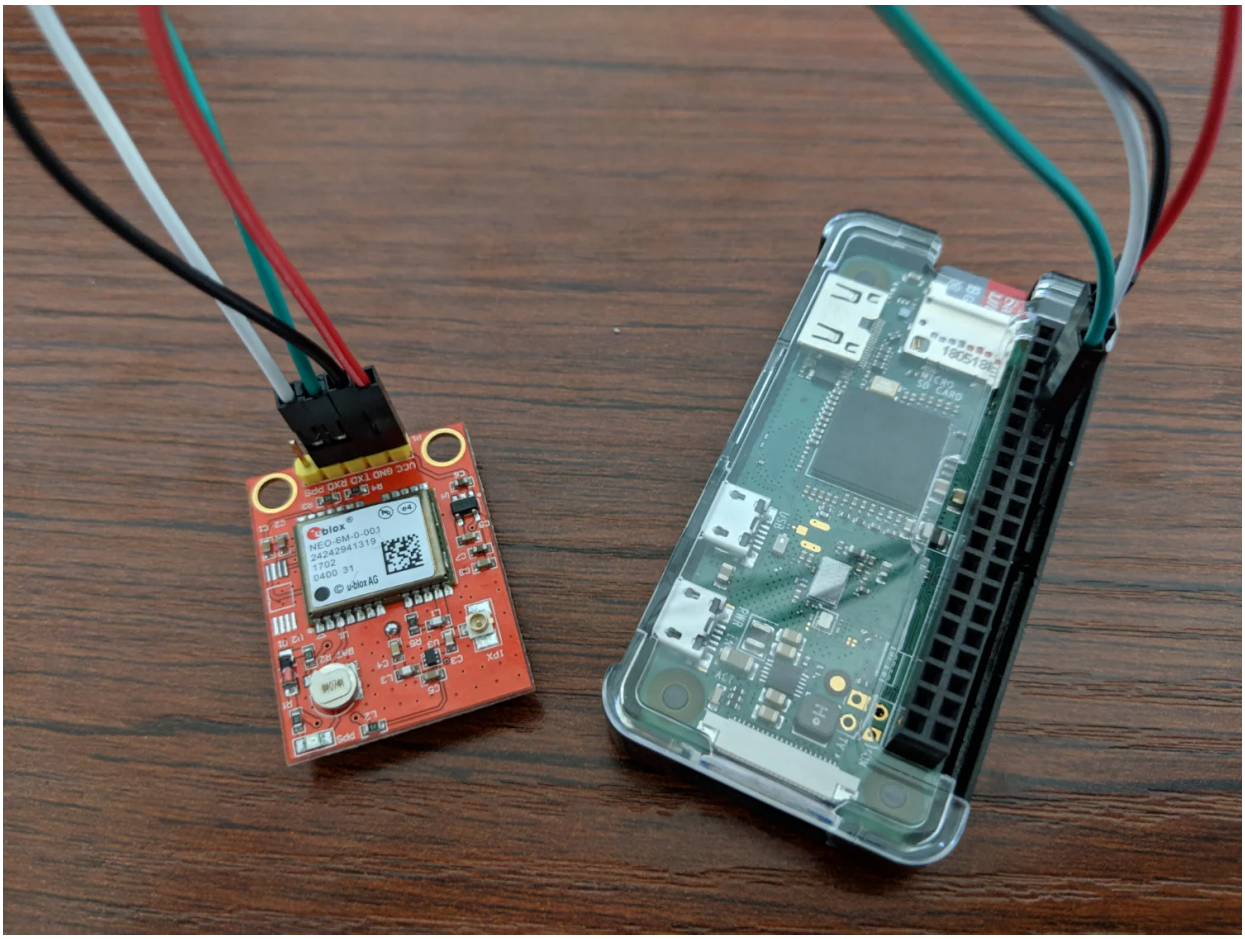
Developer

HANDS ON

Read GPS Data with a Raspberry Pi Zero W and Node.js

By **Nic Raboy** | 30 MAY 2019



The Raspberry Pi is an awesome piece of Internet of Things (IoT) hardware and when equipped with the correct modules, it can do powerful things with minimal effort. Take GPS for example. You can pick up a NEO 6M GPS module or similar for roughly the same price of a Raspberry Pi, read position information, and reverse geocode that information to address estimates.

In this tutorial we're going to see how to hook up a GPS module to a Raspberry Pi Zero W, read the data over the serial port connection, and send it to HERE in exchange for human readable

addresses. We're going to do all this with just a few lines of Node.js and JavaScript.

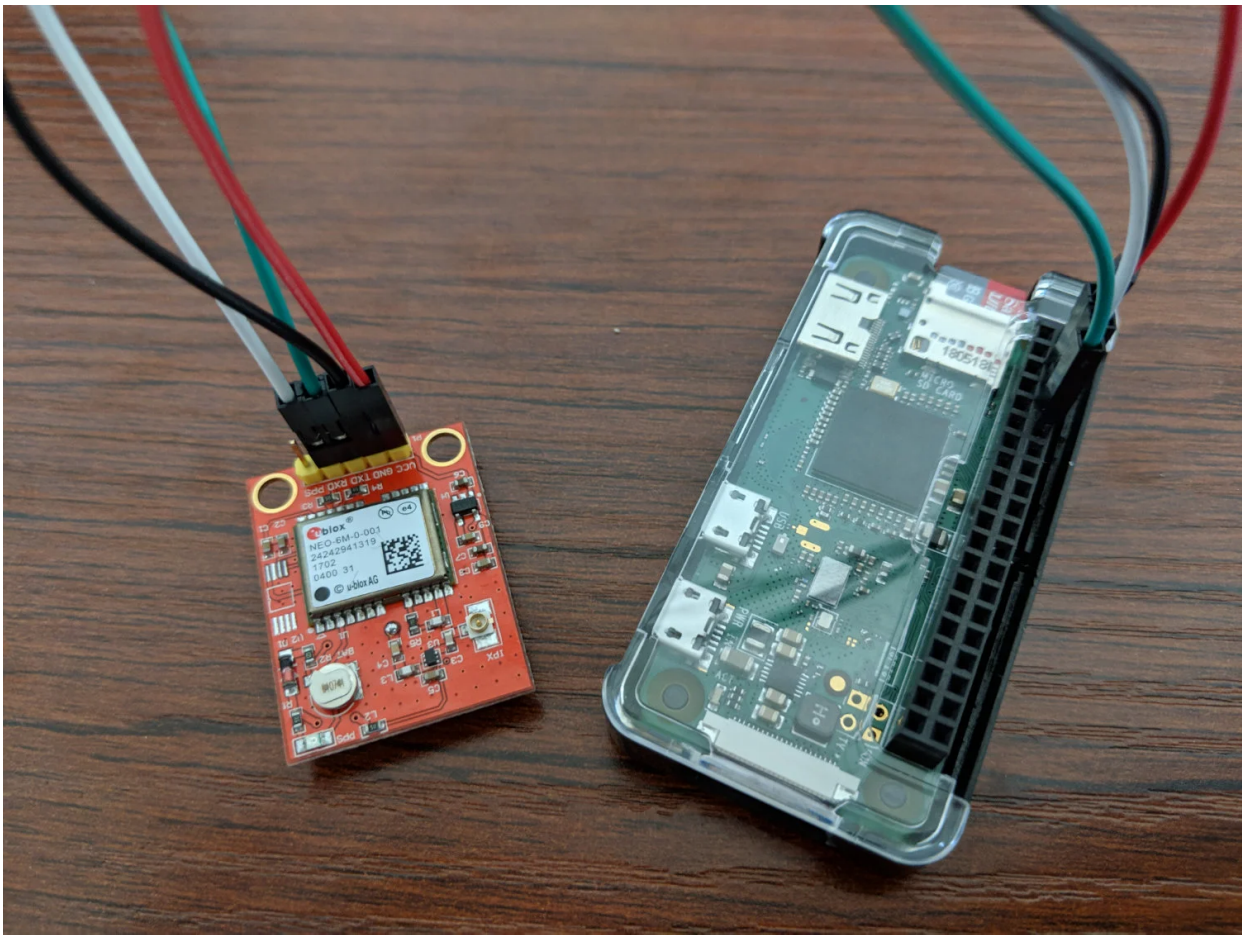
The Software and Hardware Requirements

Before we get too invested in the project, let me outline the hardware and software requirements. In terms of hardware, I'm using the following:

- U-blox NEO 6M GPS Module
- Raspberry Pi Zero W

There is fine print to the above hardware. My GPS module already had pins attached and I had soldered a GPIO header to my Raspberry Pi Zero W myself. I also have an antenna for my GPS module to boost my signal. How you get to that point is up to you, but in terms of specific hardware, that is the IoT device and GPS module I'm using.

To get an idea of what my setup looks like, take a look at the following image:



When it comes to software, having Node.js installed on your Raspberry Pi Zero W is a requirement. If you need help installing it, take a look at my tutorial titled, Install Node.js on a Raspberry Pi Zero W without NodeSource.

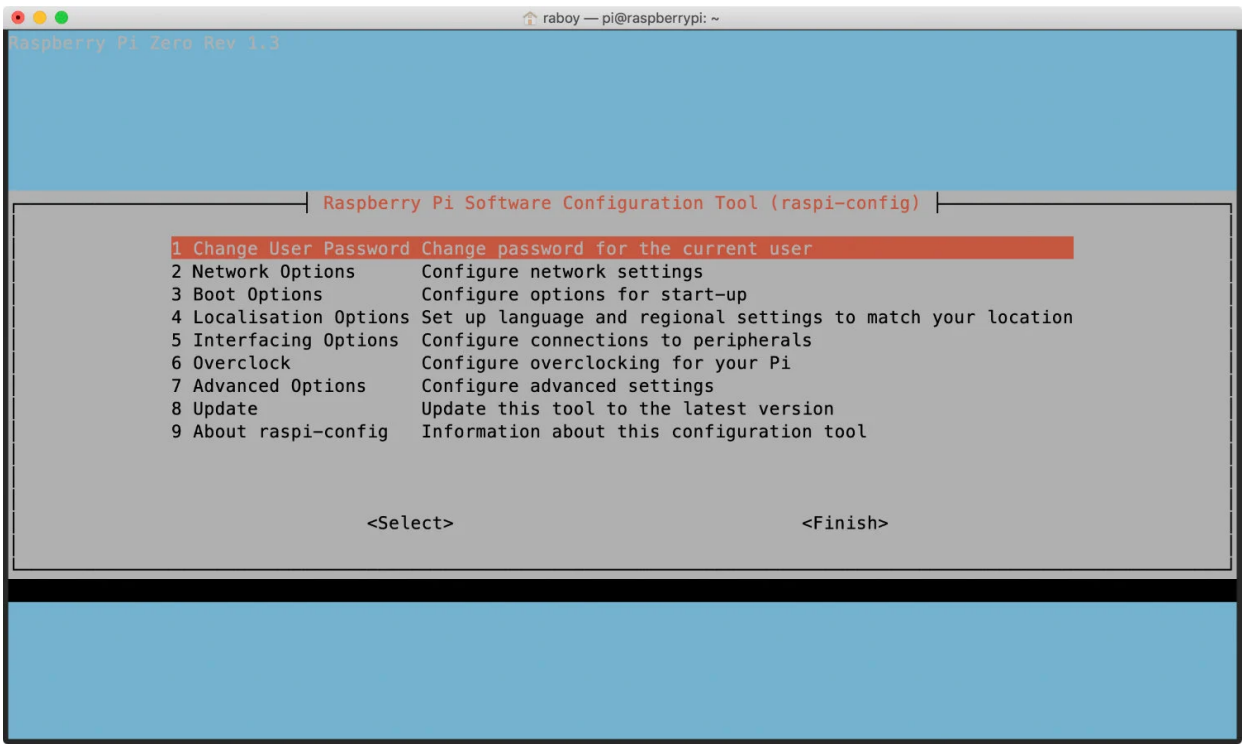
Configuring the Wires and Enabling Serial Port Communication on the Raspberry Pi

Before we attach the GPS module, we need to enable serial port communication on the Raspberry Pi. This isn't for host computer to Raspberry Pi communication, but Raspberry Pi to GPS module communication.

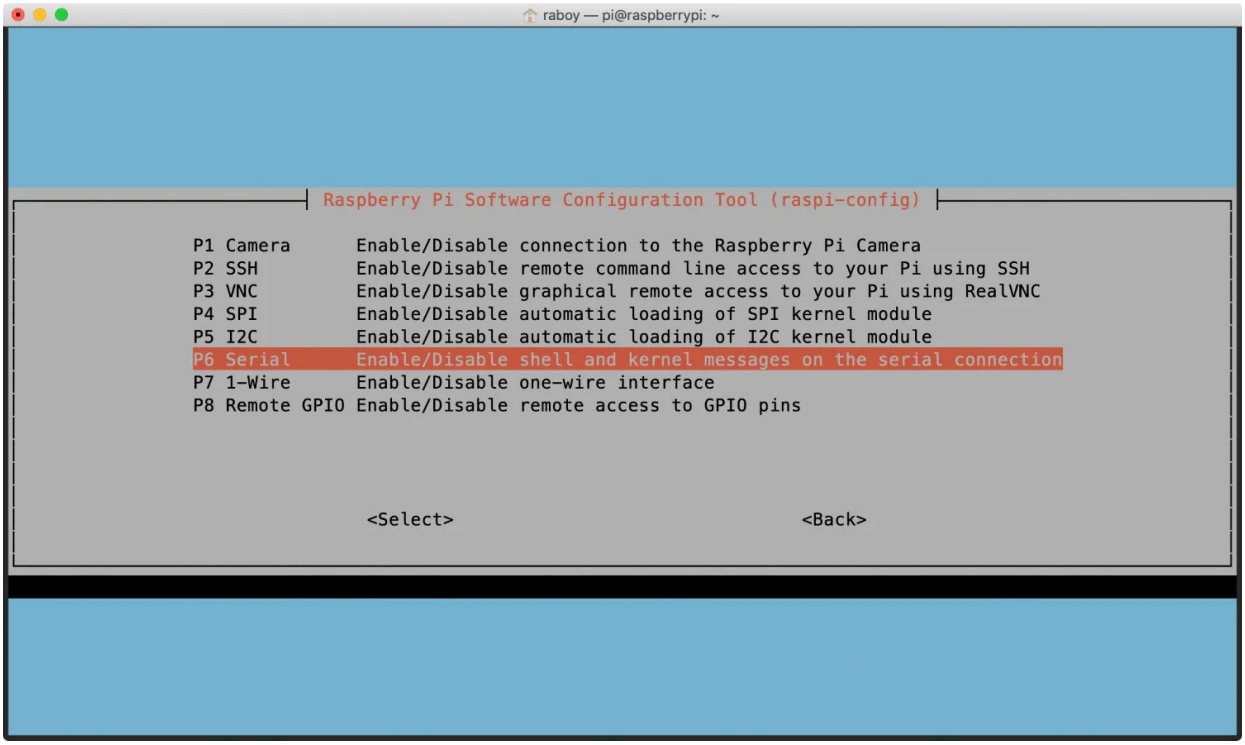
Assuming you are using Raspbian, which is one of the most common Rasbperry Pi Linux distributions, execute the following after establishing an SSH connection:

```
sudo raspi-config
```

After executing the above command, you'll be shown a configuration prompt with options far beyond what we're trying to accomplish.



Inside the configuration tool, you're going to want to choose **Interfacing Options** from the list. This is where we are given an opportunity to choose how to interface with the Raspberry Pi.



For this particular tutorial we're interested in using the serial port on the Raspberry Pi Zero W through the GPIO header. From the list, select **P6 Serial** to be brought to the next screen.

To finalize the configuration, the first of two screens will ask about enabling serial based logins.

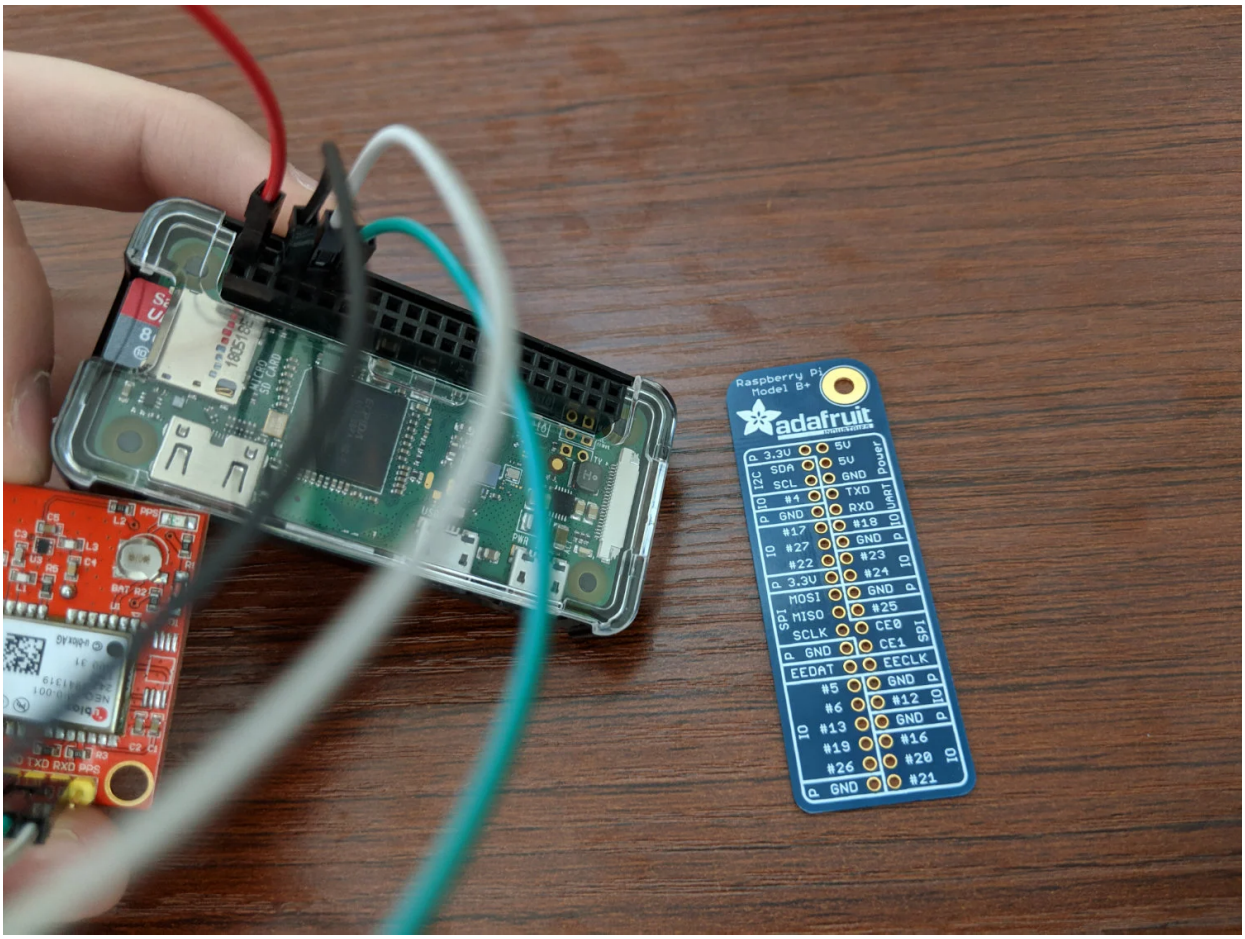
We're already using SSH so being able to login through the serial connection is not relevant to us. Go ahead and choose **No** to proceed to the next step.

The next screen will ask about the port hardware being enabled.

We must enable this so that way our Raspberry Pi can read the GPS data coming in from the pin connection.

Once you've completed this step, you should restart your Raspberry Pi. Instead of doing a restart, you can do a complete shutdown because we plan to connect our GPS module. The Raspberry Pi Zero W should not be powered when we start connecting our pins.

You can get an idea of my pin setup in the following picture:



You probably noticed my Adafruit GPIO template. If you don't have one, I strongly recommend buying one since the pins are not marked on the Raspberry Pi. This will save you from having to do lookups on the internet for the layout.

My pin connections are as follows:

- GPS VCC to Raspberry Pi 5V (Red)
- GPS GND to Raspberry Pi GND (Black)
- GPS RXD to Raspberry Pi TXD (White)
- GPS TXD to Raspberry Pi RXD (Green)

Once connected, you should be able to view the incoming stream

of data. On my Raspberry Pi, the serial port is **/dev/ttyS0**, but yours may be different.

At this point we can focus on the code.

Reading from the Serial Port, Parsing the Data, and Reverse Geocoding it with HERE

You should already have Node.js configured on your Raspberry Pi Zero W by now. If you haven't, please consult this tutorial.

On your Raspberry Pi, create a new directory and execute the following commands:

```
npm init -y
npm install serialport --save
npm install gps --save
npm install request --save
npm install request-promise --save
```

The above commands will create a new **package.json** file and install our dependencies. We'll be using serialport to read from our serial port, gps to parse our NMEA sentences which are returned from the GPS module, and `request` as well as `request-promise` for making HTTP requests to the HERE Reverse

Geocoding API.

Create an **app.js** file within your project and include the following lines:

Copy

```
const SerialPort = require("serialport");
const SerialPortParser = require("@serialport/parser-readline");
const GPS = require("gps");
const Request = require("request-promise");

const port = new SerialPort("/dev/ttyS0", { baudRate: 9600 });
const gps = new GPS();

const APP_ID = "HERE_APP_ID";
const APP_CODE = "HERE_APP_CODE";

const parser = port.pipe(new SerialPortParser());

function getAddressInformation(latitude, longitude) {}

gps.on("data", async data => {});
parser.on("data", data => {});
```

The above code will essentially initialize our dependencies. We are configuring the correct serial port and baud rate, defining our HERE API tokens, and drawing the blueprint for our event listeners.

If you don't already have a HERE Developer Portal account, you'll need one to get your tokens. It is free, so don't worry.

Before we start reading and parsing our GPS data, let's create our function for swapping latitude and longitude coordinates with

addresses. Add the following to the `getAddressInformation` function:

Copy

```
function getAddressInformation(latitude, longitude) {
    let address = {};
    return Request({
        uri: "https://reverse.geocoder.api.here.com/6.2/reversegeocode.j
        qs: {
            "app_id": APP_ID,
            "app_code": APP_CODE,
            "mode": "retrieveAddress",
            "prox": latitude + "," + longitude
        },
        json: true
    }).then(result => {
        if (result.Response.View.length > 0 && result.Response.View[0].R
            address = result.Response.View[0].Result[0].Location.Address
        }
        return address;
    });
}
```

Using a simple HTTP request and some parameters as defined in the HERE Reverse Geocoding API, we can get an estimate of the address for that position.

Now let's look at the event listener for when data comes through the serial port:

Copy

```
parser.on("data", data => {
    try {
        gps.update(data);
    } catch (e) {
        throw e;
    }
```

```
});
```

When data comes through the serial port, the goal is to pass it to the GPS NMEA parser. We could parse it ourselves, but using an already existing parser does help.

The NMEA parser would look like this:

Copy

```
gps.on("data", async data => {
    if(data.type == "GGA") {
        if(data.quality != null) {
            let address = await getAddressInformation(data.lat, data.lor
            console.log(address.Label + " [" + data.lat + ", " + data.lo
        } else {
            console.log("no gps fix available");
        }
    }
});
```

GPS modules return NMEA sentences of different formats. My NEO 6M module returns `$GPGGA` formatted sentences. You can figure out what yours returns by just reviewing the raw data that comes back in the serial port event listener.

When the data is parsed, we check for a data quality. If the data quality is null or zero, it means we probably don't have a GPS fix. Without a GPS fix we won't have latitude and longitude positions. When we do have a fix, we can use those positions in our `getAddressInformation` function.

If you're not using an antenna on your GPS, it could take a day to get data. As soon as I attached mine, it took just a few minutes to get a fix.

Conclusion

You just saw how to read, parse, and reverse geocode GPS data on a Raspberry Pi Zero W with JavaScript and Node.js. While this example was quite simple, it can open the door to complicated ideas.

If you're a fan of Golang, I also wrote a tutorial just like this Node.js tutorial. It is titled, Interacting with a NEO 6M GPS Module using Golang and a Raspberry Pi Zero W.

by **Nic Raboy**

Nic Raboy is an advocate of modern web and mobile development technologies. He has experience in Java, JavaScript, Golang and a variety of frameworks such as Angular, NativeScript, and Apache Cordova. Nic writes about his development experiences related to making web and mobile development easier to understand.

Be the first to submit a comment

NAME

EMAIL (OPTIONAL, WILL NOT BE SHOWN)

COMMENT

Submit comment

Developer

Products

Workspace
Marketplace
Studio
Maps
Geocoding and Search
Routing
Fleet Telematics
HERE SDK
Live Sense SDK
Tracking
Indoor Positioning
Venues

Community

Blog
Newsletter

Twitter
LinkedIn
GitHub
Twitch
YouTube

Stack Overflow
Slack

Company

About Us
Contact Us
Visit here.com

Pricing and Plans
Developer Terms

Sitemap

Privacy Settings Privacy Policy Cookie Policy Service Terms