PREDATOR/OPTIC INSTALLATION KIT

Owner's Manual V2.0

Contact

If you run into any problems, have questions, or need help, don't hesitate to get in contact!

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Introduction

Thank you for supporting the development of Predator by purchasing a preconfigured kit from V0LT! This document contains important information about building your Predator system.

Disclaimer

This document is an overview of the steps required to install and use your Predator system. However, different installation packages may come with different components. As such, your kit may not contain all of the components or features listed in this document.

Features

Here is a brief overview of the features supported by Predator:

Transparent

Predator is completely open source, which makes it perfect for privacy-conscious users or hobbyists who want to tinker with their system.

Modular

Predator is unbelievably modular, and works with a huge collection devices. In the event that you want to upgrade or repair your dash-cam system in the future, nearly any USB webcam, USB GPS receiver, Linux computer, or router will be compatible with Predator!

Secure

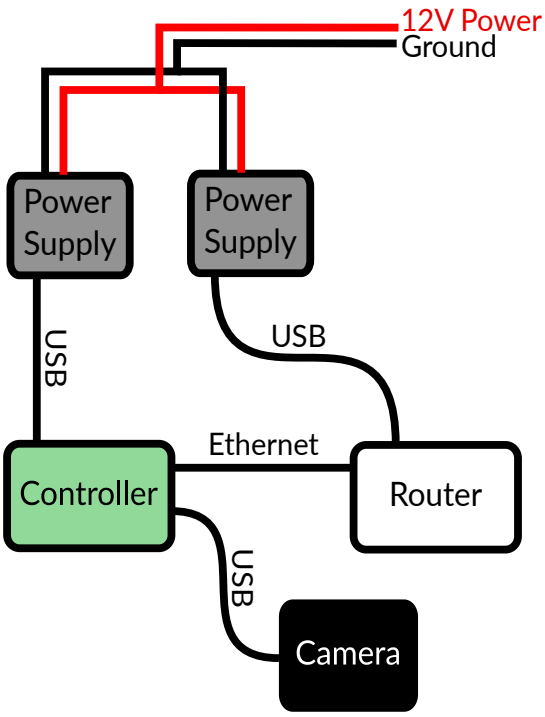
Having the controller installed separately from the camera unit makes your dash-cam significantly more secure by making it dramatically more difficult for a thief to find and access the device containing your stored dash-cam video.

Wireless

Your installation kit includes the ability to interface with Predator over a local WiFi network. This allows you to quickly change settings, transfer video, and interact with Predator using your smartphone, laptop, or tablet, even without access to an internet connection.

Overview

While the number of components may seem daunting, the installation process for your Predator dash-cam system is similar to installing a traditional all-in-one dash-cam. This is an overview diagram showing how all of the components in your kit connect to each other.



The "Controller" is the Raspberry Pi 5, which is the brain of your dash-cam system. It's responsible for recording, processing, and storing video.

The "Router" is the GL-SFT1200 travel router. This is only included in the "Ultimate" package. Other packages simply use the controller as a standalone router, and will not include the second power supply.

The "Camera" is the USB camera, which connects to the controller via USB, and allows it to capture dash-cam video. Your kit may include multiple cameras.

Planning

The most technical part of the installation process is determining how to get power to the power supply harness that connects to the router and controller. You'll need to figure out how get 12V power to the red wire, and ground to the black wire. The most common way to do this is with a "fuse tap", which allows you to tap into an existing fuse in your car's fusebox. This method requires some technical experience, but should result in a very professional and concealed install. Alternatively, you can solder a 12V barrel plug connector to the included power supply harness, and connect it to an existing 12V outlet in your car. Make sure your power solution allows the power harness to reach the controller and router. If you don't feel qualified to install your Predator kit, try to find a mechanic with automotive electronic experience. V0LT is not responsible for damaged caused by improper installation.

Once you've determined how you want to power your Predator system, the next thing to consider is where you want to place the controller and router. This step is very open-ended, and depends significantly on how concealed you want your system to be. While deciding, keep in mind the length of the webcam cable, as well as the length of the wiring for your power solution. Be sure to keep all components and wiring way from moving parts, airbags, and other potentially hazardous locations. Here are some locations to consider, ranging from quick and easy, to highly concealed and professional.

- Underneath the passenger seat
- Attached to the roof of the trunk
- Inside the glove-box
- Below the center console
- Embedded in the dashboard
- Behind the rear-seat padding

Camera

The included primary camera is an industrial 4K USB camera with a metal housing and removable lens. If your kit includes multiple cameras, the additional cameras will be generic USB webcams with fixed integrated lenses. For the best performance, ensure you use the correct camera as the primary camera. Additionally, you should make sure the primary camera is configured appropriately before using your Predator system.

Focus

The stock primary camera lens uses an adjustable manual focus. While your installation kit should come with the lens focus already adjusted appropriately for dash-cam use, it's worth confirming that it wasn't inadvertently changed during shipping. To make adjustments easier, consider connecting the camera to a laptop or desktop to view the video output in real-time. The camera uses a generic driver that should be pre-installed on all major operating systems without any additional software. If distant objects in the video output appear blurry, the focus can be adjusted by rotating the inner ring at the end of the camera lens.

Mounting

The included primary camera has 1/4th inch tripod-style mounting points on the top and bottom of the housing. Secondary cameras will only have one mounting point, although the adjustable hinge allows you to change the orientation of the camera. Depending on the mounting hardware in your kit and where you intend to mount the camera in the vehicle, decide whether to attach the mount to the top or bottom of the camera. For example, if you want to attach your camera to the dashboard, you would attach the mount on the bottom of the camera, while an installation that hangs the camera from the windshield would use the mounting point on the top of the camera. You should verify the orientation of the camera before finishing the mounting process to ensure you haven't confused the direction the camera is oriented. While Predator does have the ability to flip the video output for cameras mounted upside down, you should generally attempt to mount the camera in the correct native orientation to reduce video processing demand on the controller.

Wiring

The included camera USB cable is long enough to reach most common mounting points for the controller. However, it is not uncommon for the cable to be too short if the controller and camera are mounted at opposite sides of the car. If the kit you've purchased contains multiple cameras, you should have received one or more USB extensions. If you need to purchase additional extension cables, ensure they are high quality, and rated to handle the bandwidth and power consumption required by the cameras you intended to connect them to. Most USB 3.0 extension cables should work for this purpose, but cheap cables are often the cause of strange behavior. If you encounter unexplained video artifacts or camera connection issues, USB extension cables are generally the first place you should investigate.

Connecting

Before you fully re-assemble the car, it's worth turning your Predator system on and attempting to connect to it, in order to make sure everything works. Once you've wired up all of the components in your installation kit according to the overview diagram, you can start the car (or otherwise turn on power to the Predator system).

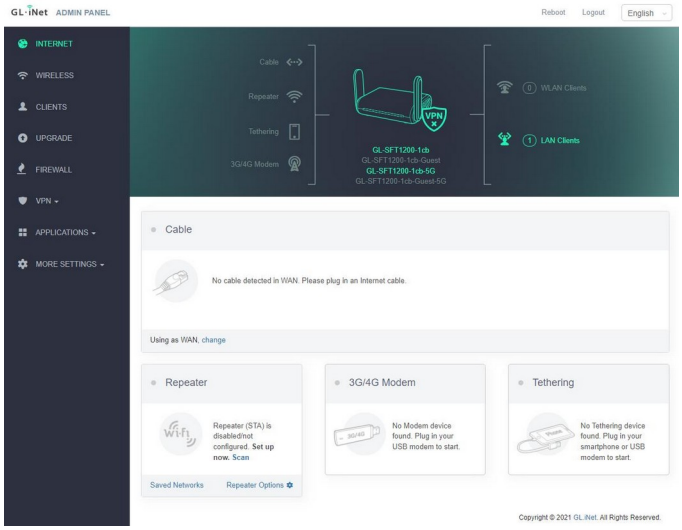
It make take a minute or more for the controller/router to boot up. After that time, you should be able to use a smart-phone or other WiFi enabled device to see the "V0LT Automotive" wireless network. The default password is "predator".

Depending on the package you've purchased, you may or may not have a stand-alone router. If your installation includes the GL-SFT1200 router, then follow the "Router" section below. If you installation only contains the Raspberry Pi controller, then skip to the the "Controller" section below. **You only need to follow the steps associated with your configuration.**

Connecting - Router

After successfully connecting to the router, you can navigate to the router web interface by entering the following URL into your web browser: http://192.168.8.1/index.html

Log into the router admin panel using the default password, "predator". You should now see the following configuration web interface.

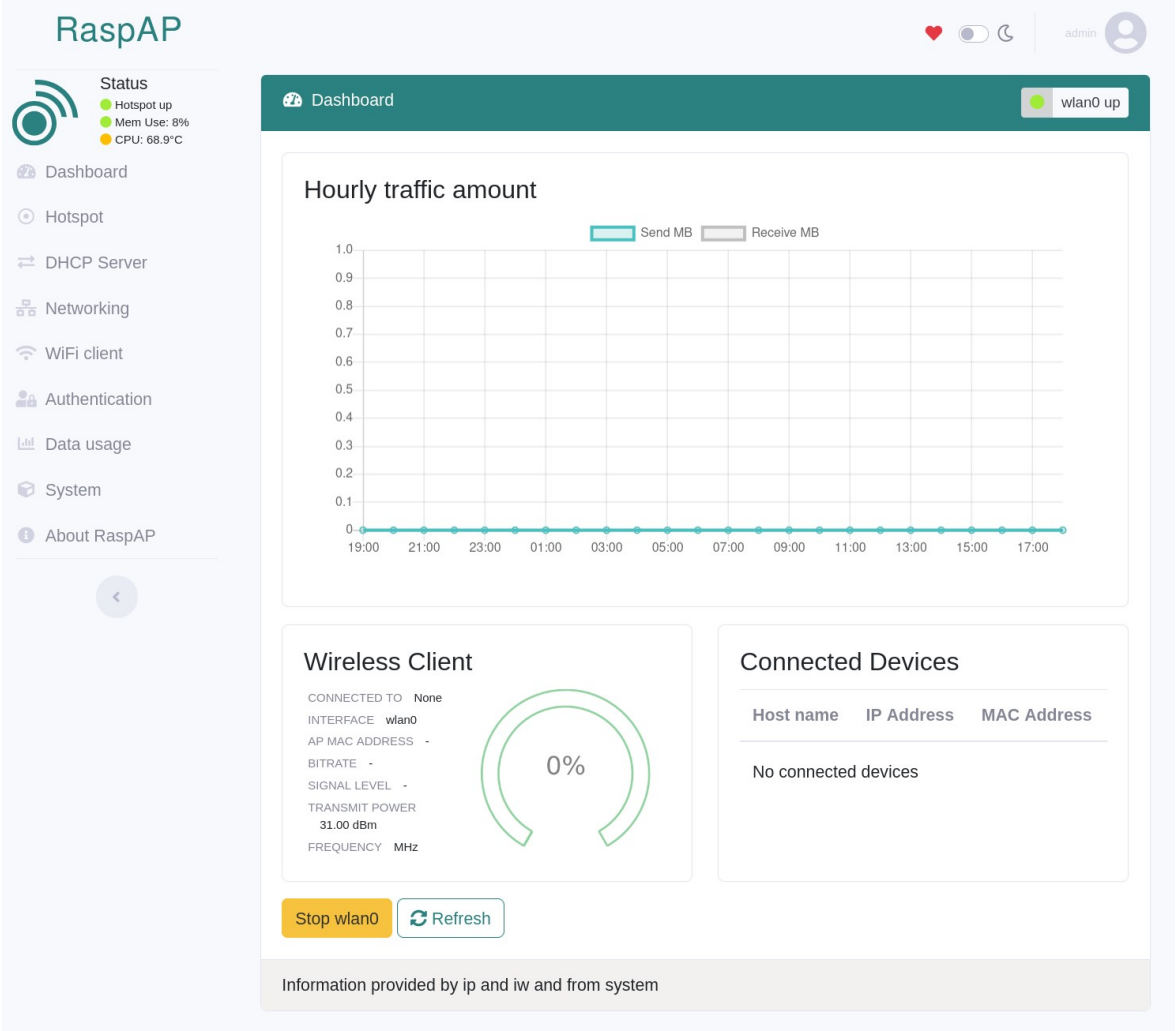


At this point, you should change the default wireless network passwords and admin interface password. You may also want to tether the router to your home wireless network. To clarify, Predator does not need an internet connection to function, but it may be useful in the event that you want to update the software on the controller.

After configuring the router, click the "Clients" tab to determine the IP address of the controller. You should see the controller under the "Wired Device" section. Take note of the IP address. This is the address you will use to connect to your Predator controller.

Connecting – Controller

After successfully connecting to the controller, you can navigate to the router web interface by entering the following URL into your web browser: http://10.3.141.1:8080/. You'll be prompted to enter an administrator login. The default username and password is "admin" and "predator" respectively. After logging into the router control interface, you can change the default administration password to something more secure under the "Authentication" tab. The default WiFi password can be changed in the "Hotspot" tab.



Since the router and the controller are integrated into the same device, you'll use the same IP address (typically 10.3.141.1) to connect to the controller in the next step.

Controlling

You can now connect to your Predator control interface for the first time! These are the steps you'll follow in the future, every time you want to connect to Optic.

To begin, enter the IP address of the Predator controller (as noted earlier), followed by "/optic". For example, you might enter "http://192.168.8.157/optic". You should see the Optic login page. Enter the default password, "predator", to log in to the control interface.

Basic Controls

You should now see the main Optic interface. Assuming everything is already connected and setup properly, you should see that Predator is already running in the status window at the bottom of the page. If not, it's possible Predator ran into a problem during start-up, and was unable to automatically begin recording. Try pressing the "Start" button, and watch for any errors in the status window.

If an important event occurs, and you want to prevent the current video segment from being overwritten, press the "Lock" button. This will save the current and previous dash-cam segments to a separate folder. To view previously recorded dash-cam video segments, click the "Storage" button in the top right of the main interface.

Automatic Startup

By default, Predator will automatically begin recording when the system starts. To enable or disable this functionality, click "Settings" on the main Optic dashboard, then "Management", then "Service". Use the "Enable" and "Disable" buttons to enable and disable automatic startup.

Configuration

To configure Predator and Optic, click the "Settings" button on the main dashboard. The "Controller Settings" page allows you to configure the Optic control interface. The "Instance Settings" page allows you to configure the Predator back-end. You can hover over the name of each configuration value to see a brief description of it.

More Information

To learn more about how to use the Optic control interface for Predator, see https://v0lttech.com/optic.php. Documentation can be founded bundled with the software downloads, in the DOCUMENTATION.md file.

Integration

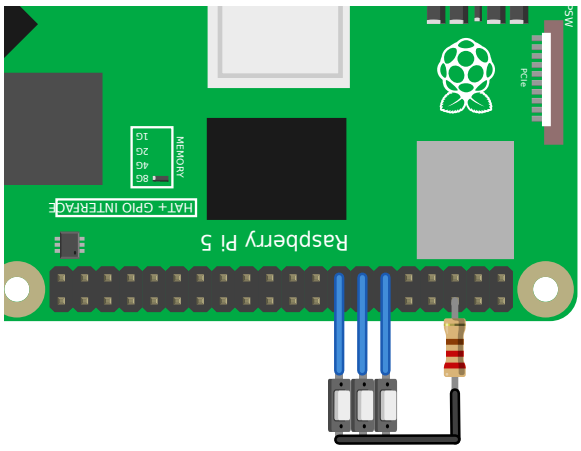
Once you've fully installed and configured your Predator dash-cam, you may be interested in further integration with the car. This section assumes you are a technically-minded user. You should only attempt to follow these instructions if you have experience with electronics. V0LT is not responsible for damage caused by improper installation.

Fundamentals

Predator triggers events from external triggers by detecting when a circuit is closed between a given GPIO pin and ground.

Generally speaking, you should connect triggers between a GPIO pin, through a ~1K resistor, to a common ground pin.

The example to the right depicts 3 push buttons (GPIO22/#15, GPIO27/#13, and GPIO17/#11) connected to a shared ground pin (#6).



Since the only requirement for an event is that a circuit be closed, Predator allows for a wide variety of components to be used as triggers. At a basic level, toggle switches and momentary push buttons can be used to allow the user to interact with Predator. Relays can be used to activate triggers when other components in the car receive power such as the headlights, brakes, or horn.

Configuration

GPIO triggers need to be configured in the Predator configuration file to control behavior. A given GPIO pin can only be associated with a single event (in other words, the same pin can't be used both in a video overlay trigger, and as a dash-cam save trigger).

User interactions for dash-cam saving can be configured in the "dashcam>saving>trigger_gpio" configuration section.

Video overlay stamps can be configured in the "dashcam>stamps>relay>triggers" configuration section.

For more information, see the "docs/CONFIGURE.md" file. This file can be found in the Predator instance directory on your controller, or you can find it bundled with the Predator downloads at https://v0lttech.com/predator.php.

User Interaction

Momentary push buttons and toggle switches allow the user to interact with Predator. These components can be placed nearly anywhere in the vehicle, including in existing body panels for a clean and discrete look. While buttons can be configured to appear as overlays in dash-cam video, they are generally used to trigger dash-cam saving events.

Video Overlays

The second way to integrate GPIO events into Predator is using video overlays. Video overlays allow you to show customizable overlays when specific events occur. This feature is generally designed to use relays to close a GPIO trigger when a particular component in the car receives power, such as the horn, lights, siren, radio, or turn signals.