

KSuse
BulleTTime

v 3.7.0

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The software requires a “software” license.

In case you have no active license, the program’s work is not limited, but a watermark is added to the video.

Use only English letters, numbers, point, hyphens, underscores in the names of paths, folders, files!

System requirements

Compatibility: Windows 10-11 x64, Canon cameras:

PowerShot V10

EOS R100

EOS R8 / EOS R50

EOS R6 Mark II

EOS R10

EOS R7

EOS R3

EOS Kiss M2 / EOS M50 Mark II

EOS Kiss X10i / EOS Rebel T8i / EOS 850D / EOS Ra

EOS-1D X Mark III

EOS M200

EOS M6 Mark II

EOS 90D

PowerShot G7X Mark III

PowerShot G5X Mark II

EOS Kiss X10 / EOS Rebel SL3 / EOS 250D / EOS 200D II

EOS RP

PowerShot SX70 HS

EOS R

EOS Kiss M / EOS M50

EOS Kiss X90 / EOS REBEL T7 / EOS 2000D / EOS 1500D

EOS REBEL T100 / EOS 4000D / EOS 3000D

EOS M100

EOS 6D Mark II

EOS Kiss X9 / EOS Rebel SL2 / EOS 200D

EOS Kiss X9i / EOS Rebel T7i / EOS 800D

EOS 9000D / EOS 77D

EOS M6

EOS M5
EOS 5D Mark IV
EOS-1D X Mark II
EOS 80D
EOS Kiss X80 / EOS Rebel T6 / EOS 1300D
EOS M10
EOS 5DS
EOS 5DS R
EOS 8000D / EOS REBEL T6s / EOS 760D
EOS Kiss X8i / EOS REBEL T6i / EOS 750D
EOS M3
EOS 7D Mark II
EOS Kiss X70 / EOS 1200D / EOS REBEL T5 / EOS Hi
EOS M2
EOS 70D
EOS Kiss X7 / EOS 100D / EOS REBEL SL1
EOS Kiss X7i / EOS 700D / EOS REBEL T5i
EOS-1D C
EOS 6D
EOS M
EOS Kiss X6i / EOS 650D / EOS REBEL T4i
EOS-1D X
EOS 5D Mark III
EOS Kiss X50 / EOS REBEL T3 / EOS 1100D
EOS Kiss X5 / EOS REBEL T3i / EOS 600D
EOS 60D
EOS Kiss X4 / EOS REBEL T2i / EOS 550D
EOS-1D Mark IV
EOS 7D
EOS Kiss X3 / EOS REBEL T1i / EOS 500D
EOS 5D Mark II
EOS 50D
EOS DIGITAL REBEL XS / 1000D/ KISS F
EOS DIGITAL REBEL Xsi / 450D / Kiss X2
EOS-1Ds Mark III
EOS 40D
EOS-1D Mark III

Recommended computer: Intel i5 (8th Gen and above), i7 (4 or more cores), SSD, at least 8GB RAM (up to 15 cameras), at least 16GB RAM (more than 15 cameras).

When using AI: at least 16GB RAM (up to 15 cameras), at least 24GB RAM (more than 15 cameras), nvidia GTX 1050 and above or RTX at least 4GB VRAM. AI works on Cuda SDK 6.0 and up and takes more than 3GB of VRAM!

When using two AIs (RB AI and SM AI) on the GPU, at least 8GB of VRAM is required. It is recommended to use i7 (10 generation and above).

If there is not enough VRAM, SM AI can run on the CPU. And in the absence of a compatible graphics card, both AIs run on the CPU. But AI runs many times slower on the CPU, which is only good for testing.

Required software:

1. .NET 6.0 Desktop Runtime (v6.0) - Windows x64
<https://dotnet.microsoft.com/en-us/download/dotnet/thank-you/runtime-desktop-6.0.28-windows-x64-installer>
2. Codecs. Recommended K-Lite Codec Pack Mega.
https://codecguide.com/download_kl.htm
3. Latest drivers for the video card. <https://www.nvidia.com/Download/index.aspx>
4. Microsoft Visual C ++ 2019 redistributable component (both x86 and x64 versions).
https://aka.ms/vs/17/release/vc_redist.x86.exe
https://aka.ms/vs/17/release/vc_redist.x64.exe

Recommended camera settings

To reduce lag and color difference, it is recommended to reset the camera settings to factory settings, and then disable the following options: Red-eye reduct., Auto Lightning Optimizer.

It is recommended to make sure that all cameras have the same firmware version.

Description of the program interface

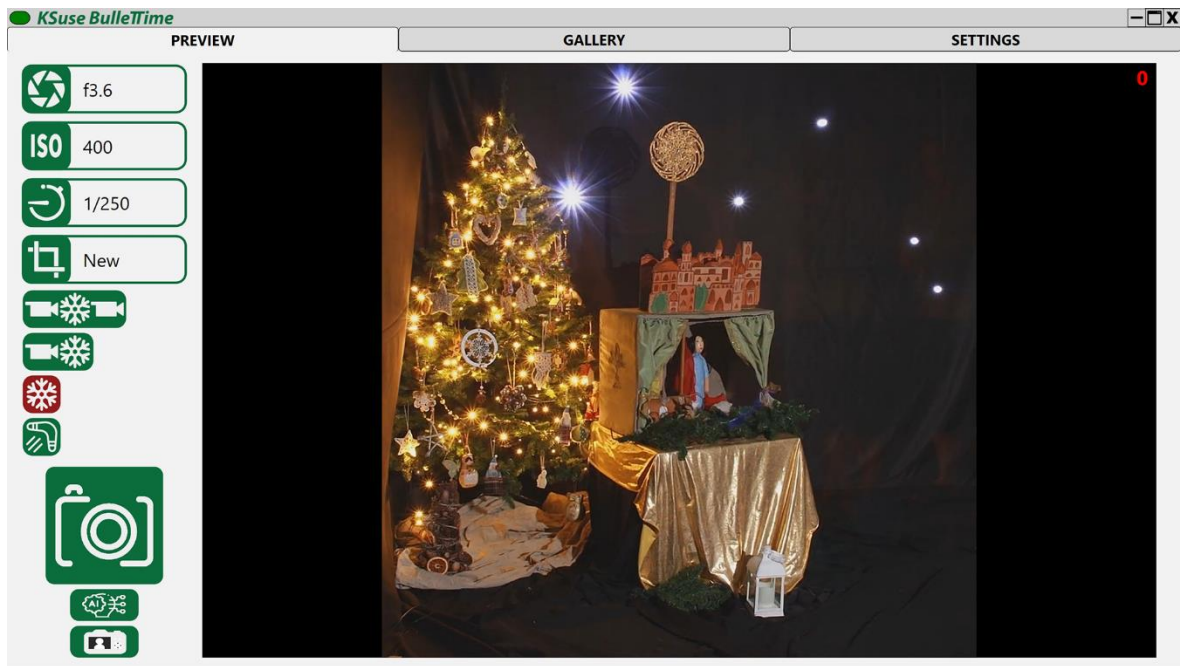
View window (on the second monitor)



The viewing window is displayed on the second monitor for participants and photographer. This window displays the last video, displays a status indicator and information about the current shooting settings.

The display of indicators and buttons can be turned on / off in the settings.

The main software interface



In this window, we can also see the last shot, change the settings or take a photo. Right clicking on the large button turns on / off the camera preparation mode (when syncing via usb or having a DzenTech or Esper trigger). When you left-click on the large button, a picture is taken. In addition, the Enter key corresponds to a click on this button. Shooting may be done without waiting for the end of processing the previous frame. It is not recommended to shoot before finishing the processing of the previous frame.

Below is a button to send the last video to the AI processing queue.

The bottom left button to turn on / off the “live mirror” mode.

The bottom right button is used to upload the latest video to ftp. This button is hidden if a ftp connection is not available.

4 buttons in the upper part are responsible for the choice:

- aperture value (the list consists of currently available on cameras).
- ISO (list consists of currently available on cameras).
- shutter speed (the list consists of currently available on cameras). In Bulb mode, the first click starts shooting, the second one stops.
- Preset.

Selection is possible among presets that are in the “Enabled” state. At least one preset must be in this state.

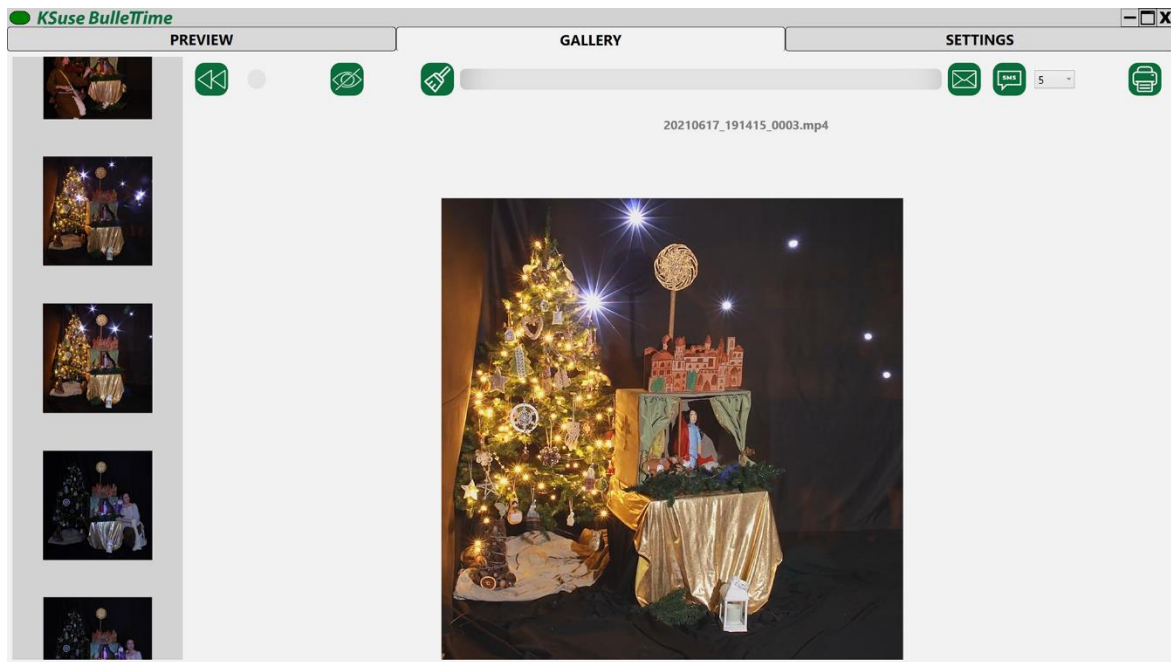
The slider is used to set the delay between camera shots in boomerang mode.

For boomerang, there are 5 modes: uniform, with deceleration, with acceleration, with deceleration towards the center, with acceleration towards the center.

In addition, the following modes are available: freeze, video + bullet, video + bullet + video.

You can choose the direction of the boomerang: one way or diverging from the center.

Gallery



Video is added to the video frame list immediately after its processing.

When you click on the image in the upper slider, it opens the corresponding video in the viewing block.

An email address is entered in the field (focus is always on it, there is no need to place the cursor in the field for keyboard input).

A button with a broom icon is used to clear the field with the mail address.

The slider is scrolled by a mouse click and up and down arrows.

Only files created or modified in the last 12 hours (by default) are displayed in the gallery!



- enable / disable automatic rewind to the last photo




- open the last photo



- clear address

Ctrl + D - delete the video. The video is hidden from the gallery and all web pages. Emails with this video cannot be sent.



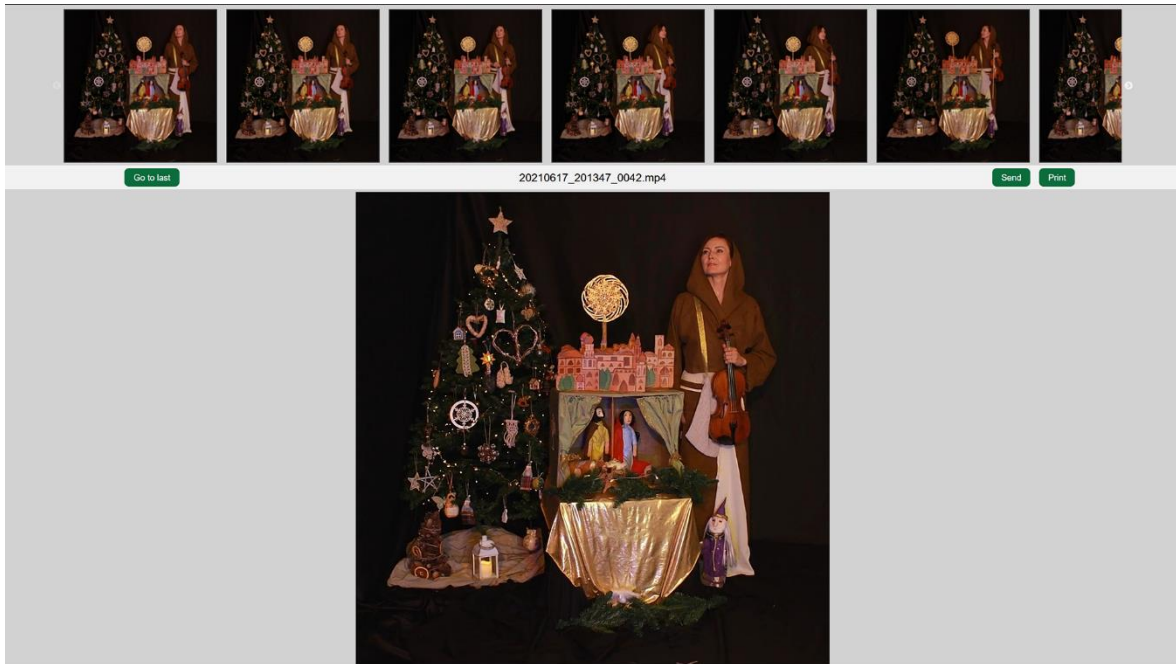
Ctrl + H or  - hide the video. The video is hidden from the gallery and all web pages. Emails with this video can be sent.

The "Print" button and the choice of camera for printing appears when the option "Save source" is selected in the options.

The “Upload to ftp” button is displayed when connecting to ftp is available.

Attention! The program does not control the printer settings. It sends the photo to print to the printer set in Windows by the default printer, stretching the image to the paper size set in the printer properties.

The web version of the gallery is also available.

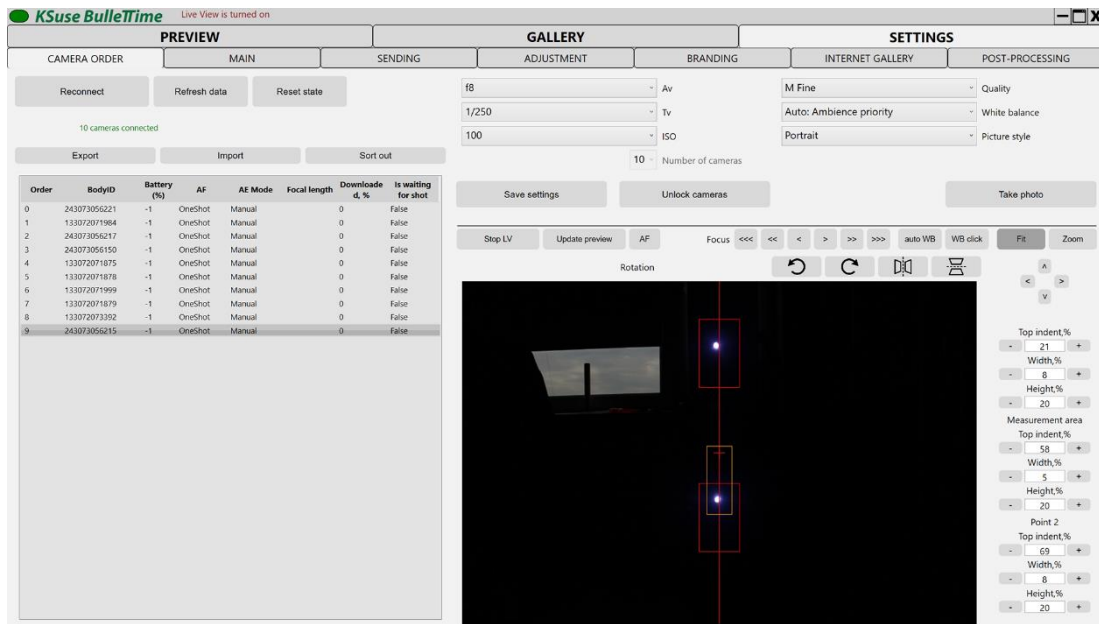


On any device connected to the same network as a computer with BulleTTime software, you must open any browser and enter the IP address of the computer with BulleTTime software in the address bar.

The web gallery and carousel addresses are displayed in the “Settings – Main - Web”.

For the web gallery to work correctly, you must allow access via the TCP protocol for port 80 in the firewall, or disable the firewall. It is also necessary to turn off any other programs that may use port 80 before starting KSuse BulleTTime.

Sort settings window



After changing the order of cameras or software operation mode, you must click “Save Settings” before switching to another window or starting shooting!

Setting the order of the cameras (the order of gluing frames) is done by dragging them with the mouse while holding down the shift key. To see the picture from the camera, you can click "Run LV", the order of the cameras does not change.

The second way to sort cameras:

1. Click the "Sort out" button.
2. Press the shutter button on each camera in right order.
3. Press the "Sort out" button again.
4. Save settings.

When a problem with the camera is detected, the status indicator turns red and the line of the camera with a failure is highlighted in red.

When a camera with incorrect settings is detected, the indicator turns magenta.

When the cameras are disconnected, using the "Number of cameras" field, you can set the required number that you want to save in the settings, for example, for the correct work of post-processing.

In this window, you can choose the same settings as in the main software window plus additional ones: video duration, quality and white balance. The selected settings apply to all cameras.

For stable working of 1300D and high quality, the "M Fine" or "S1 Fine" modes are recommended.

"Reconnect" - Restarts camera clients.

"Update data" - Read the camera parameters again. For example, after disabling autofocus.

"Reset state" - Reset the snapshot state.

"Reset power" - Restart camera power (available with Dzen Tech trigger). After all the cameras are found by OS again, needs to restart the clients by clicking on "Reconnect".

Also, in this window are set the search area of the calibration markers.

You can view current search zones by enabling Live View.

Example: <https://www.youtube.com/watch?v=BCDRiGaBMr0>

Also, in this window it is possible to set the size of the exposure evaluation zone.

The camera has locked autofocus and disabled Live View after turning off the program. To use the camera outside the software, you must press the "Unlock cameras" button before turning off the program.

If you have IS STM lenses, or when autofocus is enabled on another lenses, you can adjust their focus from the program using the appropriate arrows.

The AF button starts autofocus, autofocus on the selected camera works all the time while the AF button is pressed. Shift+AF starts autofocus on all cameras at the same time.

"Fit" shows a preview of the entire frame.

"Zoom" enlarges 1/10 frame.

Using the arrows below these buttons, you can shift the zoom area relative to the full frame.

"auto WB" - manual white balance by the center point of the frame.

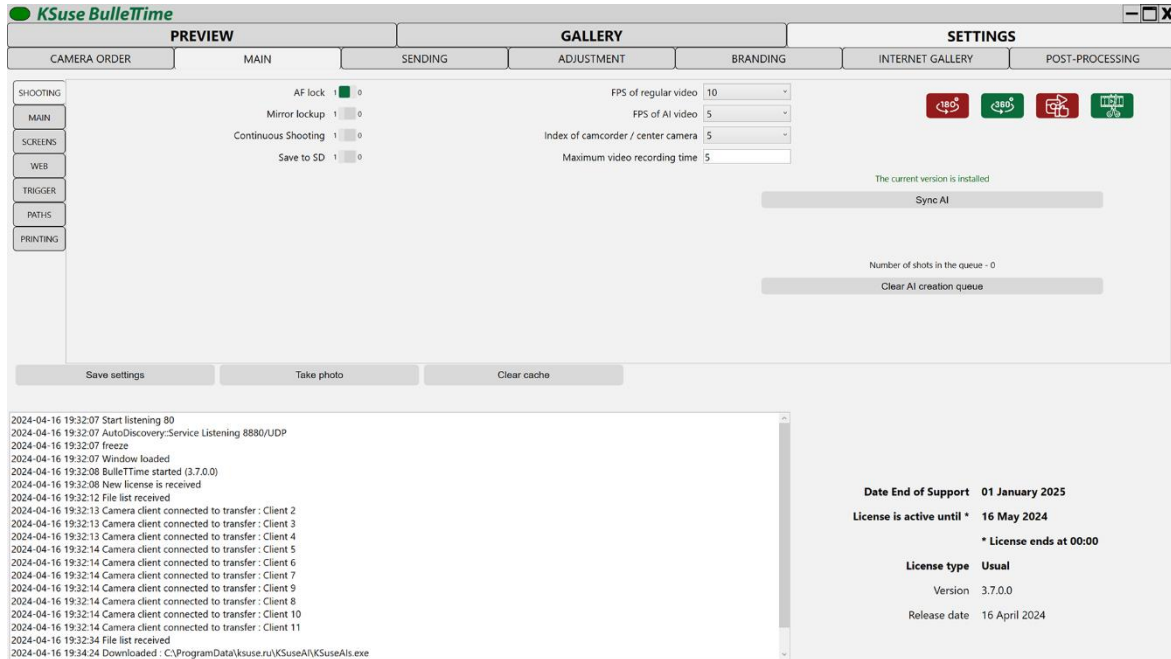
"WB click" - setting the white balance by the selected point in the Live View.

You must manually set the required image orientation! After selecting the rotation mode, you must save the settings!

General settings window

Be sure to click "Save Settings" when changing values in this window before switching to another window or starting a shooting!

Shooting settings



“FPS” - The base fps is always 30. When choosing a smaller value, the frames are duplicated. For example, when selecting 10fps each frame is repeated 3 times. When using AI, virtual intermediate views are created instead of duplicates.

“Lock AF” - Programmatically autofocus lock. Software AF lock and burst mode apply to the following models: 1100D, Rebel T3, Kiss X50, 1200D, Rebel T5, Kiss X70, 1300D, Rebel T6, Kiss X80, 800D, Rebel T7i, Kiss X9i, 1500D, 2000D, Rebel T7, Kiss X90, 550D, Rebel T2i, Kiss X4. Software AF lock and burst mode can be applied to the following models: 3000D, 4000D, Rebel T100, 600D, Rebel T3i, Kiss X5. To prevent autofocus from interfering with shooting on other models, it is recommended to turn it off with the switch on the lens.

“Continuous Shooting” - Continuous shooting is performed while the shutter button is pressed. Available only when synchronizing via usb.

“Save to SD” - Photos are saved on the SD cards of cameras. Full, slow or poor-quality SD cards will cause a malfunction when shooting.

“Block mirror” - The first press of the shutter button raises the mirror; the second press takes a picture. Doesn't work in Bulb mode!

“Index of video camera / center camera” - Camera index, which will be used to shoot video in video + bullet mode.

"Maximum video recording duration" - The interval in seconds after which video recording in the "video+bullet" and "video+bullet+video" modes stops if the shutter button is not pressed.



- In the video records the movement forward and backward (cycle).



- Records of motion only in one direction (available only with synchronization on usb).



- The minimum duration is equal to 4 seconds.



- In the video exactly one pass for easy editing.

You can use AI only after installing the AI module.

Installation is done using the “Synchronize AI” button.

To use AI and any post-processing, you must enable saving of stabilized HiRes.

General settings

The screenshot shows the 'Ksuse BulleTime' settings window. The 'SETTINGS' tab is selected, and the 'INTERNET GALLERY' sub-tab is active. The interface includes a sidebar with navigation options (SHOOTING, MAIN, SCREENS, WEB, TRIGGER, PATHS, PRINTING) and a main area with various settings. A log window at the bottom left shows system messages, and a license information window at the bottom right displays support and license details.

License Information:

Date End of Support	01 January 2024
License is active until *	28 May 2023
	* License ends at 00:00
License type	Usual
Version	3.6.0.0
Release date	28 April 2023

The license is automatically extended for 7 days when you start the program if you have an Internet connection.

The ability to take a photo from the settings window is present only when the “freeze” or “boomerang” modes are on!

“Language” - Select the interface language.

“Theme” - Select the color palette of the interface.

“Save source images” - Enables saving photos received from cameras in jpg format.

“Save HiRes” - Enables saving of stabilized photos to the folder with sources until they are cropped and reduced.

“Save gif” - Specifies whether it is necessary to generate gif along with mp4.

“Set preview size” - Define your own jpg size for a preview.

“Preview size” - jpg size with a preview on the long side, with the size override enabled.

“Set gif size” - Defining your own gif size.

“Size gif” - Size gif on the long side, with the size override enabled.

“Test shooting” - Used to check the stability of the system. When enabled, produces a shot at a specified interval.

“Reverse Hotkeys (PgUp, PgDown)” - The ability to swap the hot keys Page Up and Page Down.

“Enable PgUp global hotkey” - When this mode is activated, only one PgUp hotkey works. The first press turns on the half-press, the second press takes a shot. The key works even when the program window is inactive. Attention! Fast and long presses do not work in this mode.

Shooting in Bulb mode is not possible.

“Displayed indices begin with 1” - When you turn on it, the numbering of cameras will begin with 1 in the lists in sorting and calibration. Numbering of filenames, cameras in branding, sequences will always start from 0.

“Check beta version” - Enable notification of the release of a new software version in beta status.

“Endless Playback” turns on / off cyclic video playback in the “Preview”, “Gallery” windows and on the second screen.

“Add BodyID to the filename (source)” - the name of the jpg file of the source and stabilized source can be in the form of a camera index _ BodyID, or just a camera index.

"Mute sound in the build-in gallery" - Mute / unmute the sound in the built-in gallery.

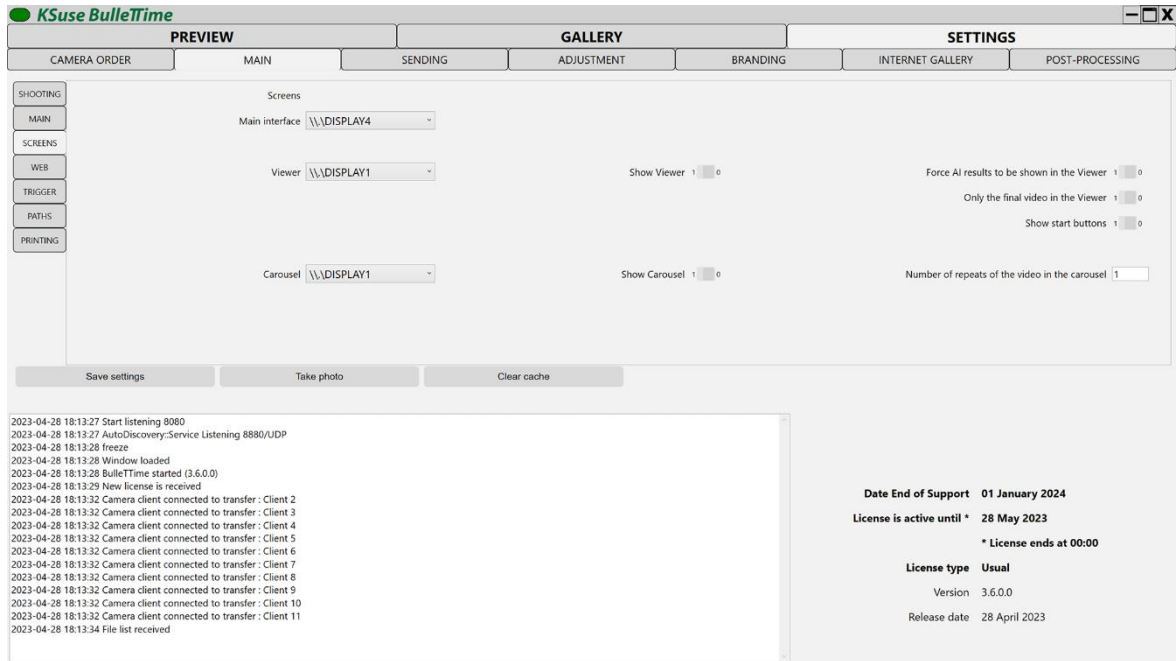
"Mute the sound on the second screen" - Mute / unmute the sound on the second screen.

"Number of repeats of video with sound in the galleries" - After selecting the video, the specified number of times is played, then the playback is stopped or the sound is turned off. 0 - unlimited.

You can limit the files displayed in the gallery by setting the number of hours from the current date to the date of creation or modification of the file (the maximum value of them). This quantity can be changed in the field “Period of validity, hours”. The default value is 12. Videos older than the specified number of hours will not be displayed in galleries.

"Clear cache" - Clears the sync database.

Settings of screens



To connect cameras through other computers, you must allow udp access to ports 8880-8882 and tcp access to port 445 in the firewall, or disable the firewall.

It is also necessary to enable the option “Turn off password protected sharing” in the “Network and Sharing Center”.

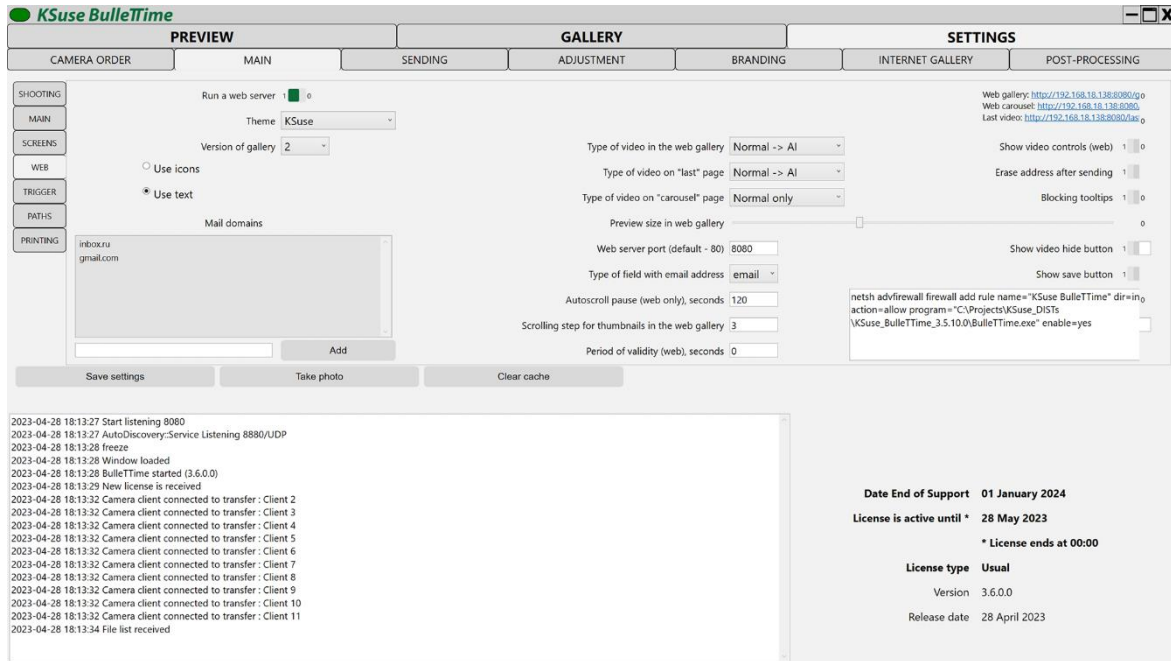
"Show Viewer " - Enable / disable the viewing window of the last video with work state indicators.

“Only the final video in the Viewer” - Disables the display of work state indicators and intermediate results.

"Show start buttons" - Enables the display of buttons in the Viewer.

“Show Carousel” - Enable / Disable the view window of the entire captured video.

Webpages Settings



The option "Run web server" applies only when the program is restarted!

"Version of gallery" - a choice of two layout options for the web gallery.

The web gallery displays only regular videos, only video after being processed by AI, or first a regular video, which is replaced with video processed using AI, as soon as it is ready.

For the field types "email" and "text", a different virtual keyboard is displayed. Validation for compliance with the format is used for the field with the type "email", but there is no autocomplete on iOS devices.

"Erase the address after sending" - automatic cleaning of the field with the address immediately after sending.

"Blocking tooltips" - disable autocomplete.

"Show video controls (web)" - displaying controls on the pages "last video" and "carousel".

"Period of validity (web), seconds" - Videos older than the specified number of seconds will not be displayed on web pages.

The specified domains are displayed as buttons after entering the @ symbol in the recipient address field.

To remove a domain from the list, select it and press the Delete key.

Trigger settings

The screenshot shows the 'Trigger settings' window in Ksuse BulleTime. The 'TRIGGER' tab is selected in the sidebar. The main settings area includes:

- Trigger port:** A dropdown menu.
- Trigger type:** A dropdown menu set to 'usb'.
- Port of additional controller:** A dropdown menu.
- Type of additional controller:** A dropdown menu set to 'usb'.
- Monitor trigger responses:** A checkbox that is checked.
- Center camera release delay (usb, freeze), ms:** A numeric input field set to 0, with buttons for 0, 10, and 100.
- Does not release the half-press (usb):** A checkbox that is unchecked.

At the bottom of the window, there are three buttons: 'Save settings', 'Take photo', and 'Clear cache'. A log window at the bottom left shows the following messages:

```

2023-04-28 18:13:27 Start listening 8080
2023-04-28 18:13:27 AutoDiscovery:Service Listening 8880/UDP
2023-04-28 18:13:28 freeze
2023-04-28 18:13:28 Window loaded
2023-04-28 18:13:28 BulleTime started (3.6.0.0)
2023-04-28 18:13:29 New license is received
2023-04-28 18:13:32 Camera client connected to transfer : Client 2
2023-04-28 18:13:32 Camera client connected to transfer : Client 3
2023-04-28 18:13:32 Camera client connected to transfer : Client 4
2023-04-28 18:13:32 Camera client connected to transfer : Client 5
2023-04-28 18:13:32 Camera client connected to transfer : Client 6
2023-04-28 18:13:32 Camera client connected to transfer : Client 7
2023-04-28 18:13:32 Camera client connected to transfer : Client 8
2023-04-28 18:13:32 Camera client connected to transfer : Client 9
2023-04-28 18:13:32 Camera client connected to transfer : Client 10
2023-04-28 18:13:32 Camera client connected to transfer : Client 11
2023-04-28 18:13:34 File list received

```

The license information panel at the bottom right shows:

- Date End of Support:** 01 January 2024
- License is active until *:** 28 May 2023
- * License ends at 00:00**
- License type:** Usual
- Version:** 3.6.0.0
- Release date:** 28 April 2023

“Port of the trigger” - you must select the correct value of the COM port, if you connect a trigger. You can find out the value in the Device Manager.

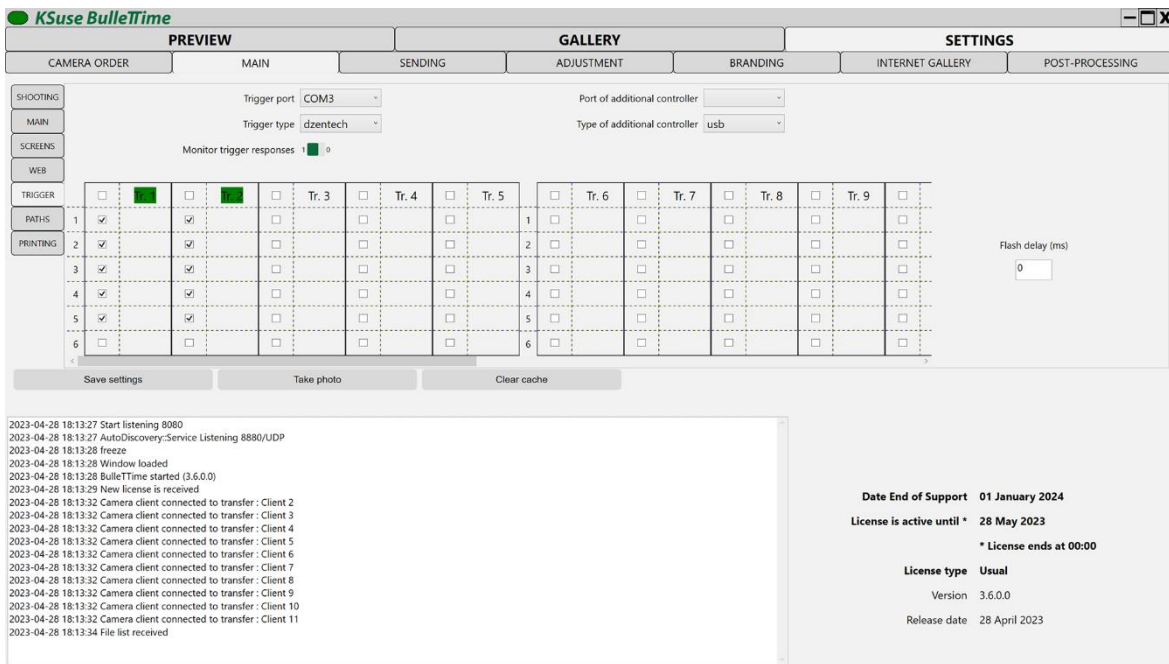
“Type of trigger” - In this version are available: Dragonfly, Dzen Tech, Esper, usb (without trigger). If you use an incompatible trigger, you must select the usb trigger type. In this case, it is impossible to set the intervals between cameras from the software interface.

“Port of an additional controller” - Here you can select the COM port of an additional trigger that will be used only for receiving commands from it, for example, this trigger with an integrated remote control. If such a controller is not connected, then you must leave the field blank.

“Type of additional controller” - Same as option “Type of trigger”. If such a controller is not connected, then it is advisable to select a trigger type different from the type of the connected trigger.

After saving the new value of the type of trigger, you must restart the program!

The option "Center camera release delay (usb, freeze), ms" is intended for using the flash on the central camera to prevent the occurrence of black frames. The recommended value is 10ms. Recommended shutter speed is at least 1/60 s.



“Flash Delay (ms)” - This value is set for output for flash on all Dzen Tech triggers.

“Monitor trigger responses” - Disabling this option disables reconnecting to the trigger when the timeout for receiving a response to the command is exceeded and restarting of the camera clients when the wait time for sending the photo is exceeded.

“Do not release half-press (usb)” - Half-press always remains pressed.

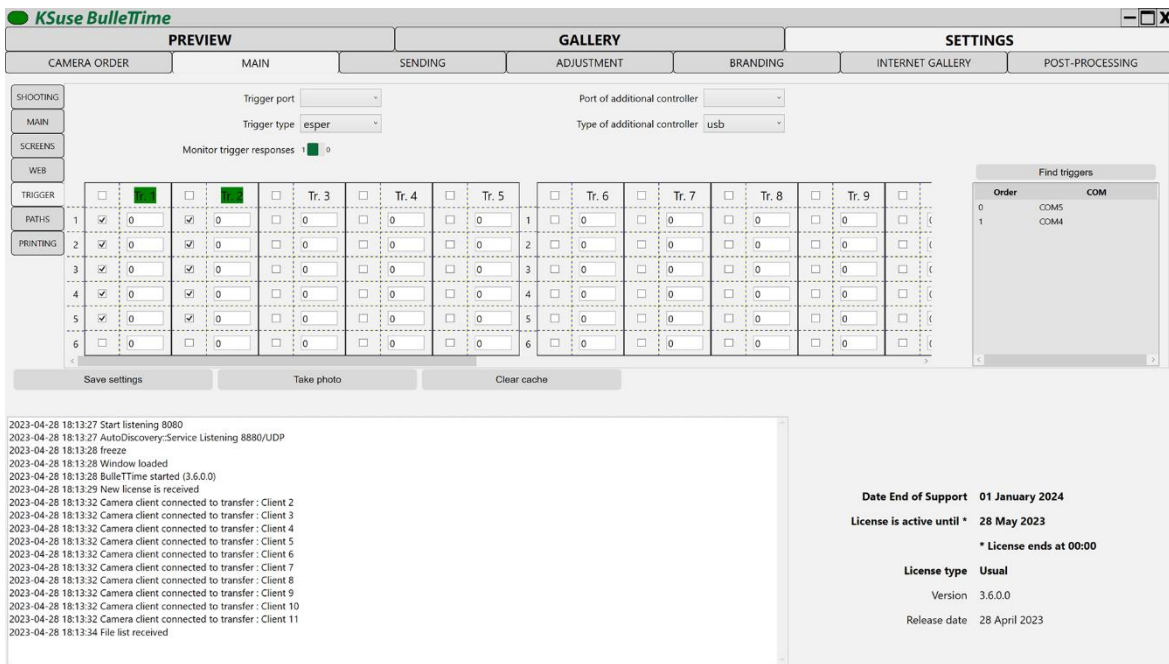
The block with the choice of ports to which the cameras are connected is available when the Dzen Tech trigger is selected. **You must choose the right values for the correct operation!**

The cameras must be connected in the same order as they are listed in the sorting!

Example. You have 3 triggers and 15 cameras. We connect in the first trigger of the camera from 1 to 5 to the corresponding slots from 1 to 5. And so on.

An example of connecting Dzen Tech trigger:

https://www.youtube.com/watch?v=7AAAh_YCjo



When you select the type of trigger - Esper, a window appears with a list of detected triggers. In this window, you must specify the correct order of triggers and the number of cameras on each. Triggers are dragged in the list by the mouse.

To update the list, use the “Find Triggers” button.

If you select a trigger from the list and press the space bar on the keyboard, a light will flash on it, allowing it to be identified.

Esper is the only trigger in which the half-press is active after the shot. With the Esper trigger, the bulb mode in the software interface does not work.

If the port is not marked as used for the camera, then a signal is sent to it with the pause specified in the text field. The value is in ms.

Example. You have 3 triggers and 15 cameras. Connect cameras from 1 to 5 to the first trigger to the corresponding jacks from 1 to 5. Connect the remote controller to the INPUT socket. Connect the LINK of this trigger and the INPUT of the next trigger with the stereo audio cable. In the next trigger connect cameras from 6 to 10 from slot 1-5 and so on. Connect all the triggers to the computer using USB M - USB type C M cables. Sort the triggers in the list, set the number of cameras, save the settings.

An example of connecting Esper Triggerbox trigger:

<https://www.youtube.com/watch?v=dhHlnY-36qU>

Folder location settings

Ksuse BulleTime

PREVIEW | **GALLERY** | **SETTINGS**

CAMERA ORDER | MAIN | SENDING | ADJUSTMENT | BRANDING | INTERNET GALLERY | POST-PROCESSING

SHOOTING	Folder for results (photo, video)	C:\Users\yakon\Pictures\BulleTime\Result	Browse
MAIN	Folder for source photo	C:\Users\yakon\Pictures\BulleTime\Source	Browse
SCREENS	Folder for cached files	C:\Users\yakon\Pictures\BulleTime\Cache	Browse
WEB	Folder for audio files	C:\Users\yakon\Music\BulleTime	Browse
TRIGGER	Folder for intro files	C:\Users\yakon\Videos\BulleTime	Browse
PATHS	Folder for AI module	C:\Users\yakon\Downloads\ksuse.ru\BulleTime\AI3	Browse
PRINTING	Folder for PS curves (acv)	C:\Users\yakon\Pictures\BulleTime\Acv	Browse

Save settings | Take photo | Clear cache

```

2023-04-28 18:13:27 Start listening 8080
2023-04-28 18:13:27 AutoDiscovery:Service Listening 8880/UDP
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2023-04-28 18:13:28 Window loaded
2023-04-28 18:13:28 BulleTime started (3.6.0.0)
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2023-04-28 18:13:32 Camera client connected to transfer : Client 2
2023-04-28 18:13:32 Camera client connected to transfer : Client 3
2023-04-28 18:13:32 Camera client connected to transfer : Client 4
2023-04-28 18:13:32 Camera client connected to transfer : Client 5
2023-04-28 18:13:32 Camera client connected to transfer : Client 6
2023-04-28 18:13:32 Camera client connected to transfer : Client 7
2023-04-28 18:13:32 Camera client connected to transfer : Client 8
2023-04-28 18:13:32 Camera client connected to transfer : Client 9
2023-04-28 18:13:32 Camera client connected to transfer : Client 10
2023-04-28 18:13:32 Camera client connected to transfer : Client 11
2023-04-28 18:13:34 File list received
    
```

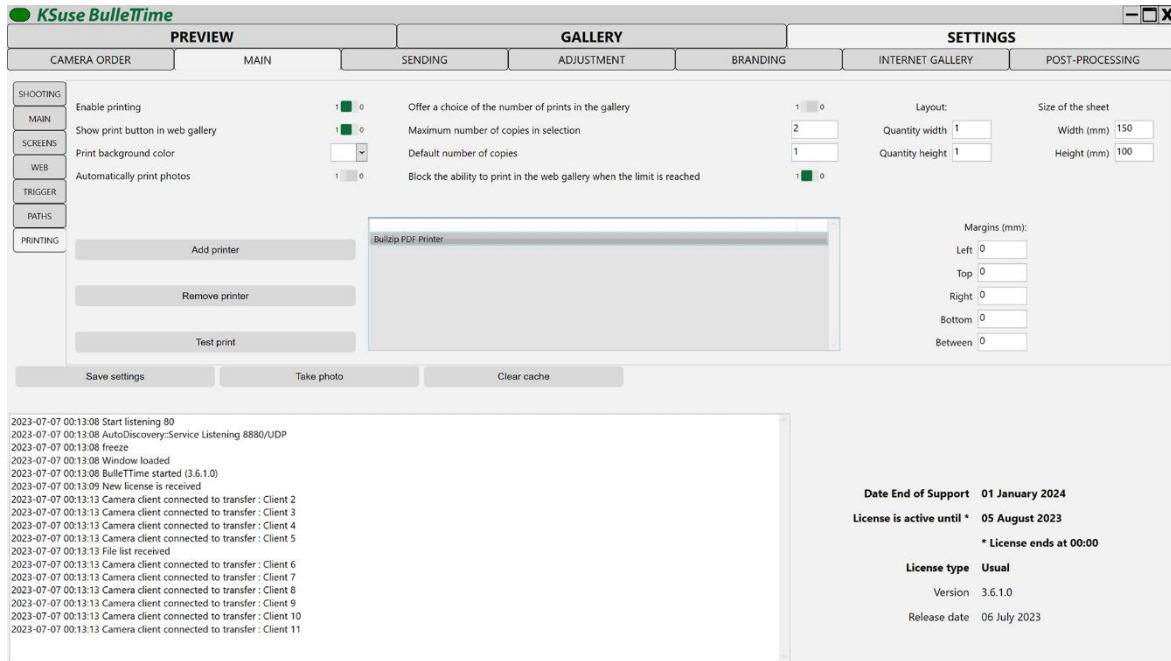
Date End of Support 01 January 2024
License is active until * 28 May 2023
 * License ends at 00:00
License type Usual
 Version 3.6.0.0
 Release date 28 April 2023

This window contains a choice of ways to save the results and sources.

In the folder with the final video, Gif, Photo, PhotoPrew subfolders are created that contain: an animated gif with video sizes, a photo from a central camera with video sizes, a photo from a central camera reduced for the gallery.

After saving the new values of the paths, you must restart the program!

Print settings



Photos for printing are selected through the web gallery.

When printing is on, photos are automatically sent to the printers added to the list. Print jobs are sent to each printer in turn. Printers in offline state are skipped.

Do not enable the “Printing enabled” option if printers are currently unavailable!

Attention! Paper size and orientation is defined in the printer settings in Windows! These parameters must be the same on every printer added to the list!

Using the "Margins" and "Layout" settings you can place several photos on one printed sheet.

Margins are not related to margins in printer settings! These are additional indents of the photo from the edge of the sheet.

Margins are configured separately for each printer in the list.

Fields are filled with the color selected in the "Print background color".

By setting the margins in the program, you can eliminate the cropping of the photo by the printer. If the printer cuts the photo, first increase the margins to such a value that they appear on the print, and then reduce them exactly as far as they are visible.

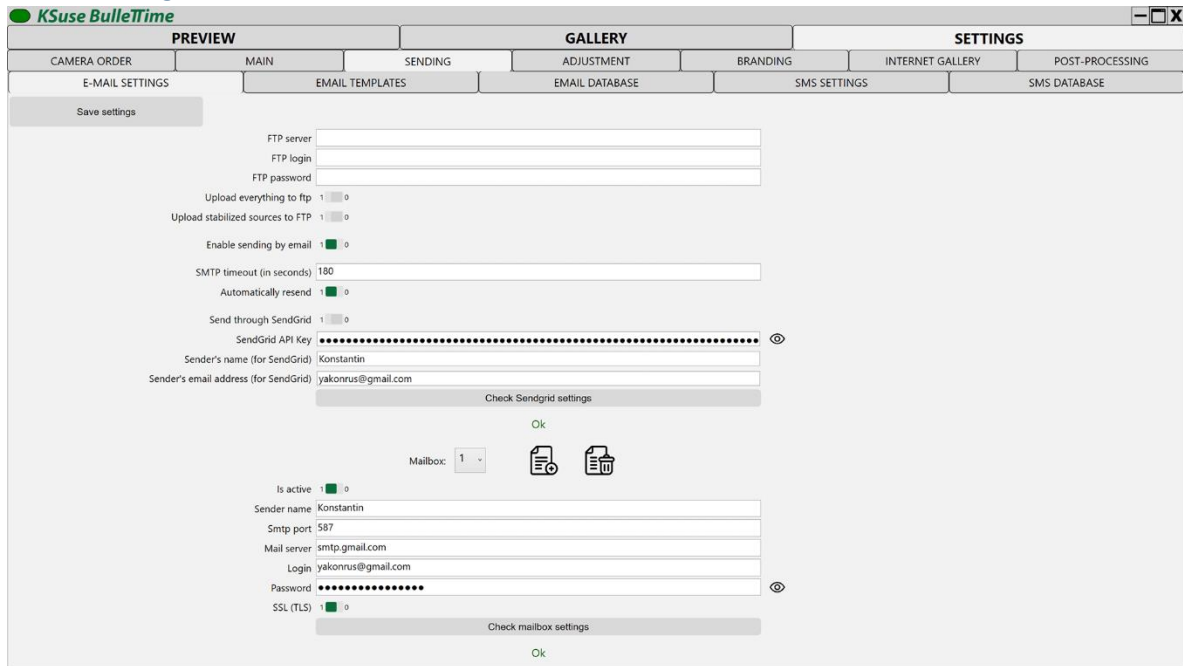
With the help of the option "Offer a choice of the number of prints in the gallery" it is possible to enable the output of the selector of the number of printed copies in the built-in and web galleries. The limitation of the number of copies and the default value are also set here.

When the option "Automatically print photos" is enabled, the photo will be printed in the quantity specified in the "Number of copies by default" immediately after adding to the gallery.

If you enable the option "Block the ability to print in the web gallery when the limit is reached", the print button will disappear from the web gallery if this photo is printed in the quantity specified in the "Maximum number of copies in selection" field.

Window "E-MAIL"

Email Settings Window



To send via SendGrid, you need to create an API key in your account and copy it to the program settings.

When the "Upload all to ftp" option is activated, all bullets (center frame, gif, mp4) are forcibly uploaded to ftp without having to click on the "Upload to ftp" button in the gallery.

"Upload stabilized sources to FTP" turns on uploading stabilized sources into the "stab" folder on ftp.

In the folder on the ftp server, you need to create folders: "gif", "mp4", "jpg" and give write permissions. They will load the appropriate file types.

The folders "gif", "mp4", "jpg" and "stab" will be created in the folder on the ftp server. They will load the appropriate file types.

The "Automatic resending" option allows automatic repeated attempts to send messages with the "Error" status. Attention! Sharp increase in traffic volume with unstable internet connection is possible.

When entering the data of several mailboxes, the program will send letters in turn from each. In the absence of a license, sending is done from only one mailbox.

If the "Login" field contains the full email address, then in the "Sender's name" field you can simply enter a display name. If the login is not equal to the e-mail address, then in the field "Sender's name" you must enter the e-mail from which the sending will be made in square brackets. For example: Konstantin <yakonus@gmail.com>. The specified email must match the account on the mail server.

SSL connection on port 465 is not supported!

Gmail requires you to use a secure app password instead of your account password. To use Gmail, you need to enable two-factor authentication and create an app password:

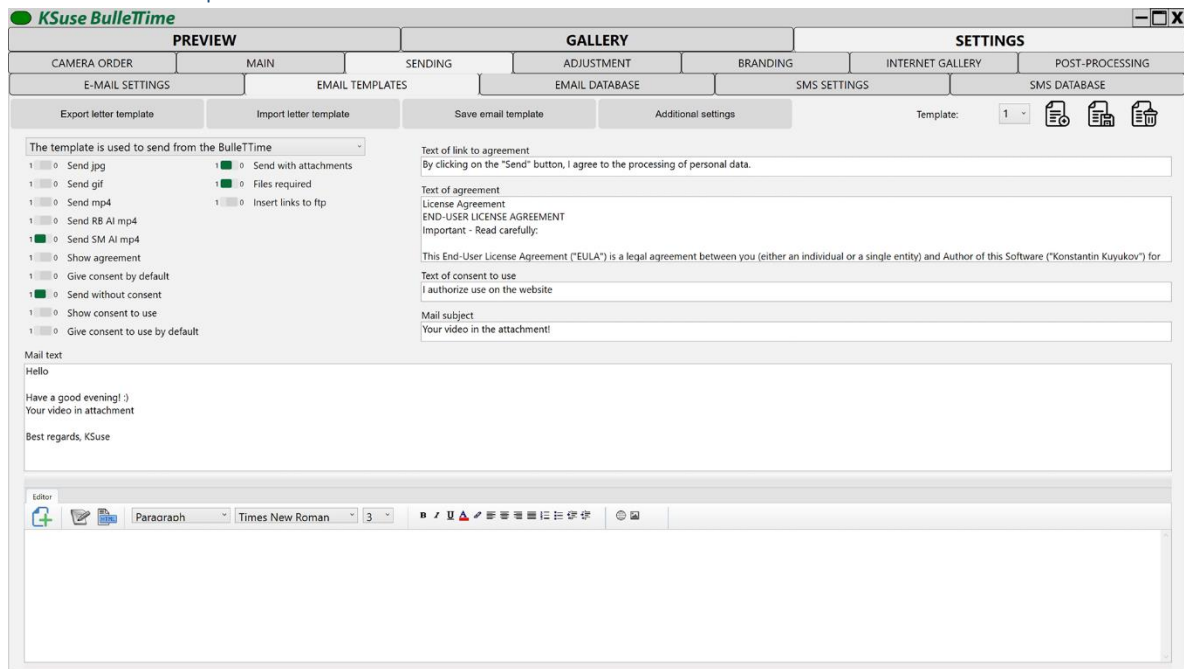
<https://myaccount.google.com/signinoptions/two-step-verification>

<https://myaccount.google.com/apppasswords>

You must use the generated password in the BulleTTime program instead of the account password.

The “Test the settings” button sends a test email.

Windows “Templates”



If FTP is enabled, then in the text of the letter {photo}, {video}, {gif} are replaced with the corresponding download links.

It is possible to obtain two consents from the user. The first of these can be made mandatory.

The template selects the types of files that will be attached to the email, as well as the obligatory presence of them.

Thus, for example, you can choose that the email will contain a video processed using AI, and display a regular video in the web gallery. Guests will select a video in the web gallery and send it to their mailbox. But the email will be sent only after the readiness of such a video (which is especially important for weak computers).

Emails are sent using the template selected on this page.

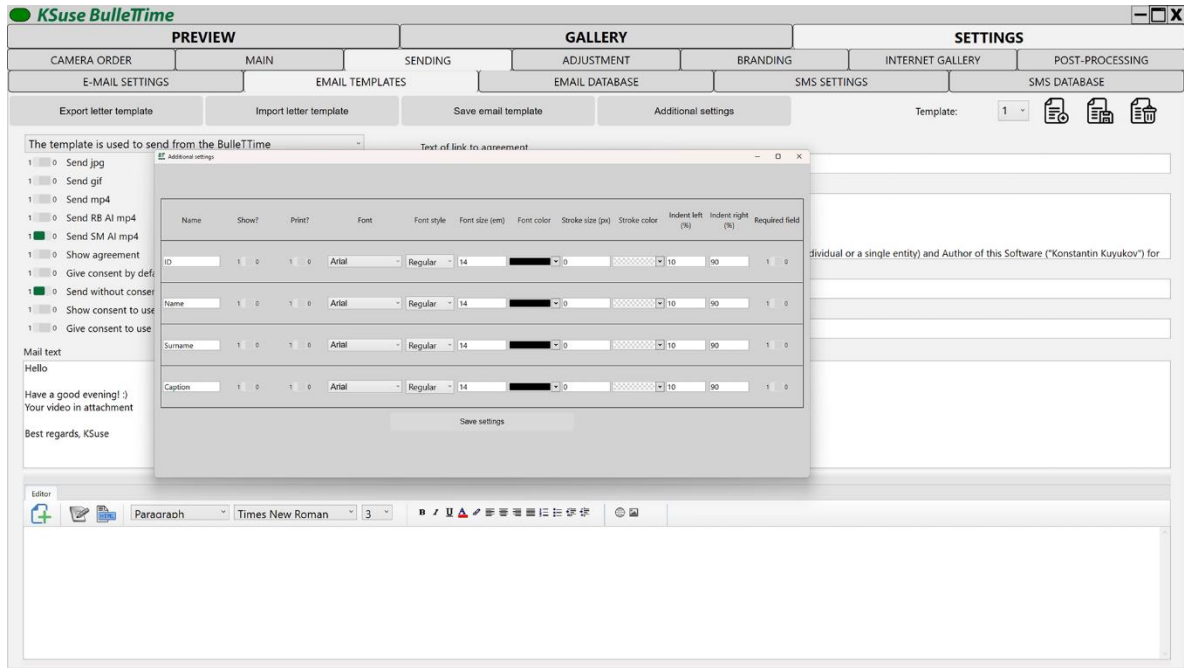
The template has the ability to enable / disable the attachment of files to the email.

Auto replace tags:

{InternetGalleryLink} - link to the Internet gallery

{InternetGalleryPhotoLink} - link to the file in the Internet gallery

Window "Additional Settings"



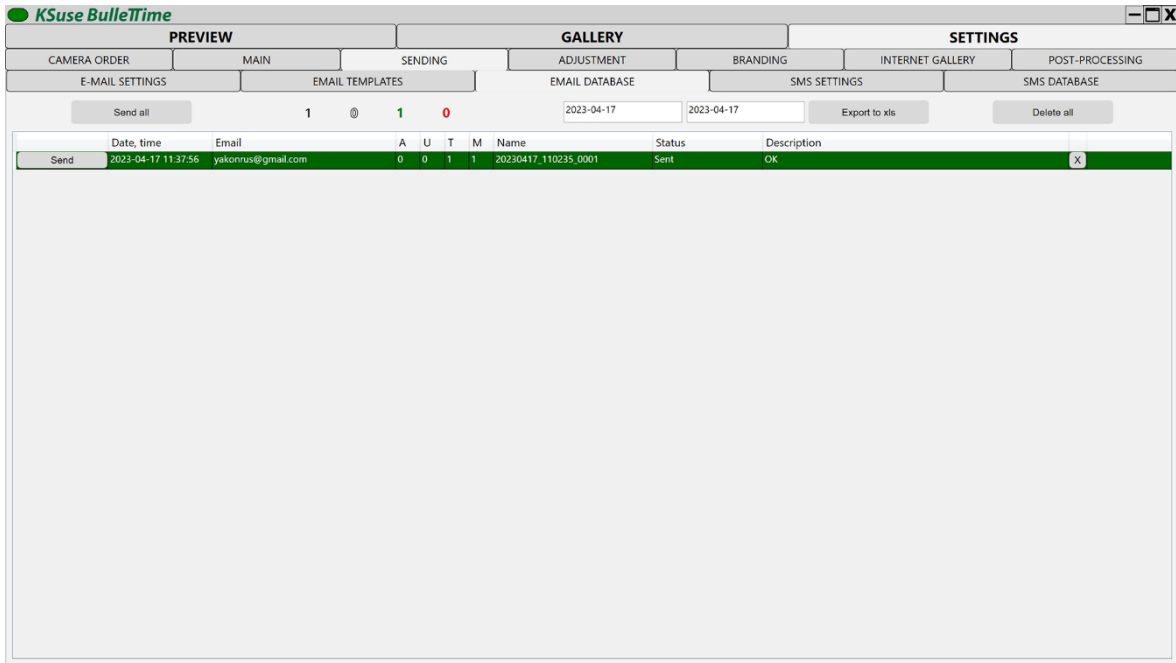
In this window, you can choose which additional data entry fields to display in the web gallery.

The collected data is contained in the exported xls file.

It is also possible to turn on printing of the entered data on photos choosing the position, font, and color of labels.

Additional fields can be renamed and made mandatory.

Database window



In this window, you can see the status of all sent letters in the selected date range and resend if necessary.

You can delete an error line by selecting and pressing the Delete key.

The width of the columns can be changed by moving the separators in the table header.

The "Send All" button re-sends all emails for the specified date interval except those already sent. While holding down the Shift key, all messages are resent, including those successfully sent.

In the table you can change the email address of the recipient and the number of the template.

"A" - whether consent was given to the processing of personal data

"U" - was consent to the use of the video given

"T" - letter template number

"M" - mailbox number

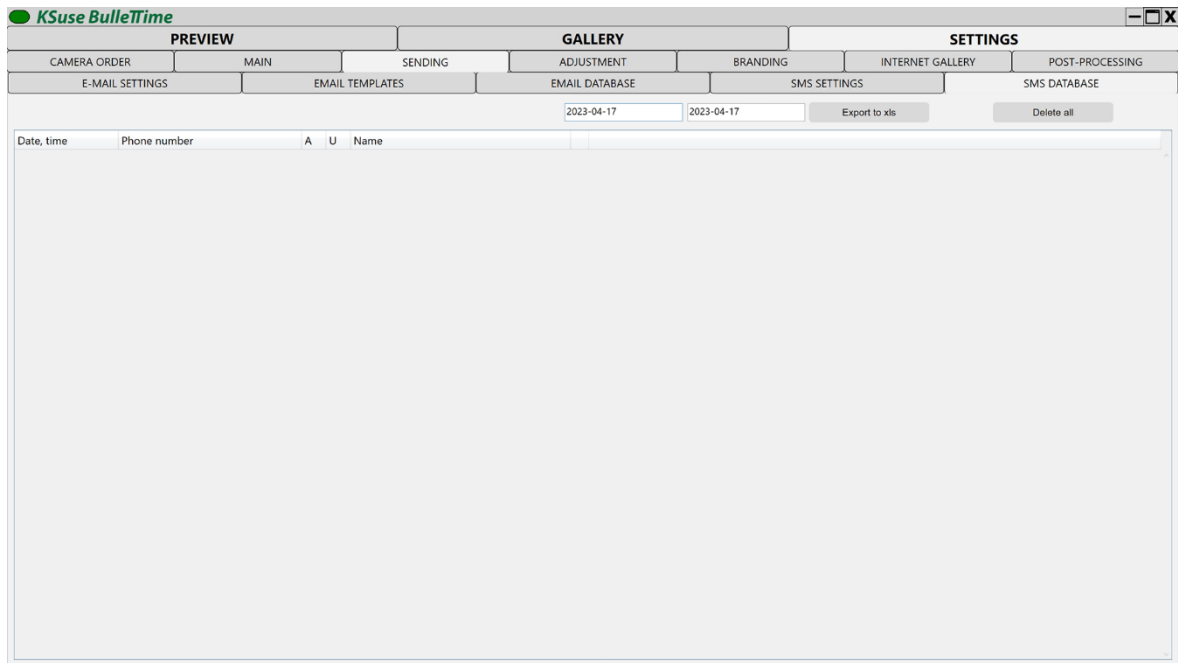
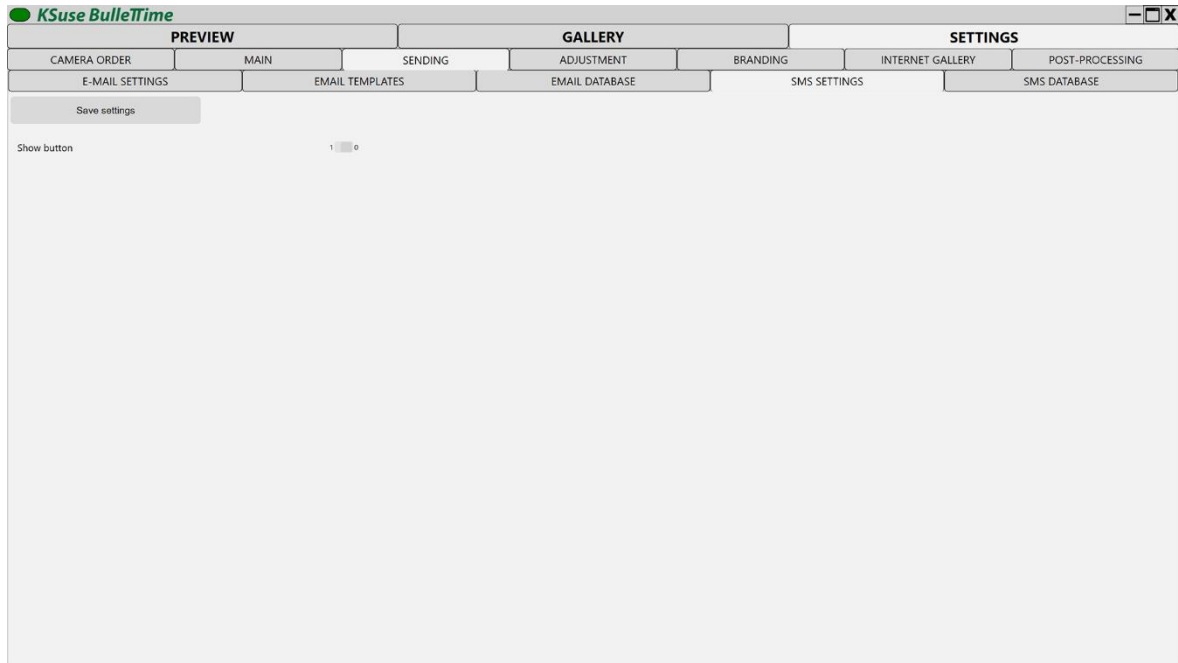
Black number - total emails

White number - sending

Green number - sent

Red number – errors

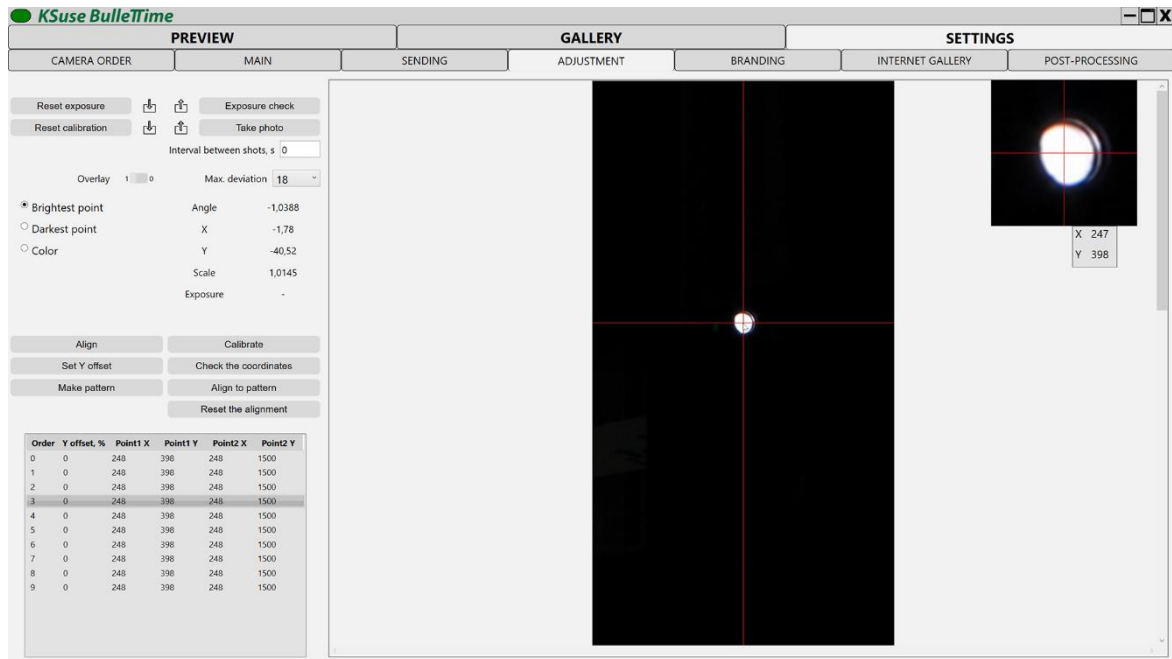
"SMS" settings window



Additional text boxes and consent checkmarks appear in the galleries according to the selected email template, even if email is turned off.

Attention! There is no integration with sending services. Designed only to collect phone numbers for manual sending.

Adjustment settings window



It is used to configure the adjustment of the cameras.

Calibration diodes are always located strictly perpendicular to the plane of the cameras.

Before starting the calibration, you must make sure that the center of the frame of each camera coincides with the calibration pole and each camera is correctly focused.

“Reset calibration” - Reset all calibration settings.

The picture for calibration needs to be shot only from this window by clicking on "Take Photo", when switching to another tab image in memory is destroyed.

It is possible to take a photo both simultaneously for all cameras and at a selected interval.

Clicking on the camera in the list below you can see the result image.

“Check coordinates” - Starts the search for markers in the picture. Serves to verify the correctness of their detection.

“Calibrate” - Automatic calibration by markers.

The algorithm searches for two brightest or darkest points or similar colors in the specified search zones.

As the coordinate of a point, the center of the spot is determined, which consists of all points corresponding to the parameter “Max. deviation”.

It is recommended to calibrate in M mode without compression.

If the calibration is unsuccessful, then you should interrupt the calibration, click "Reset calibration", check if all cameras are aligned, if there are other light sources in the search zones, change the brightness, take a slightly darker or lighter frame and calibrate again.

"Set offset by Y" is used to offset the aligned images in height relative to the found center. It is necessary, for example, if the cameras have different installation heights. The value is set as a percentage of the distance between the diodes.

See the "Standard calibration procedure" section for a complete description of the calibration process and video.

Manual calibration possible.

To do this, mark the upper calibration point (convergence point of cameras) on all photos with the left mouse button, and the lower point with the right button.

To record the values of the current position of the mouse cursor in coordinates, you can use hot keys: number 1 - for the top point and number 2 - for the bottom point.

Then click the "Align" button.

Example: <https://www.youtube.com/watch?v=sAPTe-LfEjl>

Adjusting White Balance, Exposure and Calibration: https://youtu.be/Y50nzJJ1_JM

It is possible to make a backup copy of the calibration parameters and restore them back.

There is an automatic calibration correction function.

It is necessary to take a photo of a clean background after calibration.

Then, if necessary, you can correct the calibration using this pattern.

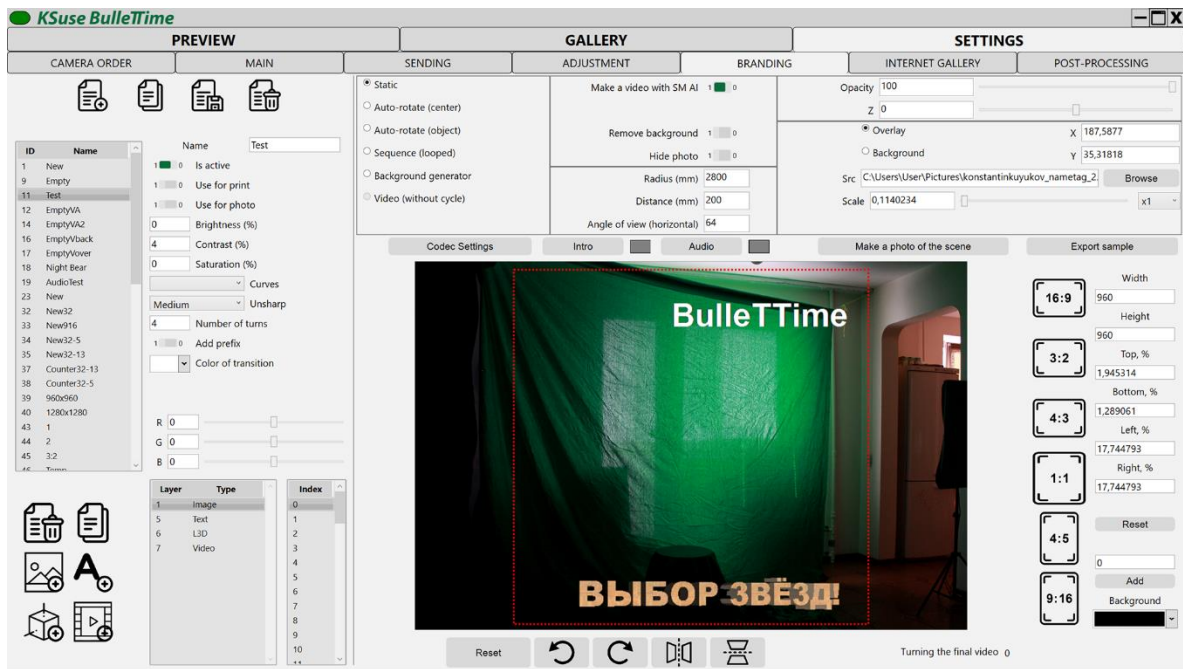
Video instruction: <https://youtu.be/qjYPEP4Stb8>

"Make pattern" - save the shot as a template

"Align to pattern" - fix the calibration according to the template

"Reset the alignment" - return the values of the original calibration

Branding settings window



This window creates a set of presets for video branding.

For each preset, you can select the aspect ratio of the frame, frame size, video encoding bit rate, title, additional framing of the source, deletion of background, brightness and contrast correction.

In the "Preview" window, a choice is made among presets for which the "Enabled" option is enabled. After turning on / off a preset, you do not need to save it unless you made changes to other options.

To brand the printout, use the "Use for Printing" option. Only one of the presets can have the status "Enabled for printing".

"Use AI Slow Motion" - This option appears after installing AI. To work, you need a 4GB or more nvidia video card. In this mode, virtual cameras are created, in the amount of $(N - 1) * 30 / \text{fps} + 1$, where N is the number of real cameras.

When using AI Slow Motion, the number of virtual cameras will depend on the set fps value. It is necessary to edit and save the presets that will be used in this mode.

The option "Add prefix" adds the name of a preset to the names of photos and videos.

"Brightness", "Contrast", "Saturation" options increases these video parameters by the specified number of percent.

The “Unsharp” option allows you to sharpen the image.

It is possible to color correct the final mp4 using the selected PS Curves preset (.acv). The drop-down list displays all files located in the folder specified in the main settings.

“Number of turns” sets the minimum number of rotation cycles in the final video. With this option you can set the duration of the video.

“Color of transition” - Color of flash in transition from video to bullet in "video + bullet" and "video + bullet + video" modes.

Video codec settings are set using the "Codec Settings" button. It is recommended that you select “High” quality and one-pass encoding.

Crop setup example: <https://www.youtube.com/watch?v=Xjbl0gDxN3w>

The red rectangle is the crop rectangle.

The orange rectangle is the visibility area used when removing the background. Everything that is outside the visibility zone becomes transparent and is replaced by a background image.

The blue rectangle is the insertion area of the original image. Can be used to downsize and move objects in the frame while removing the background.

Moving of the current layer carried out by the left mouse button.

You can use the mouse wheel to scale on the current layer.

The left mouse button while holding down the Shift key moves the crop rectangle.

The left mouse button while holding down the Ctrl key shifts the crop border. When you click in the upper quarter of the frame - the upper border, in the lower quarter - the lower border, in the right quarter - the right border, in the left quarter - the left border.

The left mouse button while holding down the Shift + Alt keys moves the visibility area rectangle.

The left mouse button while holding down the Ctrl + Alt keys shifts the visibility zone border. When you click in the upper quarter of the frame - the upper border, in the lower quarter - the lower border, in the right quarter - the right border, in the left quarter - the left border.

The left mouse button while holding down the Ctrl + Alt + Shift keys moves the rectangle of the insertion area of the source image.

When you change the cropping rectangle, the insertion area of the original image automatically becomes equal to it.

To apply the settings, you must save the preset!

When the shooting mode for posting, "Number of turns" is set, the number of turns of the bullet between the videos in the "video+bullet" mode and the minimum number of turns in "freeze" and "boomerang" modes are set, but not less than 3 seconds.

Preset graphics are customizable by adding layers: text layers, image layers, 3D graphics layers, and video layers.

For each layer, you can adjust the opacity parameter (individual for each angle, for example, you can simulate the appearance of a logo during rotation) and Z (the layer layout on the axis connecting the center of the rotation and the camera lens. $Z = 0$ - the center of rotation).

The slider of the opacity of the layer, while holding down the Ctrl key, changes the transparency of the layer in all cameras at once.

Static - the same object in every view.

Automatic rotation about the center - Transformation of the object in each angle relative to the center of rotation.

Automatic rotation relative to the object - Transformation of the object at each angle relative to the center of the object.

Sequence (looped) - An images have been prepared for each view in advance (preliminary render). The files must be named Name_X.png, where X is the camera index. The index of the first camera is always 0, that is, the sequence numbering must start from 0.

Layers overlap in the order in the list.

Moving the current layer is done with the left mouse button, or by changing the values of the "X", "Y" fields.

You can scale the current layer using the mouse wheel.

If none of the presets is set to "Use for printing", then the photo is printed as it was taken in a 3: 2 aspect ratio.

If you want to brand a photo, then you must enable "Use for print" for the selected preset. Select the required aspect ratio from the list of sizes. It is desirable to choose a larger size, since this affects the drawing of the overlaid graphics.

You do not need to make this preset active, otherwise it will appear in the list of presets for shooting in the main interface.

The "Reset" button sets the crop margins to 0.

The "Add" button increases the crop margin by the specified value. The value can be negative, then the margins decrease.

After making any changes, you must save the preset!

When you click on "Save Preset", the program creates a set of png files that will be used when processing photos.

It is possible to create branding for an arbitrary number of cameras. To do this, select the required number of cameras in the drop-down list. By default, as many cameras are displayed as there were connected to the system during the last save of the program settings.

When you click on the "Make a photo of the scene" button, photos is taken and the images are saved for presets.

To facilitate cropping, you can select a background color. When processing a photograph, areas outside the original photograph will be painted in the specified color.

Clicking on "Export sample" creates a video with the current preset based on the saved frames. The finished video will be added to the gallery.

To do this, you need to enable the use of this AI, and then save a snapshot of a clean background.

<https://youtu.be/2zF8fqCAEWc>

With the help of the RGB sliders, it is possible to perform color correction by boosting or attenuating the corresponding channel.

The settings "Radius (mm)", "Distance (mm)", "Angle of view (horizontal)" are set according to your setting and affect the rendering of images with the modes "Auto rotation about center", "Auto rotation about object", as well as rendering layers with 3D graphics (.obj).

"Radius (mm)" - the distance from the camera to the convergence point

"Distance (mm)" - the distance between the optical axes of cameras

"Angle of view (horizontal)" - Horizontal angle of view of the lens (can be found in Wikipedia)

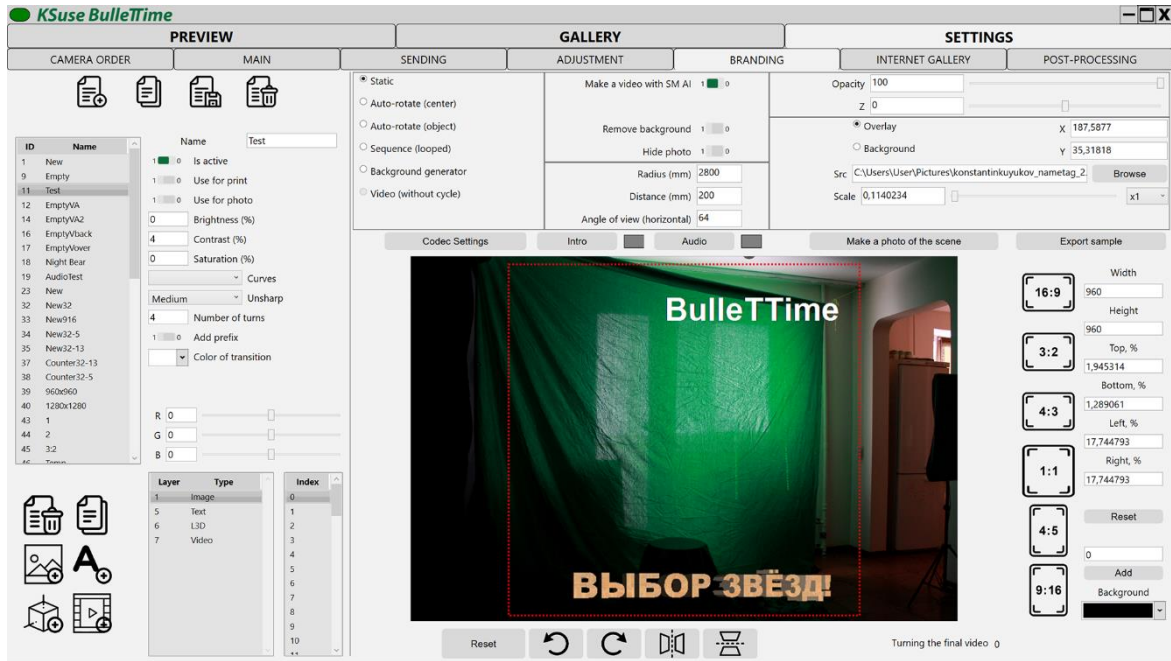
You can create separate presets for use when printing photos and for photos that will be attached to emails.

Attention! Image correction options (brightness, contrast, saturation, curves, RGB) are not used to process these photos.

If for some reason you need to rotate the final video, you can use the buttons at the bottom of the window. Rotation applies to the entire video, including overlay graphics, except for intro and video overlay.

If you are using not a classic horizontal bulletime, but a vertical one, then in order to calibrate it you need to use not a vertical, but a horizontal calibration pole. The cameras in sorting must be rotated by 90 degrees, since the calibration algorithm requires a vertical arrangement of diodes. And then the final video needs to be rotated 90 degrees in the opposite direction.

Image layer



If "overlay" is selected, the image is superimposed over the one received from the camera.

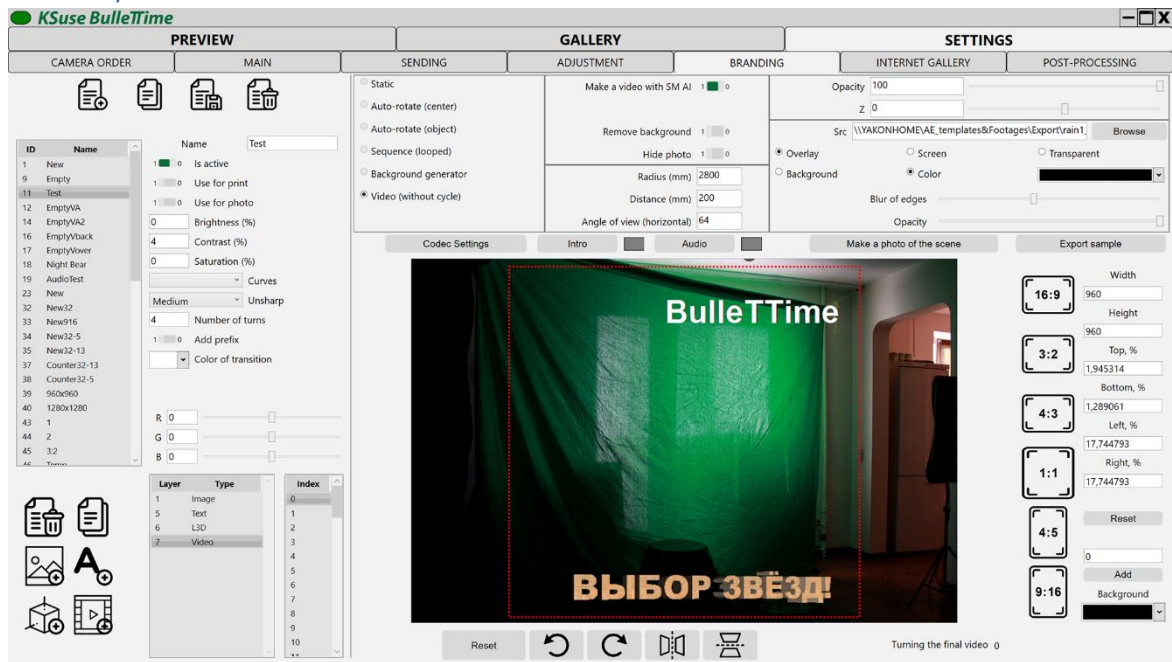
If "background", then it is placed instead of the removed background.

If you use auto-rotation of the image, then to increase the effect, you can reduce the installation radius or increase the distance between the cameras.

"Background Generator" - allows you to create a sequence from the selected image:

<https://youtu.be/Y6V6b-nyGqk>

Video layer



.mp4 and .mov import supported.

FPS video should be 30!

The video must be longer than the length of the final video!

Currently only one video layer is used.

This video is overlaid on top of all of the final video without looping. It fits within the dimensions of the final video. Zoom and position cannot be adjusted.

Blending is done using the Blend mechanism:

Screen - resulting in brighter pixels of the video and overlay

Transparent - overlay with alpha blending

Color - the specified color is replaced with transparent

In the case of using color keying, the degree of blurring of the edges and the transparency of the video are additionally indicated.

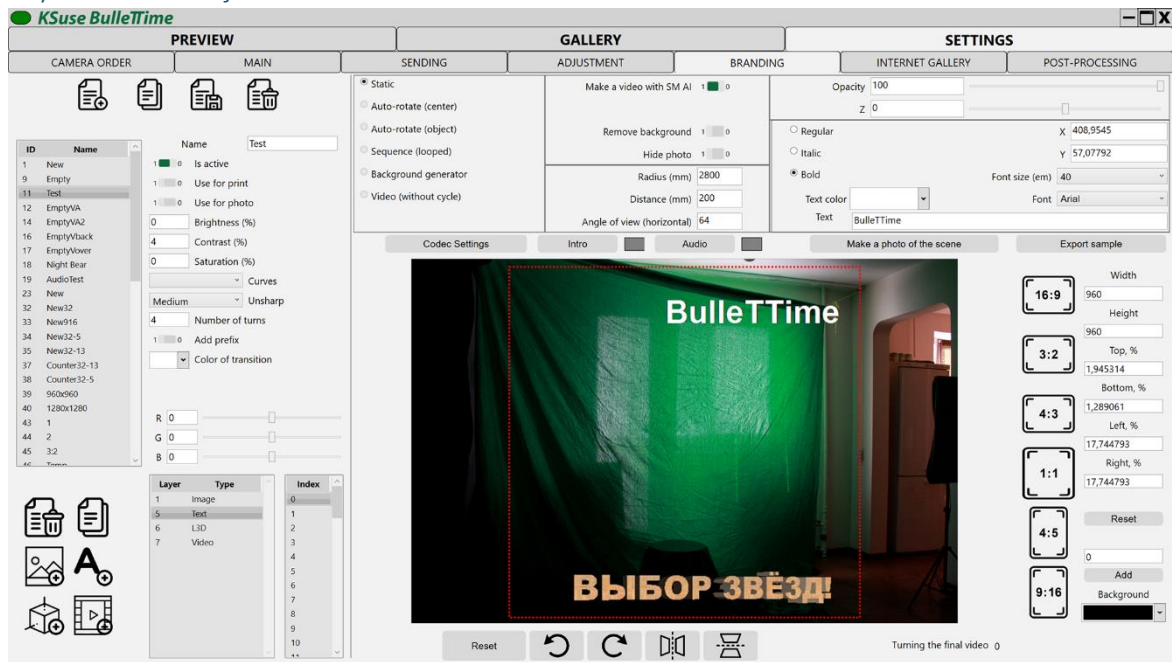
Text layer

The screenshot displays the Kuse BulleTime software interface, which is divided into several functional areas:

- PREVIEW:** Contains a list of layers on the left, including 'New', 'Empty', 'Test', and various video/audio elements. A 'Layer' table is visible at the bottom left:

Layer	Type
1	Image
5	Text
6	L3D
7	Video
- GALLERY:** Features a central preview window showing a video frame with a green background and the text 'BulleTime' and 'ВЫБОР ЗВЁЗД!'. Below the preview are controls for 'Reset', 'Undo', 'Redo', 'Mute', and 'Volume'.
- SETTINGS:** Divided into sub-sections:
 - SENDING:** Includes options for 'Static', 'Auto-rotate (center/object)', 'Sequence (looped)', 'Background generator', and 'Video (without cycle)'.
 - ADJUSTMENT:** Contains settings for 'Remove background', 'Hide photo', 'Radius (mm)', 'Distance (mm)', and 'Angle of view (horizontal)'.
 - BRANDING:** Includes 'Make a video with SM AI', 'Opacity', 'Z', 'Regular', 'Italic', 'Bold', 'Text color', and 'Text'.
 - INTERNET GALLERY:** Features 'Codec Settings', 'Intro', 'Audio', 'Make a photo of the scene', and 'Export sample'.
 - POST-PROCESSING:** Includes aspect ratio options (16:9, 3:2, 4:3, 1:1, 4:5, 9:16), width/height settings, and alignment options (Top, Bottom, Left, Right).

Layer with 3D object



Compatible models are in the format .obj

Lights in the model are ignored.

The model is lighted by three light sources. Brighter in the center of the installation and two weaker at the edges. The total brightness is set by a slider or by entering a text value.

It is quite difficult to see the 3D model in the preview window.

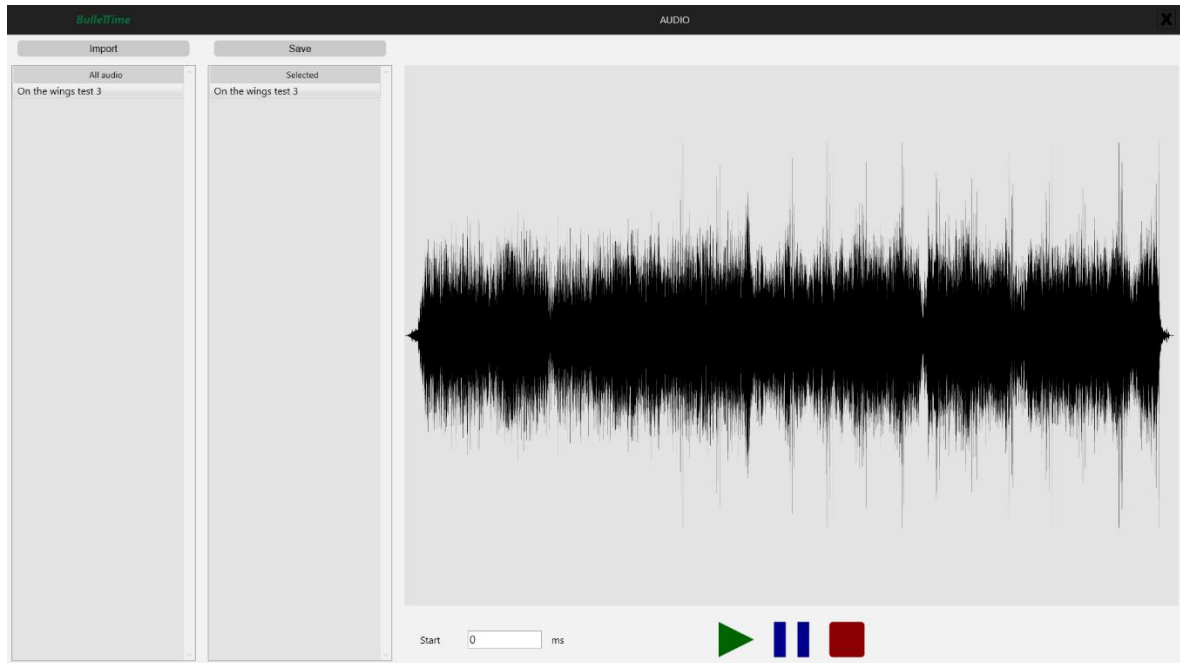
Model can be located far beyond the window.

It is recommended to set the origin in the center of the model in advance.

To increase the effect, you can reduce the installation radius or increase the distance between the cameras.

It is highly recommended that you use pre-render instead of models.

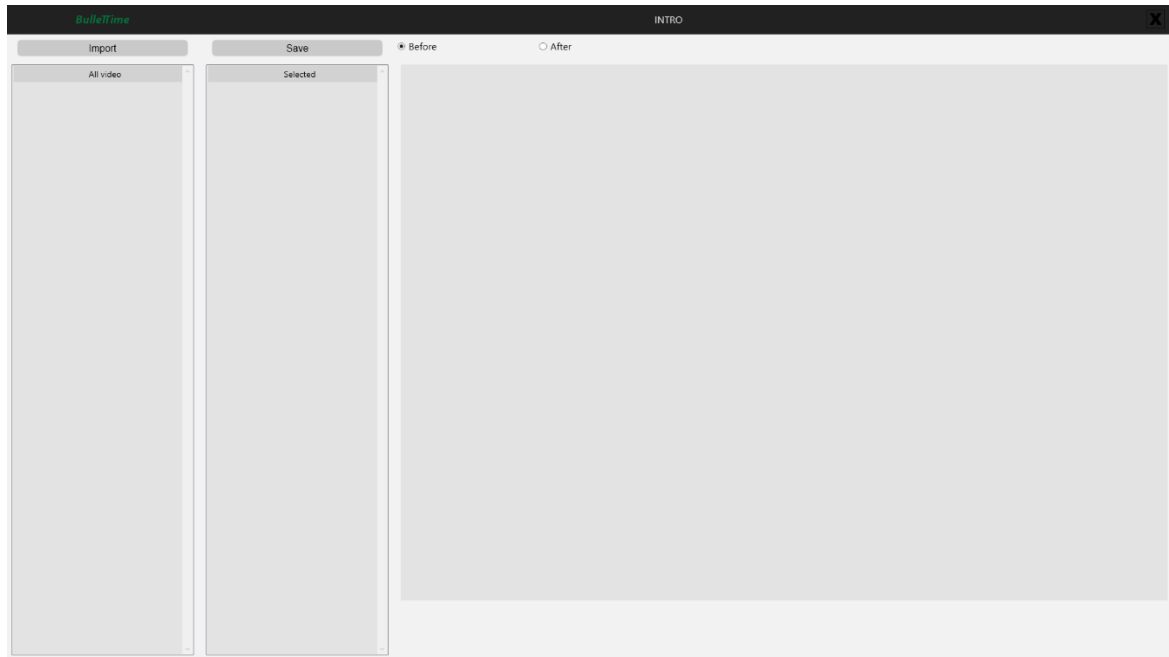
Audio editor



In this window it is possible to import audio files in mp3 and wav formats. The audio files that will be used in the preset are dragged by mouse into the "Selected" column. For each track, you can set the starting position (the sound will start with the selected ms). After selecting the tunes and setting the beginning, you must click the "Save" button.

One of the selected melodies will be randomly inserted into the video.

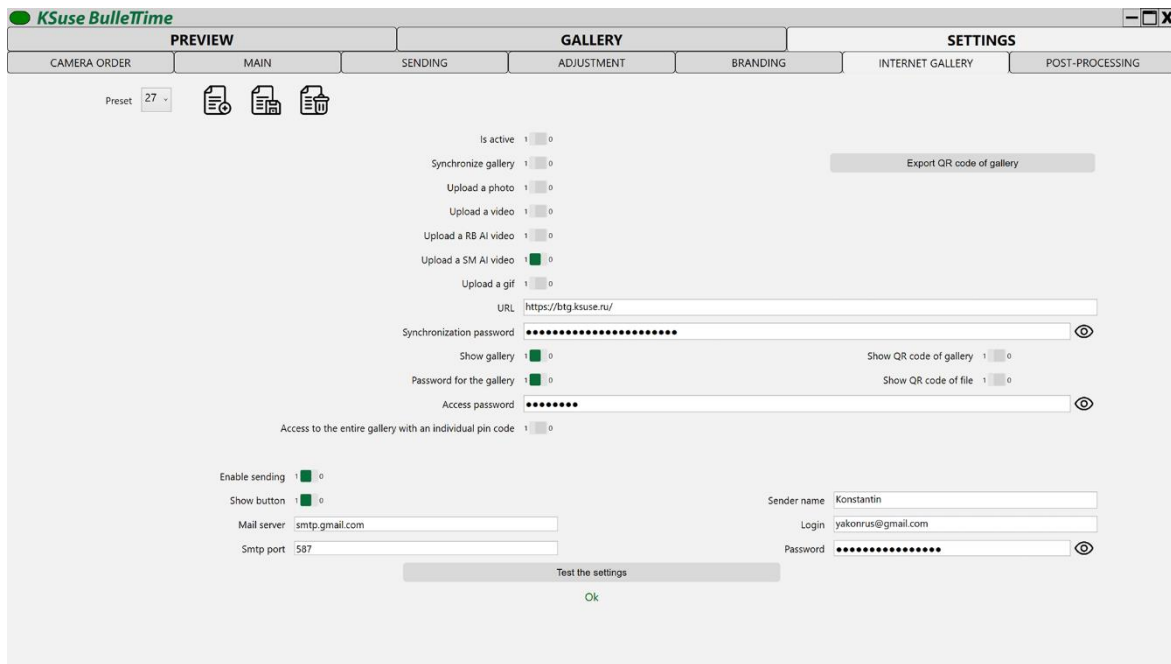
Intro



In this window it is possible to import video files in mp4 format. The video that will be used in the preset as an intro is dragged with the mouse into the “Selected” column. After selecting, you must click "Save".

You can set whether the intro is inserted before or after the main video.

Internet Gallery settings window



In this tab, enter the website address for the online version and the synchronization password.

The online gallery runs in php 7.2 and later. The content is loaded via ajax using the jquery library without refreshing the page, which allows you to embed the gallery into almost any of your pages.

You need copy the files from the "for_site" folder to the site. These files must correspond to the version of the program from which the gallery is synchronized.

You must set the Data folder to have permission 0777.

The pass.php file stores the sync password.

The dictionary.php contains the online gallery dictionary.

Attention! You cannot sync one gallery from different copies of the program! Synchronization is one-way, one Sender will hide files uploaded by another Sender.

“Show gallery” - enables displaying the entire gallery.

“Password for access” - sets a password for viewing the gallery.

A shot is always available using a pin-code regardless of the gallery settings.

With the "Access to the entire gallery with an individual pin-code", you can display the entire gallery, if you know the pin-code for any of the pictures. In fact, these are individual passwords

for the gallery. That is, if you delete someone's picture from the gallery, then the person automatically loses access to the entire gallery.

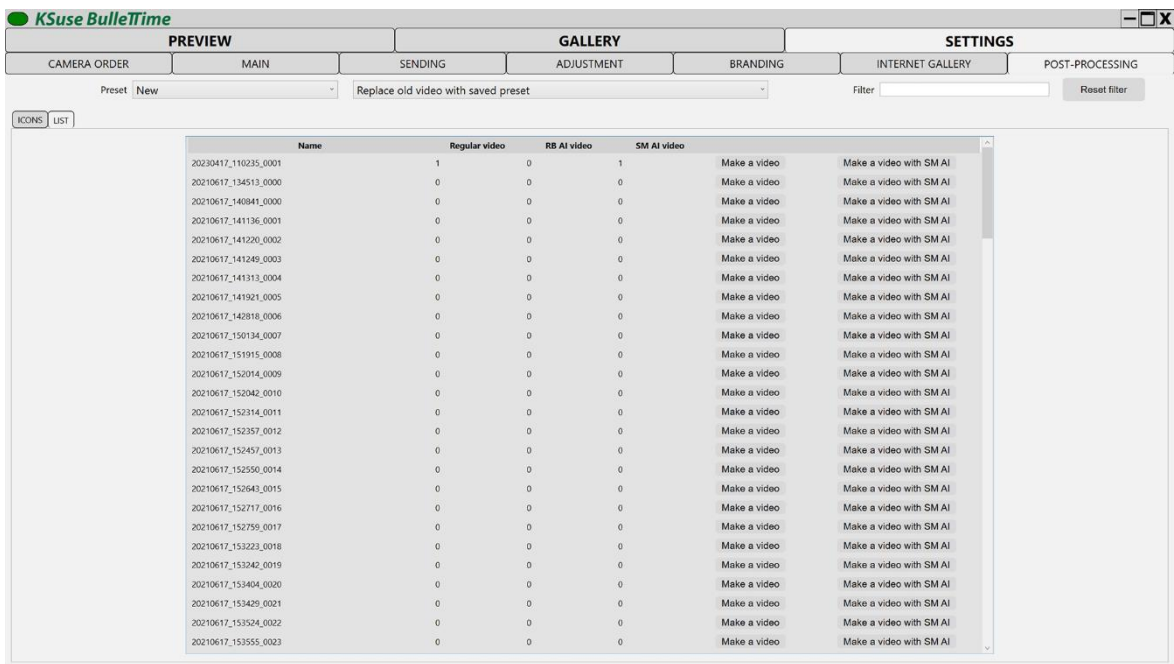
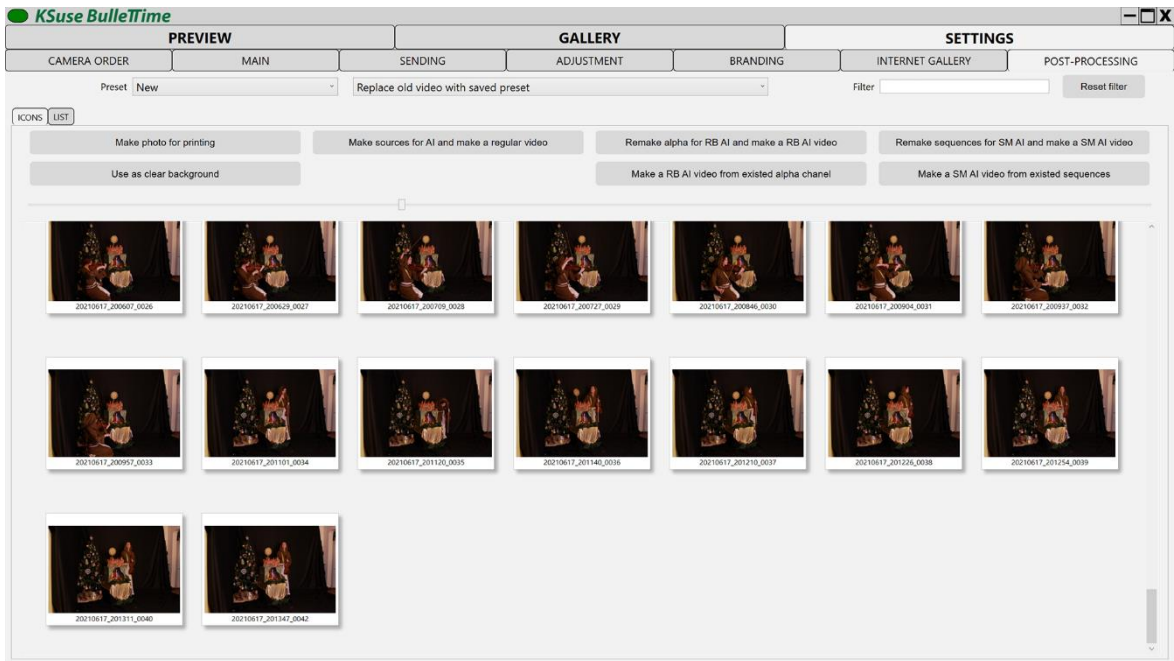
The online gallery has a button "Send email".

If you make e-mail settings on this page, then sending will be carried out through the specified mailbox. The email will contain the selected file as an attachment. The email template is selected in the "E-mail"- "Templates" tab.

Attaching images to html text is not supported. Use links to external sites.

If the data is not filled in, then the button will simply call the default email program on the device used and insert a link into the text of the email.

Post-processing window



This tab displays a list of all saved stabilized sources. The list is limited by time of creation / modify as well as videos in galleries.

In this window, the same filter by creation time is applied as in the galleries.

You can create a new video using any other preset and also apply AI Slow Motion.

If you select "Replace old video", the new video will replace the old one in the gallery and can be sent with emails in accordance with the existing records in the database.

Tutorial: https://www.youtube.com/watch?v=SIMVh01_js8

Standard calibration procedure

1. Initial setup: turn on the cameras, set all cameras on the calibration pole (align center of the frame on the pole, adjust the focus).
2. Check if all cameras are responding to the remote control. It is important! If autofocus is on and the lighting is bad, then during this test, focus may be lost.
3. Settings in the program: check that AF lock is turned on (applies only to a number of models; if the option does not work on your camera, then you need to disable autofocus with the switch on the lens), check the order of the cameras, take a shot. From the first image, it will become clear whether all cameras are sending a photo, whether the focus is set correctly everywhere, and whether there are other light sources in the search areas.
4. Set up search zones for marker/diodes (search zones are common for all angles) in the "Camera order" menu using Live View, as well as ISO, aperture, shutter speed to accurately identify diodes.
5. Go to calibration, click "Reset all", "Take photo"
6. When the indicator turns green, click on any of the cameras in the list. Check out full size image.
7. "Check the coordinates". Make sure that all the LEDs are correctly defined. The red crosshair should coincide with the center of the upper diode in all angles.
8. If suddenly the indicator does not turn green or the previews are lost on the second monitor on any of the last 2 steps, then you need to exit calibration and check the status of cameras. Then start the calibration procedure again.
9. Press "Calibrate " and wait.
10. "Take photo", wait for the video on the second monitor, if the diodes continue to jump, then go to step 3.

Recording the calibration process and setting framing in branding:

<https://www.youtube.com/watch?v=BCDRiGaBMr0>

<https://www.youtube.com/watch?v=Xjbl0gDxN3w>

<https://youtu.be/6ORsJneiVrA>

Full reboot procedure

1. Shut down KSuse BulleTTime.
2. De-energize the installation (cameras, usb hubs, trigger).
3. Disconnect the usb cable from the laptop (going to the installation).
4. Wait 30 seconds.
5. Power up the usb hubs.
6. Connect the usb cable to the laptop.
7. Power up the installation.
8. Launch the software.

Hotkeys










- C, V, PageUp - preparation for shooting (half press)
- D, F, PageUp - cancel preparation for shooting (release the button)
- R - Take a photo of the background for the AI
- Enter, space, PageDown - shutter release (full press)
- 1 - uniform boomerang
- 2 - boomerang with a slowdown
- 3 - boomerang with acceleration
- 4 - boomerang with a slowdown to the center
- 5 - boomerang with acceleration to the center
- 8 - video + bullet + video
- 9 - video + bullet
- 0 - freeze
- - - reduction of the interval in the boomerang
- + - increase the interval in the boomerang
- Ctrl + H - hide video
- Ctrl + D - delete video
- Ctrl + S - upload to ftp

Program activation

Attention! The program is tied to the computer. One license is valid for one computer.

License management is carried out through KSuse Manager.

Indicator colors

-  - Ready to shoot
-  - Low battery
-  - Camera parameters differ from each other (focal length)
-  - Camera parameters differ from each other (autofocus, shooting mode)
-  - Waiting for photos from cameras
-  - Timed out of waiting for photos from cameras
-  - Processing of photos in progress
-  - Trigger error
-  - Critical error

Possible problems and their solution

The list of cameras is empty	Check the connection of the usb cable
The red indicator in the software interface	<ol style="list-style-type: none"> 1. Go to Settings - Order. 2. Check that there are all cameras in the list of cameras, all display a BodyID and have a sequence number different from 1000. 3. There is no caption: "Incorrect number of cameras in the trigger settings". 4. The caption: "Must be X cams" is green.
Caption: "Incorrect number of cameras in the trigger settings"	<ol style="list-style-type: none"> 1. Check that the number of cameras in the list corresponds to the number of connected. 2. Go to Settings - Main. 3. Install the number of cameras connected to each trigger.
The caption: "Must be X cams" is red.	<ol style="list-style-type: none"> 1. Check that the number of cameras in the list corresponds to the number of connected. 2. Click save settings.
Black indicator	<ol style="list-style-type: none"> 1. Go to Settings - Main. 2. Check the trigger settings (port number, type). 3. Restart the software. 4. Perform a full reboot procedure if the previous steps did not help.
Black indicator	<ol style="list-style-type: none"> 1. Perform a full reboot procedure
After the shutters are released, the "purple" indicator	<ol style="list-style-type: none"> 1. Check that all cameras take a picture (turn on the displays on all cameras, take a picture, everyone should blink). 2. Click "Reconnect" in Settings – Camera order.

	<ol style="list-style-type: none"> 3. Click "Reset power", wait until all cameras are connected to the OS (Windows will stop making disconnecting sounds, connecting the device), and click "Reconnect".
<p>Did not receive a email</p>	<ol style="list-style-type: none"> 1. Open Settings - Database 2. Find the line with the entered address and frame number. 3. Check that the address is correct. 4. If the line is green, then ask to check the Spam folder of the mailbox. 5. If the line is red, then try to send again by clicking on the "Send" button.

Used libraries

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System.Data.SQLite - <https://system.data.sqlite.org>

Microsoft - <https://dotnet.microsoft.com/>

The MIT License:

DynamicExpresso.Core - <https://github.com/davideicardi/DynamicExpresso>

FluentFTP - <https://github.com/robinrodricks/FluentFTP>

GifMotion - <https://github.com/warregalyen/GifMotion>

HelixToolkit - <https://github.com/helix-toolkit/helix-toolkit>

Newtonsoft.Json - <https://www.newtonsoft.com/json>

Portable.BouncyCastle - <https://www.bouncycastle.org/csharp/>

SendGrid - <https://sendgrid.com/>

SharpDX - <http://sharpx.org/>

SharpZipLib - <https://github.com/icsharpcode/SharpZipLib>

starkbank-ecdsa - <https://github.com/starkbank/ecdsa-dotnet>

WriteableBitmapEx - <https://github.com/reneschulte/WriteableBitmapEx>

QRCoder - <https://github.com/codebude/QRCoder/>

QRCode.js - <https://github.com/davidshimjs/qrcodejs>

jQuery - <https://jquery.com/>

Super-SloMo <https://github.com/avinashpaliwal/Super-SloMo>

Named Pipe Wrapper - <https://github.com/acdvorak/named-pipe-wrapper>

Apache License:

CalcBinding - <https://github.com/Alex141/CalcBinding>

Magick.NET - <https://github.com/dlemstra/Magick.NET>

NPOI - <https://github.com/tonyqus/npoi>

Google.Apis.Drive.v3 - <https://github.com/googleapis/google-api-dotnet-client>

OpenCvSharp4 - <https://github.com/shimat/opencvsharp>

U²-Net - <https://github.com/xuebinqin/U-2-Net>

Real-time 2D Multi-Person Pose Estimation on CPU: Lightweight OpenPose -

<https://github.com/Daniil-Osokin/lightweight-human-pose-estimation.pytorch>

Microsoft Public License (Ms-PL):

DotNetZip - <https://github.com/haf/DotNetZip.Semverd>

Extended.Wpf.Toolkit - <https://github.com/xceedsoftware/wpftoolkit>

NAudio - <https://github.com/naudio/NAudio>

BSD 3-Clause License:

NLog - <https://nlog-project.org/>

PyTorch - <https://pytorch.org/>

Numpy - <https://numpy.org>

PSF LICENSE:

Python - <https://www.python.org/>

HPND License:

Pillow - <https://github.com/python-pillow/Pillow/>

LGPL v3:

FFMPEG - <https://www.ffmpeg.org/>

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