Print Farm Pro

Help Manual

Installation

Installing the Print Farm Pro software can be done a few ways depending on the operating system and configuration. Refer to the sections below that pertain to your situation.

Windows Installation

The software can be installed on any Windows machine that meets the minimum requirements. There are two ways to install and run the software: the official Windows Installer and Docker for Windows.

Windows Installer

1. Install all the pre-requisites for the software. Docker Desktop is the only pre-requisite as of version 1.0.1028
2. Download the installer here.
3. Run the installer
4. Accept the terms and conditions
5. Finish installing the software

Docker

1. Follow the installation instructions for Docker Desktop here.
2. Pull the docker image using the following command:

   $ docker image pull printfarmpro

3. Run the image using the following command:

   $ docker run -d printfarmpro

4. Verify the container is running with the following command:

   $ docker container ls

Linux Installation

Docker

1. Install Docker Engine for Linux using the guide here
2. Pull the docker image using the following command:

   $ docker image pull printfarmpro

3. Run the image using the following command:

    $ docker run -d printfarmpro

4. Verify the container is running with the following command:

    $ docker container ls

Using the Web Interface

Connection

The web interface is accessed using any modern web browser such as chrome or edge. To open the Web Interface, enter the following address into the browser:

printfarmpro

The web browser will load the login page for Print Farm Pro. The default login credentials are:

Username: admin

Password: password

First steps

For first time users, the API key and email address need to be configured on the settings page. Navigate to **Side panel** > **Settings** to open the settings page (shown below):

Enter the API key for PrintWatch into the **API Key** field, and the desired email to receive print job notifications and warnings from into the **Email address** field (shown below):

Click the **save** button.

Camera Configurator

The camera configurator is the main tool used to setup cameras, add or remove monitoring regions, add or remove blockout regions, visualize the monitoring zones, and view the defect output score.

Adding a camera

In order to add monitoring regions, a camera must be added first. To add a camera, begin by navigating to the camera configuration page by going to **Side panel** > **PFP.** Once on the camera configuration page, click on the **+ Camera** button on the right-hand side of the top panel.

A camera object will be added to the right-hand side of the screen with the following configuration options:

Protocol:

Options:

- HTTP (default) – the camera is using an HTTP/S or MJPEG streaming protocol
- RTSP – the camera is using the Real-Time-Streaming-Protocol

URL:

This is the location where the stream or snapshot can be retrieved using the camera source.

For RTSP cameras, this will be in the following format:

rtsp://<user>:<admin>@<ip_address>:<port>/<endpoint>

Where:

- **user:** the username for the RTSP camera user
- **password:** the password for the RTSP camera user
- **ip_address:** the IP address of the camera
- **port:** the port used by the RTSP stream on the camera (default 554)
- **endpoint:** the endpoint location for retrieving the RTSP stream

Refer to your camera's manufacturer user guide for setting up the camera username, password, IP address, and RTSP stream settings.

For HTTP cameras, this will be in the following format:

http://<ip_address>:<port>/<endpoint>

Where:

- **ip_address:** the IP address of the camera
- **port:** the port used by the HTTP/S stream on the camera (default 80)
- **endpoint:** the endpoint location for retrieving the HTTP stream or snapshot

Once the camera settings have been set properly, click the **save** button to initiate the cameras and begin the stream preview. The stream may take a few seconds to begin previewing.

Adding a monitoring region

Once a valid camera has been added to the configuration, monitoring regions may be added to the frame.

Monitoring regions take only the area inside the region into consideration when detecting defects. Items outside of the region will not be detected for that given region.

To add a monitoring region, click the **+ Region** button and then the **+ Draw** button to enter *drawing mode.* To begin drawing the region, click down on the stream preview on the location where the first corner of the region should exist. Once clicked, a preview rectangle will be shown of what the region will look like. Move the cursor onto the stream preview to the location where the second corner of the region should exist.

Adding a blockout region

Once a valid camera has been added to the configuration, blockout regions may be added to the frame.

Blockout regions negate anything inside of the region. They are used in combination with Monitoring regions to negate noisy regions inside of the region. One common use case for blockout regions is to negate purge towers that commonly generate spaghetti-like defects.

To add a blockout region, click the **+ Blockout** button and then the **+ Draw** button to enter *drawing mode.* To begin drawing the region, click down on the stream preview on the location where the first corner of the region should exist. Once clicked, a preview rectangle will be shown of what the region will look like. Move the cursor onto the stream preview to the location where the second corner of the region should exist.

Camera Networking

Local Area Network (LAN) Setup

To add LAN cameras to Print Farm Pro, follow the camera manufacturer's installation and setup instructions. Note that the camera must have an HTTP/S, MJPEG, or RTSP streaming option.

In most cases, a router will be required to communicate between the camera(s) and the machine running Print Farm Pro. The hardware architecture for using multiple cameras is shown below:

Once the camera is setup for streaming according to one of the supported protocols, locate the stream address (can be found on the camera's app or in the manufacturer's documentation), and use the stream address when configuration a camera according to the camera configuration section.

Wi-Fi Setup

To add Wi-Fi cameras to Print Farm Pro, follow the camera manufacturer's installation and setup instructions for network streaming. Note that the camera must have an HTTP/S, MJPEG, or RTSP streaming option.

Ensure that the camera is on the same wireless network as the machine running Print Farm Pro. Once the camera is setup for streaming according to one of the supported protocols, locate the stream address (can be found on the camera's app or in the manufacturer's documentation), and use the stream address when configuration a camera according to camera configuration section.

Camera Stream Testing

To test if the camera's stream is working properly and accessible, follow these steps:

- HTTP/MJPEG:
    - Open an internet browser (chrome, edge, safari, etc)
    - Enter the stream url into the browser and visit the web page
    - The stream should be visible in the web browser if everything is working properly
        - If using a "snapshot" endpoint, the web page will have to be refreshed to grab the latest frame
- RTSP:
    - Open a media player (VLC media player, OBS, etc)
    - Select the option to play media from a network stream
    - Enter the stream url into the input and confirm
    - The stream should be visible in the media player if everything is working properly

Camera Placement

Monitor multiple printers with a single camera

When configuring a single camera to monitor multiple printers, the placement of the camera, printers, and lighting is very important. To learn more about lighting, visit the lighting section. Before configuring the physical system, ensure that a camera with a high enough resolution to support the number of cameras is being used.

According to the minimum resolution per monitoring region, 600 x 600 pixels are required per region. This means that a 1080p (1920 x 1080 pixel) camera can support a maximum of 3 printers. Although 6 printers may be possible with a 1080p camera, it is not recommended.

It is recommended to always use as many pixels as possible, but the specification recommended resolution per monitoring region is 1280 x 1280 pixels.

The best position for the camera to be in when monitoring multiple printers is slightly above the build plates, looking down on the printers such that the entire beds are visible and minimally blocked by the toolhead.

Monitor multiple regions on a single printer

When configuring a single camera to monitor multiple regions on a single printer, the placement of the camera and lighting is very important. To learn more about lighting, visit the lighting section. Before configuring the physical system, ensure that a camera with a high enough resolution to support the number of cameras is being used.

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The best position for the camera to be in when monitoring multiple regions on a single printer is slightly above the build plates, looking down on the printer such that the entire bed is visible and minimally blocked by the toolhead. In most cases, mounting the camera on one of the inside top corners is the optimal location.

Monitor multiple regions using multiple cameras on a single printer

When configuring multiple cameras to monitor multiple regions on a single printer, the placement of the camera and lighting is very important. To learn more about lighting, visit the lighting section. Before configuring the physical system, ensure that a camera with a high enough resolution to support the number of cameras is being used.

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The best position for the camera to be in when monitoring multiple regions on a single printer is slightly above the build plates, looking down on the printer such that the entire bed is visible and minimally blocked by the toolhead. In most cases, mounting the camera on one of the inside top corners is the optimal location.

The second camera added to a single printer system is recommended to be on the top inside corner opposite of the first camera.

Any camera following the second is also recommended to be positioned above the build plate looking down. In most cases, the placement of the third camera and on is flexible and up to the discretion of the end user.

Lighting

Placement

The lighting should be placed such that every region that is being monitored is clearly visible to the human eye, and any 3d printed object or defect would also be clearly visible to the human eye. The rule to follow is:

"If a human cannot identify what is being seen in the frame, the AI model will also not be able to identify what is in the frame."

Verify that the location is receiving sufficient light, and that the camera is also receiving it correctly by previewing the stream on the Print Farm Pro Configurator page.

In most cases, the lighting equipment should be placed such that the monitoring regions are receiving indirect lighting. Indirect lighting will help prevent overexposure of the items in the frame.

Brightness

The regions being monitored should be lit up enough such that they are clearly visible and will remain clearly visible throughout the duration of the print job. The regions being monitored should not be overexposed and neither should any 3d printed part that will enter the region.

When printing with white or reflective materials, be cautious of overexposure that will occur more easily.

Exposure

When a region within the camera frame is receiving too much light and reflecting it back, it is considered overexposed. Overexposed regions within a frame can be easily identified as overtly white blobs and/or distorted regions that do not reflect the actual item in the frame.

Over-exposure should be avoided as much as possible, as the AI will likely not be able to detect anything in a region that is overexposed.

If overexposure occurs, try the following:

- Decrease the brightness of the lighting source
- Modify the angle of the lighting source
- If using direct lighting, try making the lighting source indirect
- Try changing the lighting color