

# Reeplayer Camera

## Calibration Guide (V1)

## **Change Log**

**01/31/2022**

- Update for version 0.6.1

**01/29/2022**

- Initial version of the calibration guide

## **Contents**

[Introduction](#)

[Connect to camera with WebUI](#)

[Cameras calibration](#)

[Record the video clips for calibration](#)

[Calibration with recorded video clips](#)

[Apply the calibration result](#)

## 1. Introduction

This document includes a simple guide for calibration, with current camera software version 0.6.0.

## 2. Connect to camera with WebUI

The camera system will be set as a WiFi access point (AP) for the final product, and the client devices (PC, laptop, tablet, or smartphone) will connect to the camera by connecting to the camera's AP SSID and password. In this case, using default information as below:

- Camera's AP SSID: Replayer
- Camera's AP password: Replayer
- WebUI URL: <http://10.0.0.1:8085/camera>

But during development and testing, the camera system may be set to work with a WiFi router, and the client devices connect to the camera through the WiFi router. In this case, we need to know the IP address of the camera as a client of the WiFi router, let's suppose the IP is "192.168.1.218", then the URL for WebUI is:

- WebUI URL: <http://192.168.1.218:8085/camera>

For both above cases, the operations for WebUI are identical.

## 3. Cameras calibration

Current implementation of cameras calibration takes three steps: (1) recording of video clips for calibration, (2) complete cameras calibration and save the calibration data, (3) disable/enable the video recording, or restart the system to apply the new calibration data.

One-step real-time calibration will be implemented for the final production, once the calibration algorithm is evolved to be perfect.

### 3.1. Record the video clips for calibration

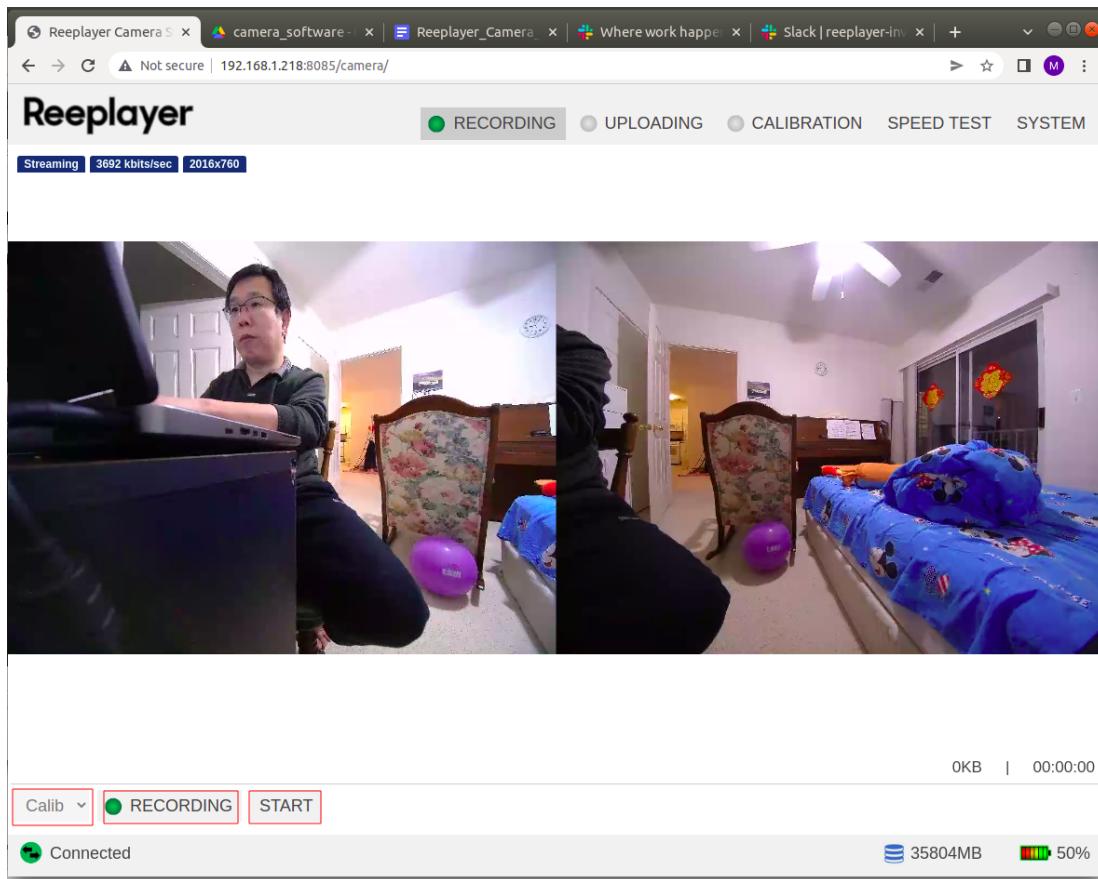
The calibration will use the raw video from the two cameras. So we need to record the video first using the "RECORDING" page of the WebUI.

1. The calibration only needs to extract several frames from the video files, so it is not necessary to record a long video, several seconds to tens of seconds is enough.

2. The calibration can use images from different video files, so it is possible to record multiple video files with different viewpoints and use them to improve the calibration quality. (experimental)
3. Please note that the scenes used for calibration should be as close as possible to the real scenes for the application. So the viewpoints for calibration could be varied a little bit to adapt to different scenes, but should not vary too much.

The recording page is shown as below. Follow the steps below for recording:

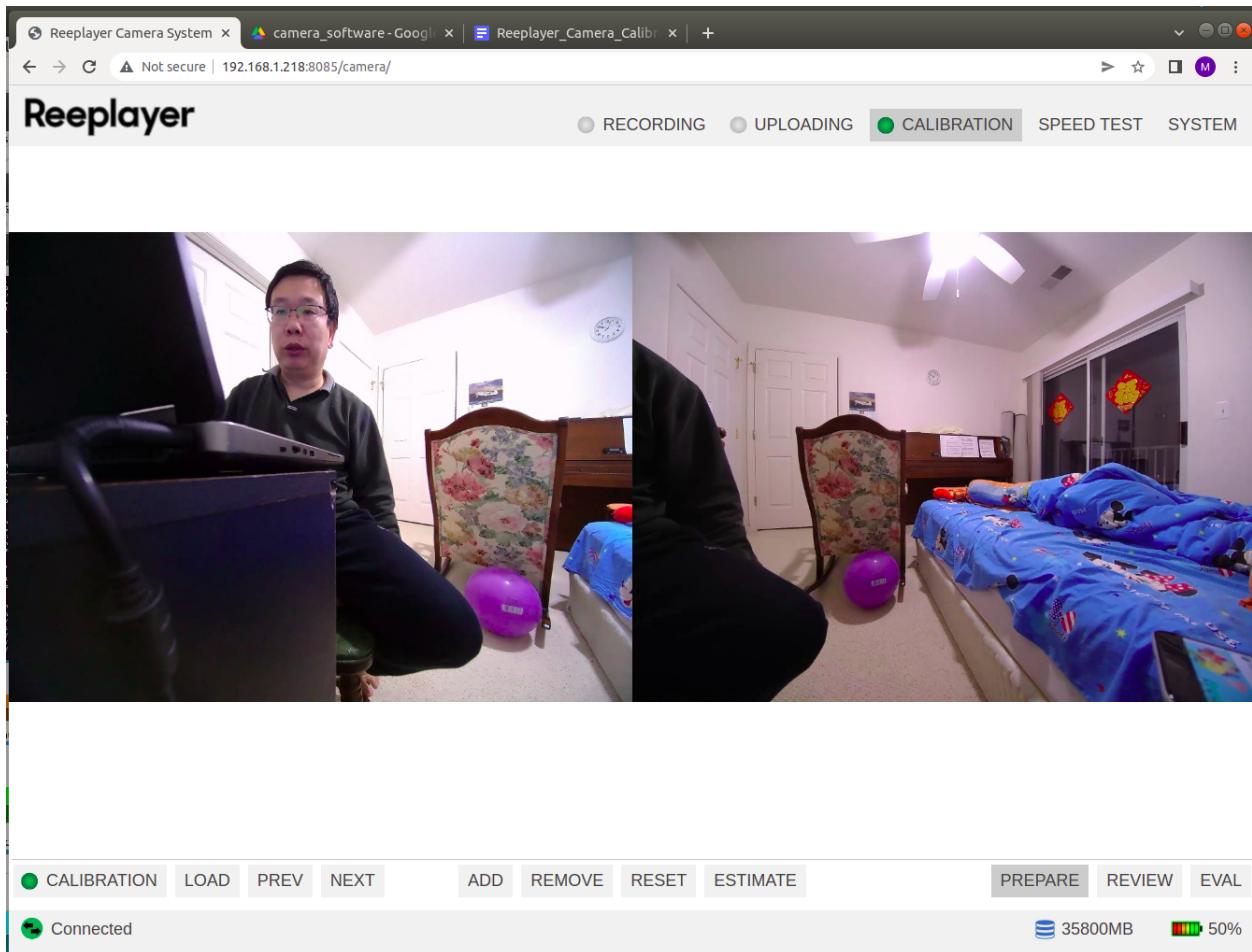
1. Choose “Calib” in the recording mode drop box; it will record the video to the calibration specific folder in the file system, and record the video from two cameras in one file by concatenating the frames side by side. By this way, the frames of the two cameras keep the alignment as they are captured (not precise though). The recording mode can be changed only when the recording is not enabled.
2. Click the “recording” button to enable the recording function.
3. Click “start” / “stop” button to record video files. Each “start/stop” will generate a video file. The video file will not splitted automatically.



## 3.2. Calibration with recorded video clips

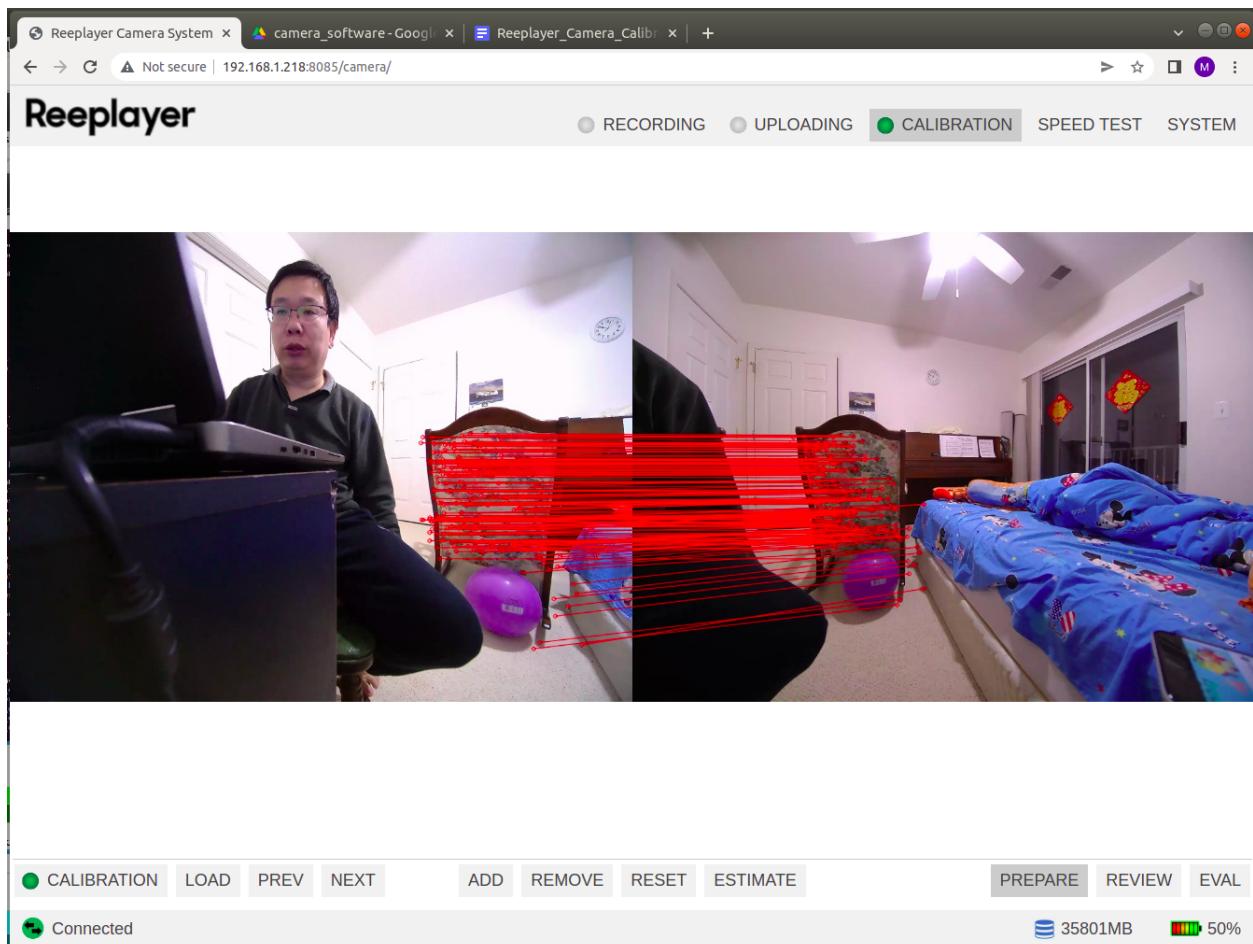
To do the calibration, switch the WebUI to the “CALIBRATION” page shown as below. Follow the steps below:

1. Click the “CALIBRATION” button to enable the calibration service;
2. “Load” the source video from list. It should display all the video just recorded for “calib” mode.
3. Click the “PREV” and “NEXT” button to navigate the video frames. Because the image frames may be very close, you may not even notice the frame is changed. Improving by skipping some frames and displaying the frame information will be done in the next version.



While navigating the video files, follow the steps below to collect features and matching.

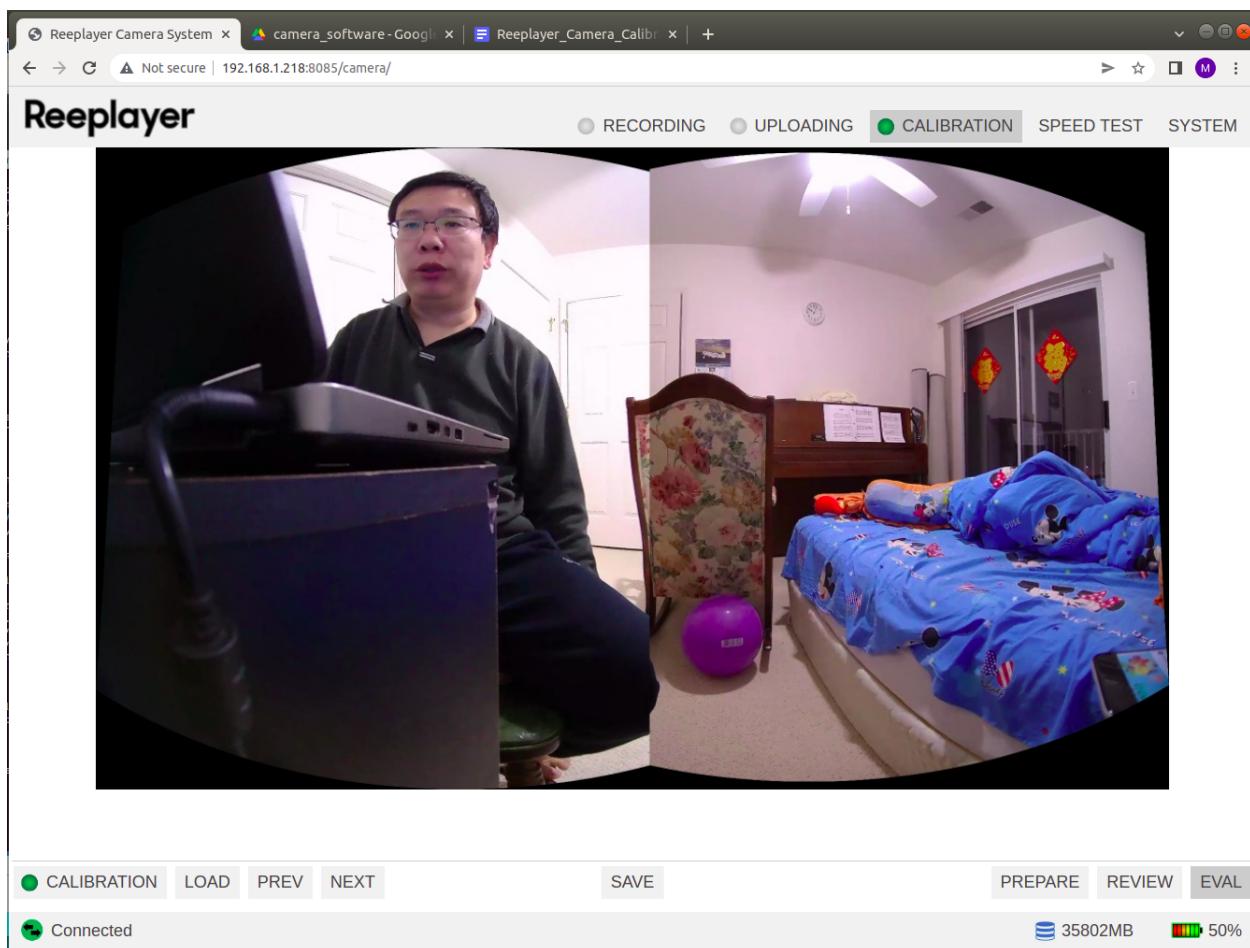
1. Click the “ADD” button to add the current frame for calibration; to collect more useful features, we should add frames with an interval, e.g. click several “NEXT” and then “ADD”.
2. After clicking the “ADD” button, it will take some time for calibration software to detect features and matching, please wait until the visual result of features matching is displayed as below.
3. We may change the input video during the features collection, so the calibration will use the images from different videos.
4. **We designed the “REVIEW” mode to review the collected frames and features, and remove bad features if necessary, but this function has not been implemented yet.**



(the amount of features depends on the scene and parameters)

Once we think we have collected enough features, we may try to do the calibration following the steps below until we get a satisfactory result.

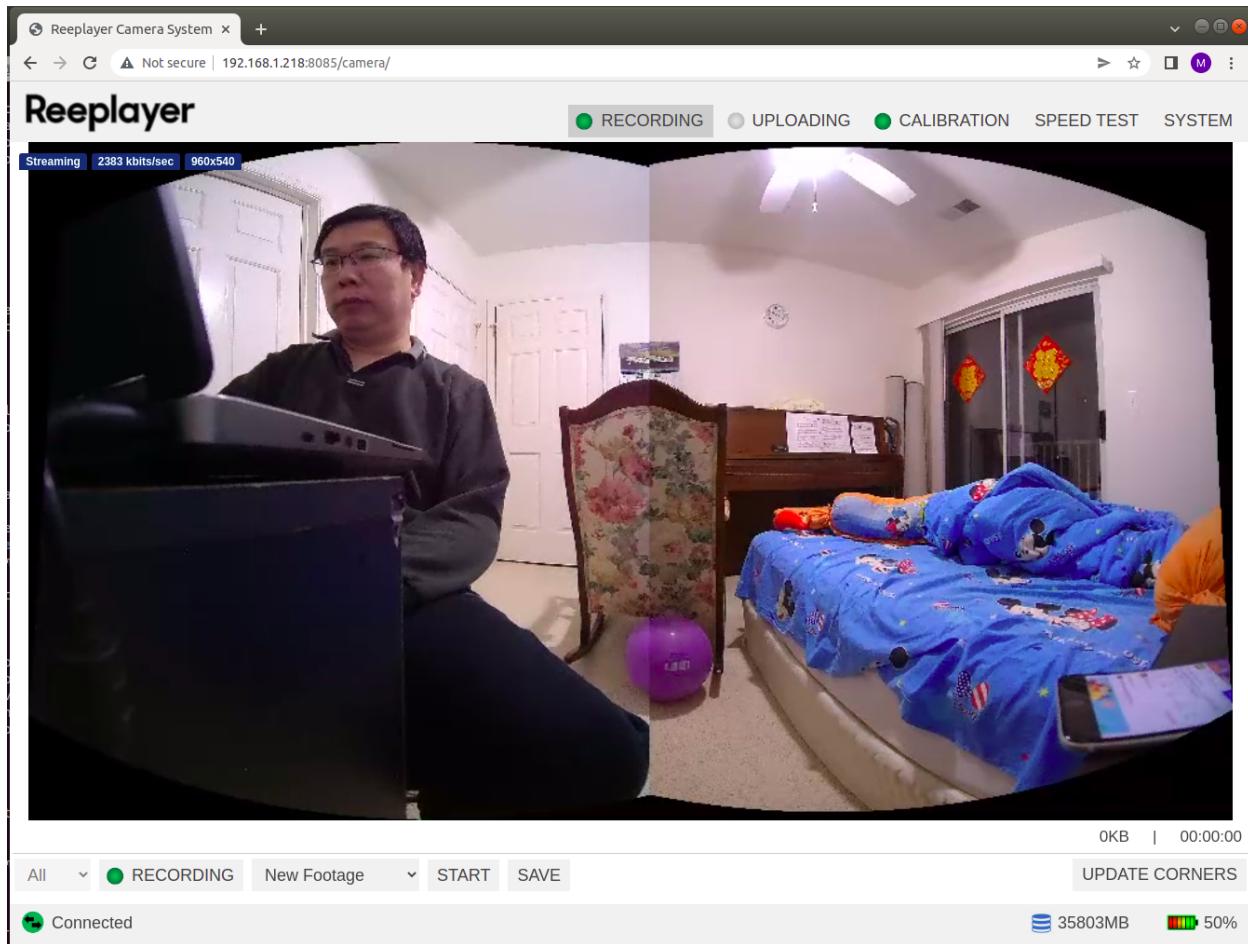
1. Click the “ESTIMATE” button to do an estimation of the transformation matrix, and the calibration will switch to “evaluation” mode. Clicking the “EVAL” button will do the same thing.
2. In evaluation mode, clicking the “PREV” and “NEXT” button will load more frames for the evaluation.
3. If the result is not satisfactory, click the “PREPARE” button to go back to the features collection step, and “ADD” more frames, and repeat the “EVAL” mode;
4. You may also click the “RESET” button to discard current features, and re-start the calibration process.
5. When you are satisfied with the calibration result, click the “SAVE” button to save the calibration data.



### 3.3. Apply the calibration result

The calibration result can be applied after the recording pipeline re-start by two ways:

1. Clicking the “RESTART” button in the “SYSTEM” page. The camera system will restart, then the new calibration will be applied;
2. Another way is clicking the “RECORDING” button twice in the “RECORDING” page to disable and enable the recording service.



For general recording tasks, we should select the “All” in recording mode, which means record both the stitched video and the raw videos. The recording mode can be changed only before the recording is enabled.

Now we will find there is a footage list box for the recording. If the “New Footage” is left as default, the “start” will record files into a new “footage” (a new folder in file system). If you select an existing footage date in the drop box, and “start” recording, it will continue to record video file to existing footage (the existing folder in file system).