

User Manual

December 11, 2024



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Version

1.0

Overview: This document outlines the necessary steps to operate the product.

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Introduction

The HydroCams Image Workbench is a specialized tool designed for the calibration of flood detection cameras, providing precise image analysis and data processing to support accurate flood monitoring. By streamlining the calibration process, this application helps improve the performance of flood detection systems while saving significant resources.

Key features of the Image Workbench include:

- Configurable parameters for robust and flexible detection.
- An intuitive, easy-to-use interface for an accessible user experience.
- Accurate real-world measurements exported in JSON for straightforward integration with flood cameras.
- A rapid workflow that gathers all calibration data in just minutes.

This user manual will serve as a comprehensive guide to installing, configuring, and maintaining the HydroCams Image Workbench. Designed with an intuitive interface and a focus on practicality, the application ensures precise calibration of flood detection systems, giving consistent accuracy and reliability. Follow this guide to leverage the capabilities of this tool.

Installation

The 2 key technologies involved in the workbench are Git and Python. Git is used to obtain the source code of the workbench, and Python is used to run it. Both of these should be installed before attempting to obtain and start the workbench.

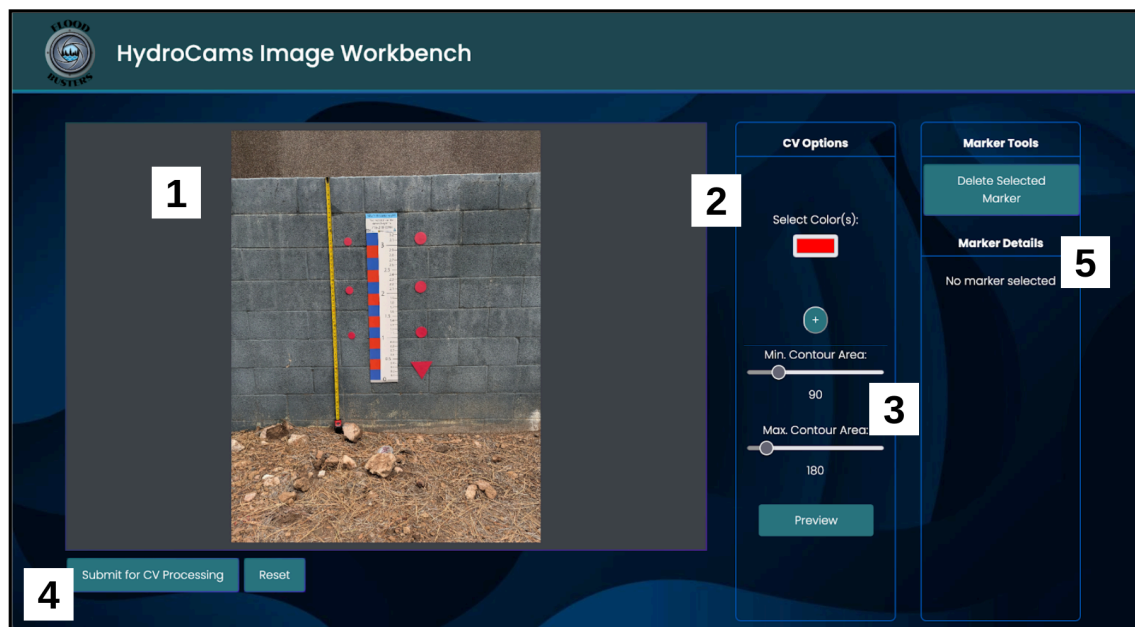
1. To ensure that Git is installed, download the latest version from <https://git-scm.com/downloads>, or follow the instructions there for your package manager of choice.
 - a. To check that it installed correctly, open a terminal and run “**git --version**”. The output should be something like “git version 2.4X.Y”.
2. To ensure that Python is installed, download the latest version from <https://www.python.org/downloads>, or install it using your package manager of choice.
 - a. To check that it installed correctly, open a terminal and run “**python3 --version**”. The output should be similar to “Python 3.1X.Y”.

3. The source code of the workbench can be obtained by cloning the Git repository or downloading the code as a .zip file. To clone the repository, run “**git clone https://github.com/HydroCams-Team/Image-Workbench**”, or to download the source code, visit the above URL and click “Code -> Download Zip”.
4. Once the source code has been obtained, open a terminal window in the “Image-Workbench” directory, and simply run “**python3 app.py**”. This should allow you to access the workbench at “**http://{ip}:5000**”.

Configuration and Daily Operation

The only configuration that may need to be changed is the port that the Flask server operates on. In order to change this, open the “**app.py**” file, and change the “**FLASK_PORT**” value to a valid port integer. Once you restart the Flask application, the workbench can be accessed at “**http://{ip}:{FLASK_PORT}**”.

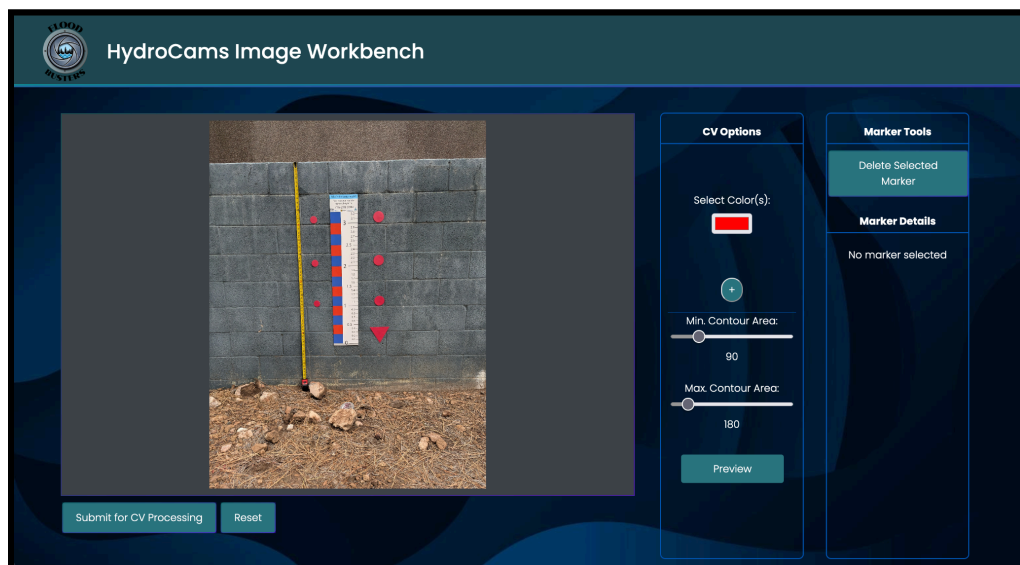
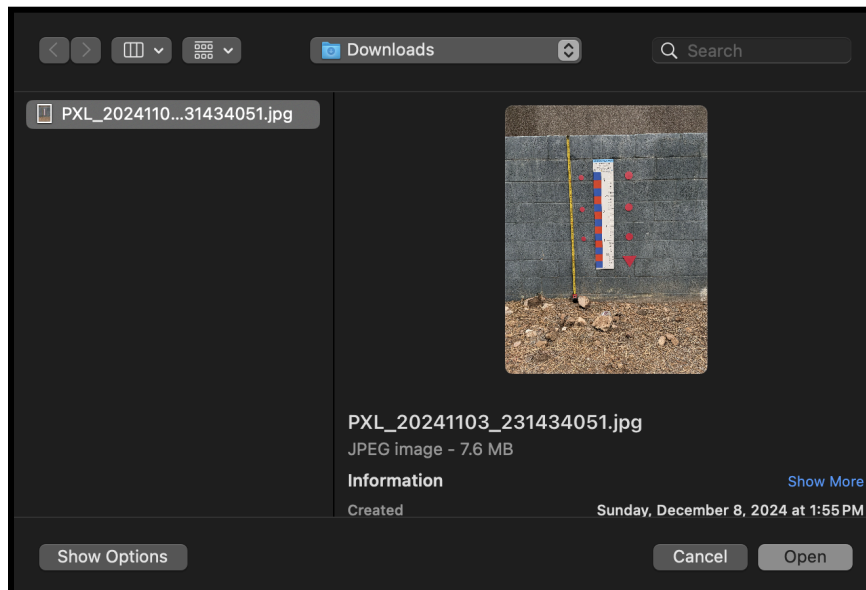
Workbench Overview:



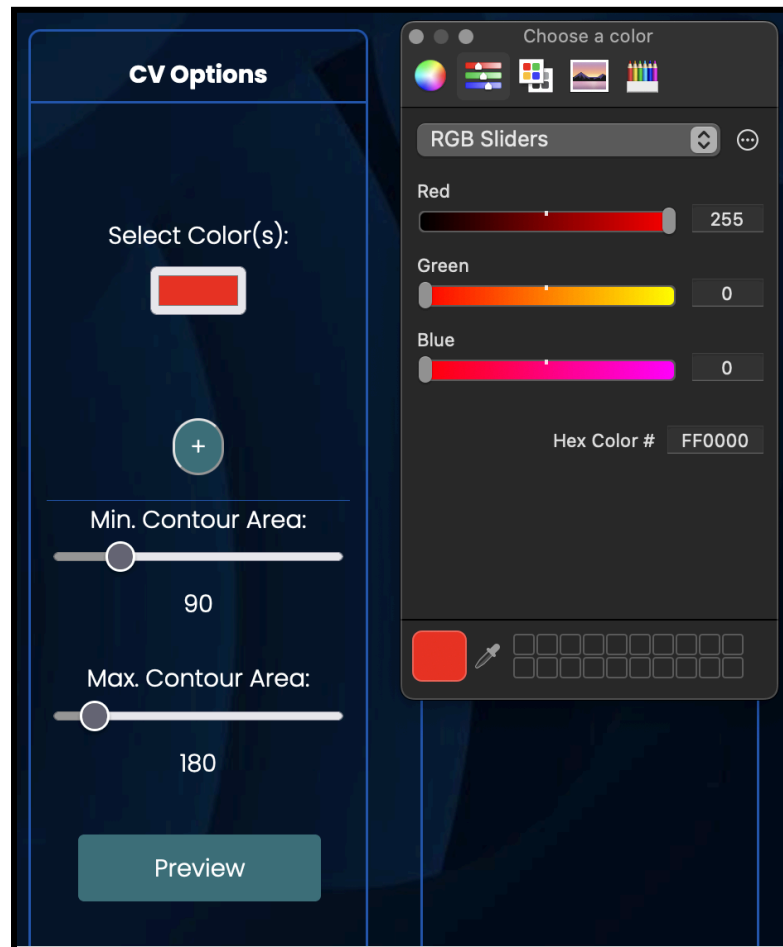
1. Image View Window: Displays the image that has been uploaded to the workbench and view markers and annotations during processing.
2. Color Selector tool for selecting marker color/s
3. Contour tool for setting min/max marker search size
4. Buttons for submitting image for processing and resetting workbench
5. Tools for marker selection and manipulation

Workflow:

1. Upload an image by clicking “Upload Image”. The operating system file selector should appear, and you should be able to select and submit an image. After clicking submit, the selected image should show.



2. Configure the computer vision parameters, including the color(s), using the operating system color selector, and the minimum and maximum area to detect as a marker.



3. To submit the image, click "Submit for CV Processing".

Submit for CV Processing

4. The workbench should now return the processed image, showing identified markers. You may click on each of these markers to review their details, set them as a zero-point, or remove them entirely.

HydroCams Image Workbench

CV Options

Select Color(s):

+

Min. Contour Area:

Max. Contour Area:

Preview

Marker Information

M1 (X: 1890, Y: 2341)
M2 (X: 1429, Y: 2316)
M3 (X: 1424, Y: 2108)
M4 (X: 1184, Y: 2029)
M5 (X: 1887, Y: 1995)
M6 (X: 1419, Y: 1894)
M7 (X: 1413, Y: 1673)
M8 (X: 1172, Y: 1582)
M9 (X: 1878, Y: 1546)
M10 (X: 1408, Y: 1441)

Marker Tools

Delete Selected Marker

Marker Details

No marker selected

Download Marker Data (JSON)

Submit for CV Processing Reset

- a. Once you have found a marker to set as the zero-point, click the “Set Zero Point” option, enter the size of the zero-point, and the inter-marker distances should now appear on the image, that you can now verify.

Set as Zero Point

Enter Zero Point Dimensions ✕

Real-world Height (in inches):

Save

HydroCams Image Workbench

CV Options

Select Color(s): ■

Min. Contour Area: 32

Max. Contour Area: 957

Preview

Measured Distances

- Vertical Distance from Zero Point (M) to M2: 2.70 inches
- Vertical Distance from Zero Point (M) to M3: 8.64 inches
- Vertical Distance from Zero Point (M) to M4: 11.45 inches
- Vertical Distance from Zero Point (M) to M5: 11.85 inches
- Vertical Distance from Zero Point (M) to M6: 14.72 inches
- Vertical Distance from Zero Point (M) to M7: 21.00 inches

Marker Tools

Delete Selected Marker

No marker selected

Marker Details

No marker selected

Download Marker Data (JSON)

Submit for CV Processing Reset

- Download the generated JSON file.



Maintenance

There is little to no maintenance needed for the Image Workbench, aside from clearing out the “**uploads**” and “**processed**” image folders. This can be done at any time, assuming the processed images are not needed. This can be done via the GUI for your file manager application, or the command line, using a command like “**rm uploads/* && rm processed/***”.

Troubleshooting

1. Installation Issues

- Git command not recognized:
 - i. Ensure Git is installed. Download the latest version from <https://git-scm.com/downloads> and follow the instructions for your operating system or package manager. After installing, restart the terminal and run “**git --version**” to verify your installation.
- Unable to clone Image Workbench repository:
 - i. Ensure you have access to the repository, if it is private.
 - ii. Verify your connection and ensure you are running “**git clone**” from a directory where you have write permissions.
- Python Installation Issues:
 - i. Install Python from <https://www.python.org/downloads> or use your package manager. Ensure the Python executable is added to your **PATH** during installation, restart your terminal and run “**python3 --version**” to verify your installation.

2. Starting the Application

- Unable to Start Workbench:
 - i. Verify that you are in the correct directory (the one you cloned via git), then run “**python3 app.py**”. If this fails, check your terminal for errors and ensure that all dependencies are installed.
 - ii. Ensure that the port you specified in your “**constants.json**” is not already in use. If the port is already in use, either kill that process or specify a different port number.

3. File Management

- Unable to Download Processed JSON Data:
 - i. Ensure your browser has permission to download files.
- Markers and Settings Don't Save After Refresh:
 - i. The workbench does not save session data by default. Make sure to download your result data before closing or refreshing the page.

4. Measurement Errors

- Marker Dimensions or Distances are Inaccurate:
 - i. Ensure you have set a **Zero-Point** with proper dimensions, along with an accurate **Marker Diameter** value in the CV Options section.

Conclusion

We hope that this user manual has served you well, and that the HydroCams Image Workbench will prove useful in any future endeavors. With best wishes from the HydroCams development team:

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Feel free to contact us with any questions in order to ensure proper deployment and daily operation!

Appendix A: Hardware Requirements

The hardware requirements for the workbench are extremely minimal, requiring only 2 GB RAM, >10 GB storage, and any modern CPU, preferably 2.5 GHz or above.