



15 Years of Experience in TWAIN SDKs
and Version Control Solutions

Panorama Guide



Dynamsoft Barcode Reader

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Introduction

Dynamsoft Panorama™ is a barcode reading and image stitching product, which allows users to capture a very wide view of the region surrounding them by stitching together multiple photos. Compared with general image stitching applications, Dynamsoft Panorama™ not only displays a panoramic view of the surrounding barcodes, but also quickly and accurately decodes these barcodes and provides users with additional barcode information in real-time. It is a revolutionary inventory management solution for warehouse managers and anyone involved in the inventory industry.

Getting Started

Dynamsoft Panorama™ offers two modes: Local mode and Server mode (the mode we recommend). Before diving into what each mode is, here are some hardware definitions to know as you read through this guide:

Image acquisition device: Captures the “individual” images to be stitched.

Processor: Does the stitching and processes the final Panorama image.

Local Mode

In local mode, images are captured via the stream and are stitched together on the device (i.e. smartphone, tablet). As in, the image acquisition device and the processor are the same device. This method requires the device to have sufficient storage and battery capacity, so it may not be ideal for large projects.

Try it now

To try out Dynamsoft panorama’s local mode, all you need to do is searching "Dynamsoft" in Google Play or App Store to find our demo app, “Barcode Scanner X”. Simply open the app, select “Panorama”, and test it out in your own environment!

Server Mode [Recommended]

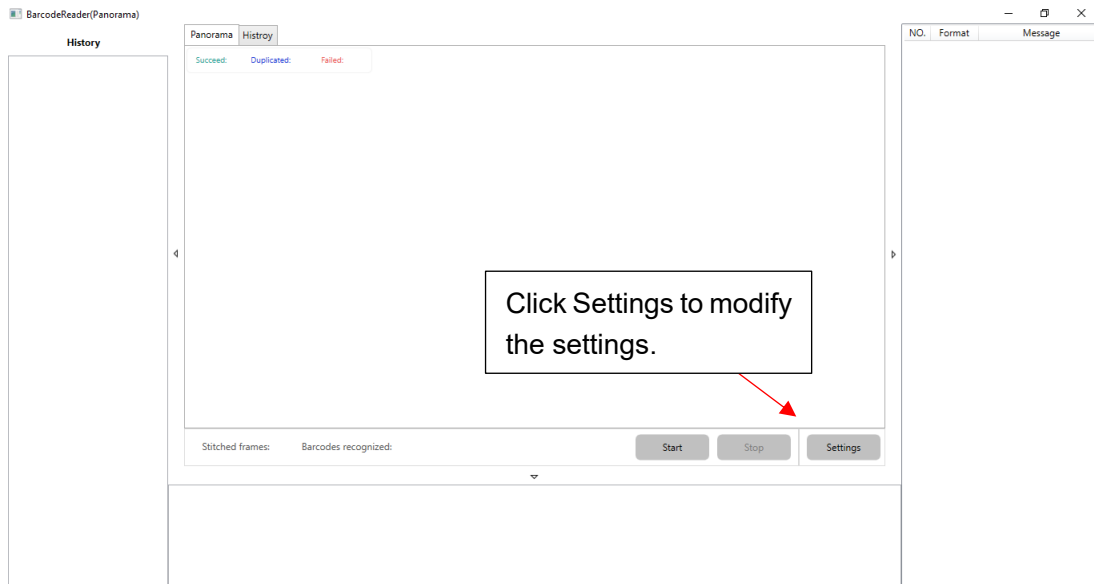
In server mode, images are captured via the camera stream and uploaded to a computer via the network where they are stitched together. In this case, the distinct image acquisition device and the processor are two distinct devices.

The capturing device is light and portable, such as a smartphone, whereas the stitching server ideally would be a more traditional PC/laptop as the device needs to be powerful enough to quickly generate and display the panoramic image.

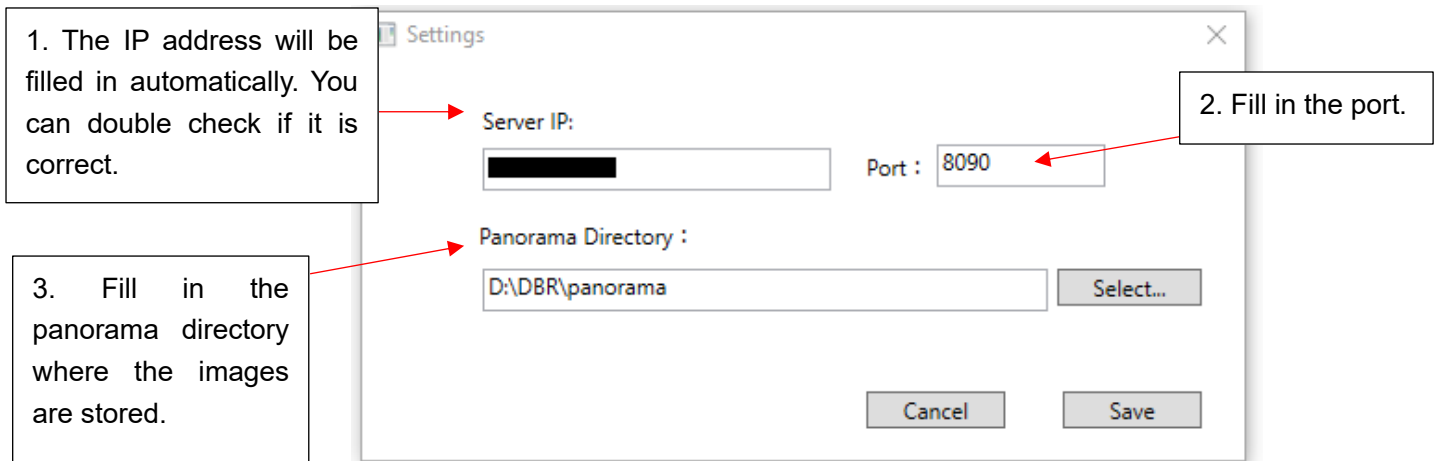
This mode is ideal for both small and large projects since storage capacity and battery consumption are much less of an issue. In addition, the stitched images are usually large, so a bigger screen will help the user better reviews the result. If you are interested in trying out the server mode, please refer to the ‘Try It Now’ section.

Try it now

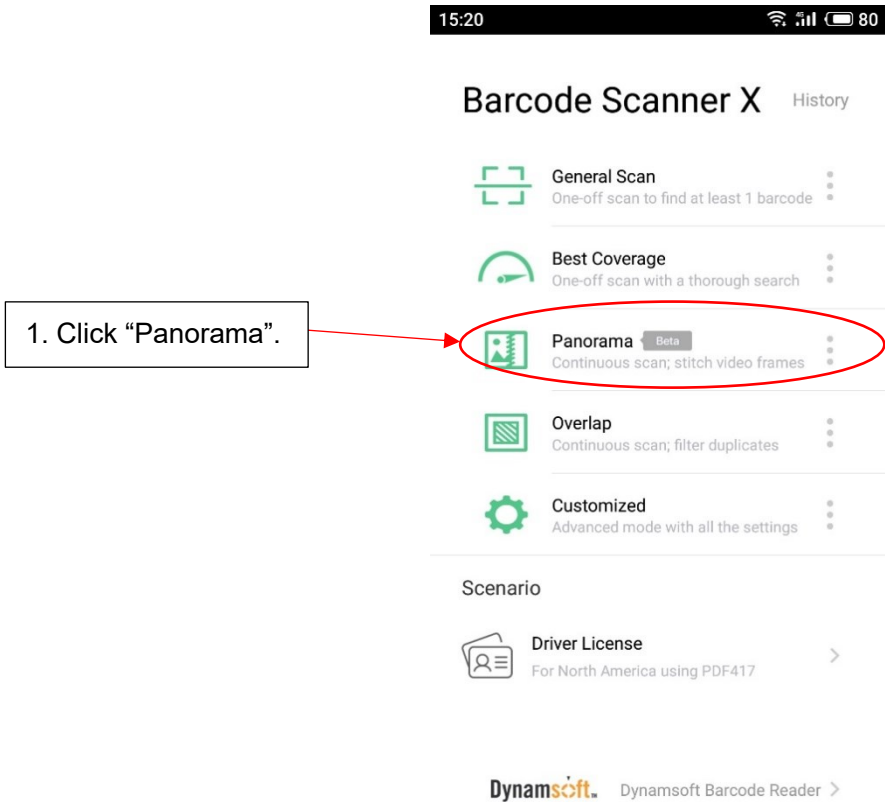
1. Configure the Panorama Server (please follow instructions 1.x to set up the server)
 - 1.1 Download the Panorama Server
Go to the [Code Gallery page](#), scroll down and click **Download EXE** button.
 - 1.2 Unzip the PanoramaServer.zip file and run PanoramaServer.exe.
 - 1.3 Click Settings to change the configuration:



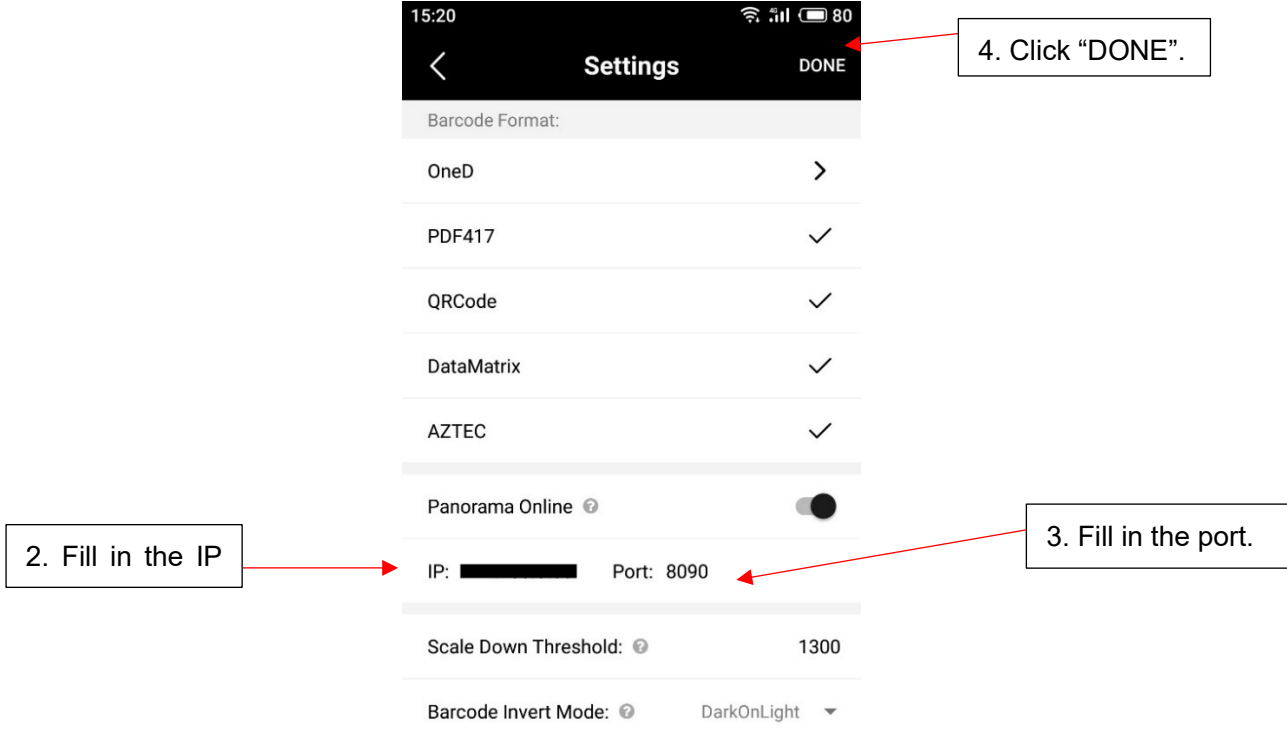
- 1.4 The Panorama Server uses TCP/IP to transfer the image and data captured. Therefore you need to fill in your server IP, the port and the Panorama Directory where the images to be stitched together are stored.



2. Now that your Panorama Server is set up, time to configure the input device (smartphone/tablet)
 - 2.1 Download our demo App “Barcode Scanner X” from Google Play or App Store.
 - 2.2 Open the App and select “Panorama”.



2.3 Click the settings icon at the top-right corner, enable “Panorama Online”, fill in the IP address and the port (the same IP address and port you inputted in the Panorama Server program), then click “DONE”.



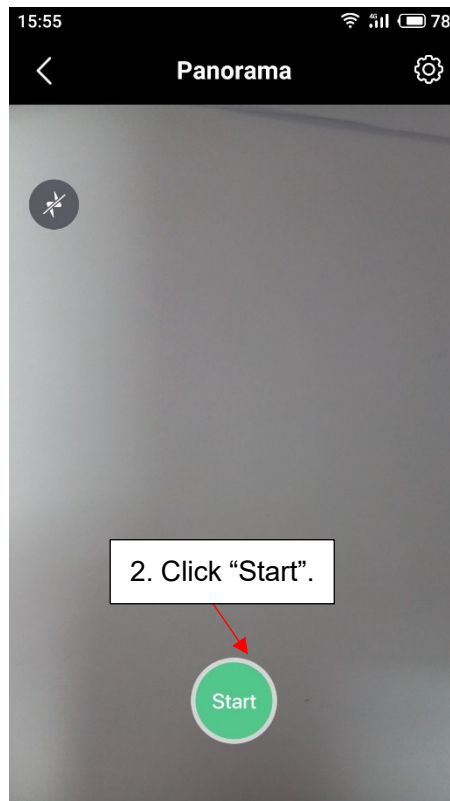
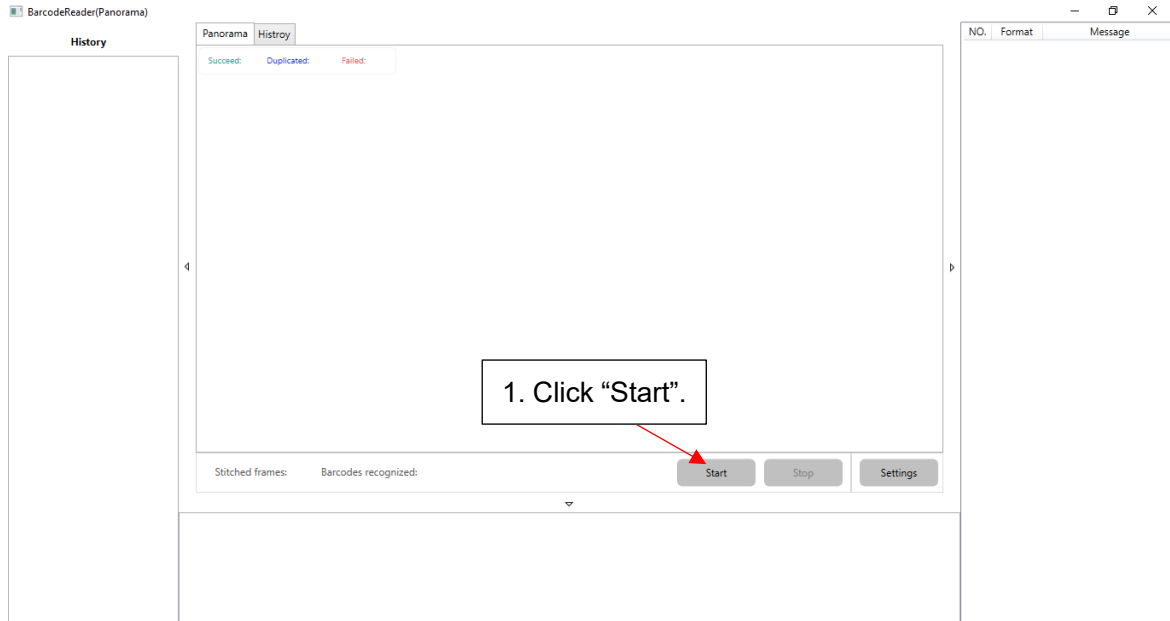
3. Now that everything is set up, it's time to test it out!

3.1 To begin, you need to click Start on the main page of Panorama Server program.

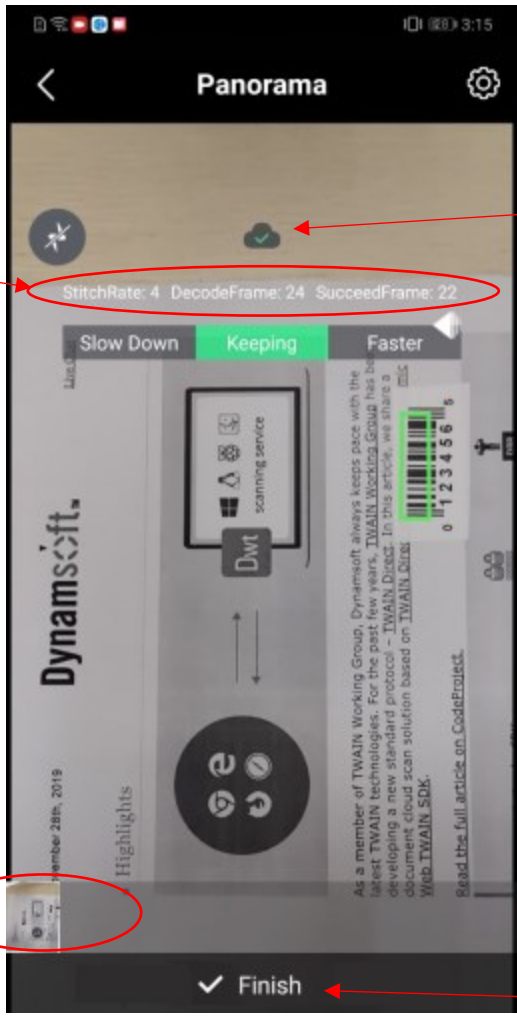
3.2 With the Panorama page open in Barcode Scanner X, click "Start". After that you will be able to use the Panorama feature.

3.3 Click "Finish" on the mobile app once you are done capturing the panorama image.

3.4 Click "Stop" in the Panorama Server app to end the process.



StitchRate: the speed at which data transferred between the server and the mobile phone, the unit is frame per second (fps).
DecodedFrame: how many frames are decoded by our library.
SucceedFrame: The successful frames will be stitched together to generate a panoramic image shown in the preview image panel.



The green tick means the connection between the server and the mobile phone is set up successfully. If an exclamation mark is displayed, it means the connection has failed. At this point, further troubleshooting is required.

Stitched preview image

3. Click "Finish" to stop the panorama.



After the stitching is done, the final result will be shown below.

AllFrames: the total count of frames in the video stream.
 StitchRate: the speed at which data transferred between the server and the mobile phone, the unit is frame per second (fps).
 SucceedStitch: The successful frames will be stitched together to generate a panoramic image shown in the preview image panel.
 FPS: frame per second.

The IP address of the mobile phone.

Barcode result

DecodedFrames: how many frames are decoded by our library.
 Barcode Recognized: how many barcodes are decoded by our library.

These are the stitched images. You can also find them in the panorama directory you specified earlier.

NO.	Format	Message
1	UPC_E	01234565
2	DATAMA	DYNAMASOFT.COM
3	CODABA	12345678

NO.	IP Address
1	192.168.8.22:57498

DecodedFrames:30 Barcodes recognized:3

AllFrames:30 StitchRate:2 SucceedStitch:28 FPS:2

192.168.8.22_0.jpg 192.168.8.22_0.jpg 192.168.8.22_0.jpg 192.168.8.22_0.jpg

Usage and Applications

There are two methods in which Dynamsoft Panorama™ can obtain the individual images to be stitched : Video and File.

Now to quickly go through each mode:

Video input : This is the traditional way of taking the Panorama image (and the way that was demonstrated in the 'Try It Now' section). The “video stream” from the image acquisition equipment is fed to the processor, at which it is processed then stitched by the processor frame by frame. It is recommended to position the camera parallel with the objects of interest when trying to acquire images via video.

File input: Dynamsoft Panorama™ also allows the user to manually load in the individual images from the local disk to the processor in case you do not have any image acquisition equipment at hand. Consecutive images should have sufficient overlap area (>70%).

Usage Scenarios

Dynamsoft Panorama™ can be used in scenarios where barcodes exist and is just as useful in scenarios where they don't. In the former scenario, we do not recommend using this product with duplicated barcodes in the same panoramic image (same barcode type and text results) as they will hinder the stitching algorithm. Here are some typical scenarios in which Dynamsoft Panorama™ would excel:

Inventory management

Many warehouses now utilize automated machines equipped with cameras. So, one popular use case is to move the machine across a shelf of boxes to capture and decode the barcode on each box on the shelf in one go. Dynamsoft Panorama instantly sends the stitched image to the warehouse manager, giving them a panoramic view of the shelf to help determine if there are any missing boxes in real-time, either via the decoded barcode results or via a visual inspection.

Using Dynamsoft Panorama in cases where an automated robot or drone is doing the scanning frees up warehouse managers to observe the barcode scanning process remotely, enabling them to interact with the panoramic images and control the process.



Document management

Manual document management and inventory is always inconvenient, so why not use Dynamsoft Panorama to automate the entire inventory process?

Say you have a shelf of document binders, with each binder having a clear barcode on the spine. The inventory worker can simply just pull up their phone, open the “Barcode Scanner X” app (or an internally developed app that can connect to the Panorama Server), and start capturing the Panorama images via the video stream. Once the stitching and decoding is done on the Panorama Server, the inventory worker will have access to the decoded results, which can be used to streamline the inventory process.



Inapplicable scenario

Dynamsoft Panorama™ may have a poor performance in the following situations:

1. Lack of sufficient background information, which may lead to a stitching misalignment.
2. If the objects you are trying to scan are at varying distances from each other in the image, it will cause a stitching misalignment.
3. If there are duplicated barcodes in the image and the information surrounding the duplicated barcodes is also the same, it will also cause a stitching misalignment.

How Panorama Works

Those who are familiar with photography are sure to understand how panorama stitching works – multiple images are compiled together to create a larger image. Dynamsoft Panorama™ works the same way.



Compared with a general panorama algorithm, Dynamsoft Panorama™ uses the intermediate results from barcode recognition, giving it an advantage when stitching together barcode images as compared with the general panorama algorithm. It calculates a transformation matrix between two frames based on the following data types:

- Quadrilaterals of barcodes
- Contours of objects
- Line segments of objects

Before the stitching process, the individual images are first analyzed by the Dynamsoft Barcode Reader SDK (DBR SDK) to find and decode any barcodes. When the barcode recognition process is complete, the DBR SDK will output the first three data types (quadrilaterals of barcodes, contours of objects, line segments of objects), find matching points based on the characteristics, and then perform stitching.

In order to meet users' requirements more efficiently, Dynamsoft Panorama™ uses multithreading to perform its many tasks, including video frame management, barcode decoding, transformation matrix computing, stitching, output image, error, and more. Dynamsoft Panorama™ is also able to return the stitching status in real-time, including the count of decoded frames, the stitching rate, and the overlapping area between stitched frames. This allows users to adjust the input frame rate and camera movement speed in time.

[API Documentation](#)

Please refer to [the API list](#).