# ARESRealworld

User Manual V1.2

ARES Realworld is a program for laser shooting training that uses cameras to detect and evaluate laser shots. It is based on the technology of Projekt ARES, but does not require a video projector, and instead allows the user to define any target within the camera images. Thus, objects can be turned into targets or shots at suspended targets can be evaluated.

Before the training can begin, the camera must be set up and the targets defined. The two required setup menus as well as the game menu can be activated with the three buttons in the upper right corner. The corresponding menu appears on the right side of the screen while the camera image is always visible on the left side.
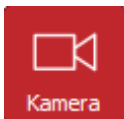
In this menu the cameras can be selected and configured. The available cameras can be found in drop-down menus. Without a license, only one camera can be used at once, while with a license, several cameras can be used simultaneously. By default, a second camera can be selected in the licensed program, but the option for up to 4 cameras can be activated in the Settings menu. However, depending on the computer and cameras used, it is possible that 4 cameras cannot be used simultaneously. The correct setting of the camera is explained later in this manual.
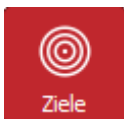
Here the target areas in the camera image can be defined and configured. The targets can be assigned a name and a score. Targets can also have special functions such as starting the game or defining an area to be excluded from laser detection. Without a license the number of targets is limited.

Rectangular, oval and polygonal targets are possible. To add a new target, first click on the corresponding button and then into the camera image. Rectangular and oval targets are defined by clicking and dragging, while polygonal targets are defined by clicking and dragging the corner points. Each left click creates a new corner point and a right click closes the polygon.

Once created, targets can also be changed later. To do this, you must either click on the target or select the corresponding list entry. They are then displayed in green and square handles appear at the corners and round handles in the middle of the edges. By left-clicking on the corresponding handle points, the corresponding corners or edges can be moved. There is also a button to automatically create a series of concentric circle targets.

Once created, targets can also be changed subsequently. To do this, they must be selected either by clicking on the target or the corresponding list entry. They are then displayed in green and square handle points appear at the corners and round ones in the middle of the edges. By left-clicking on the corresponding handle points, the corresponding corners or edges can be moved.

In addition, there is a possibility to define an area in which a ring target is evaluated automatically corrected. This is described in a separate chapter.

For polygon targets and rectangular targets the number of corners can also be changed. A right click on a corner removes it, creating a new edge between the adjacent corners. A double click on an edge center creates a new corner at this point which can then be positioned.

By clicking in the center of a target, it can be moved as a whole.

Once a target is selected, it can be removed by pressing the delete key or the corresponding button. It can also be duplicated by clicking a button and the duplicate will appear exactly over the selected one.

It is also possible to select multiple targets at the same time. This can be done either by holding down the CTRL key while selecting or by drawing a frame around the corresponding targets. These can then be moved as a group, scaled, deleted or duplicated.

Targets can also overlap. If a point is hit that is located in several targets, the target that is higher up in the list of targets is always considered to be hit. The position of the targets in the list can be changed by clicking and dragging. For a typical target consisting of concentric circles, it is important that the target that defines the innermost circle is at the top of the list and then the larger circles follow in order.
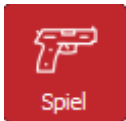
In the game menu the game type can be selected and a shot number can be chosen. The target game continues until all shots have been fired. The time game is also finished when all targets have been hit at least once. For both games the game duration and the score is displayed. There is also a list containing the data for each shot.

The game is started either by clicking on the Start button or by a laser shot at a target previously defined as a start button. When the target is hit, the start signal sounds immediately and the game begins.
In the case of the time game, however, a reloading sound is heard first and the text "wait" is written on the button. After a random waiting time between one and two seconds the start signal sounds and the game starts. If you shoot within the waiting time, this is considered an early start and the game is finished. This is the same behaviour as the game with the plate targets in Projekt ARES.

SETUP OF THE CAMERA AND THE LASER DETECTION

After a camera has been selected, the laser detection must first be set. A click on the button below the camera selection opens the corresponding window.

In this window you can see the camera image. In the Display field you can select whether it should be displayed in color or black and white. The third option "Laser" shows the evaluation of the laser detection. Here the whole image should be black and the places where a flash of light was detected should flash red. In addition, two circles are displayed showing the minimum and maximum size that such a flash of light have to be evaluated as a laser shot.

The brightness threshold is relevant for laser detection. It indicates from which brightness a flashing spot is recognized as a laser shot. The threshold has to be set in a way that the display bar never moves further than the slider for an image without laser and that it does so for a laser shot.

Laser detection can be significantly improved by using a red filter foil in front of the camera, which suppresses extraneous light. Since the laser detection reacts to changes in brightness, it may not be necessary to use a foil for a still image. If, however, movements in the camera image are to be expected, it is indispensable.

The two parameters for shot detection indicate how large or small a bright spot must be to be considered a laser shot. This can be used to suppress any image noise in the camera sensor or stray light. Usually the default values should be used. Otherwise it helps to display the laser detection evaluation to determine the correct size.
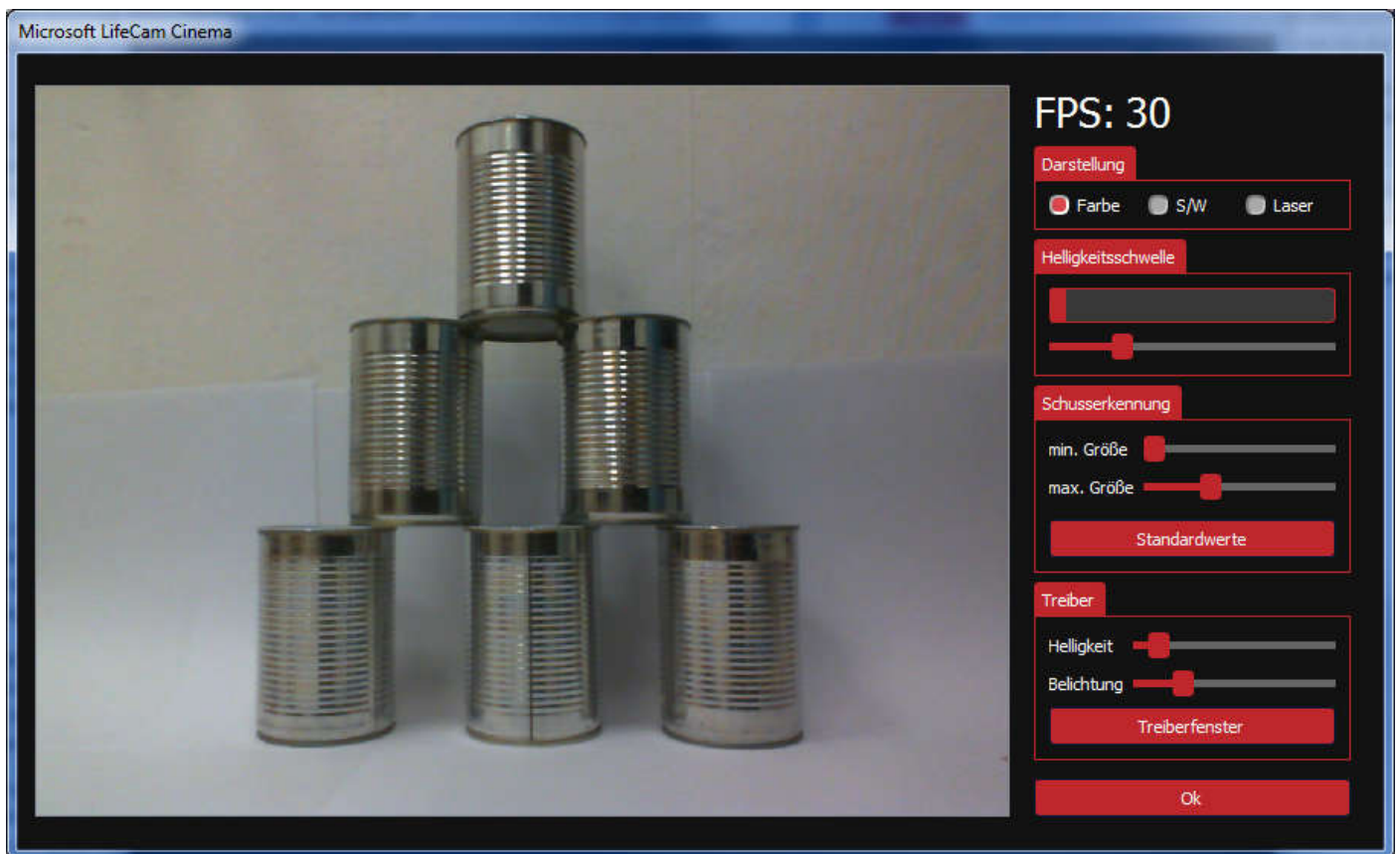
If there is always interference at a certain position in the image, for example because a blinking light of an electrical device is visible, a target can be placed in this area which is configured as an area to be ignored. Light events in these areas are ignored by the program.

Important for laser detection are the camera settings of brightness and exposure time. However, the two sliders only work if the automatic brightness or exposure control of the camera is disabled. The Driver Settings button opens the camera-specific driver menu where these functions can be disabled. However, there are also cameras that do not provide an option to disable the automatic control. These cameras are only badly or not at all suitable for ARES Realworld. Especially if a color filter is used that darkens the whole image, automatic control can cause the exposure time to increase dramatically and thus the frame rate drops to low for a smooth game. Brightness and exposure should be adjusted so that the frame rate, which is displayed in the upper right corner, is as high as possible, even if this may make the image appear dark.

The settings of the camera are saved when saving and the program tries to restore them when loading the settings. However, there may be cameras that reactivate the automatic brightness and exposure settings each time the system is rebooted. This must be deactivated after each start of the program.

SAVE, LOAD AND SETTINGS

Links oben befinden sich die Buttons zum Speichern und Laden und für allgemeine Einstellungen.

Neu — Deletes all targets.
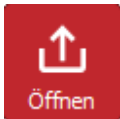
Öffnen — Opens a configuration file with the extension ".arw". It contains target definitions, game and camera settings and general settings. If a file with the name "Realworld.arw" exists in the main program directory, it will be opened automatically at program start.

Speichern — Saves all settings to a file. If you give it the name "Realworld.arw", it will be loaded automatically at the next program start

Einstell. — Opens a configuration file with the extension ".arw". It contains target definitions, game and camera settings and general settings. If a file with the name "Realworld.arw" exists in the main program directory, it will be opened automatically at program start.
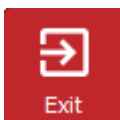
PDF-Tool — Opens the target generator

Fullscr. — change to fullsceeen mode

Windowed — change to windowed mode

Exit — exit programm

TARGET GENERATOR UND AND CORRECTED EVALUATION OF RING TARGETS

In ARES Realworld there is a target generator and the possibility to display a target created with it instead of the camera image. The target editor is started via the button "PDF-Tool". It offers many possibilities to create a document with different ring targets and to save it as PDF so that it can be printed.

Besides many parameters that determine the appearance of the targets, there is also the option to show position crosses. These are created exactly in the corners of the enclosing square and are used to position the target area for "Corrected Rings ". Their function is illustrated in the following example.

First, a target is generated with the target generator and printed out, whereby the position crosses are also activated. It should be mentioned that the procedure only supports a single target, although the target generator can also generate sheets with several targets arranged in a grid.

The target is then placed and the camera is aligned so that it is well in the picture and all position crosses can be seen.

Now a target for " Corrected Rings " is generated in the program in the targets menu. It is a rectangle where each of the four corners can be moved, but unlike the polygon target, no corner can be added or removed. These four corners are then moved to the position crosses in the camera image. Once this is done, ARES Realworld can now calculate the position of each ring.

The target object for rectified rings has a few special features compared to the normal targets. There may be a maximum of one of these objects and it cannot be renamed.
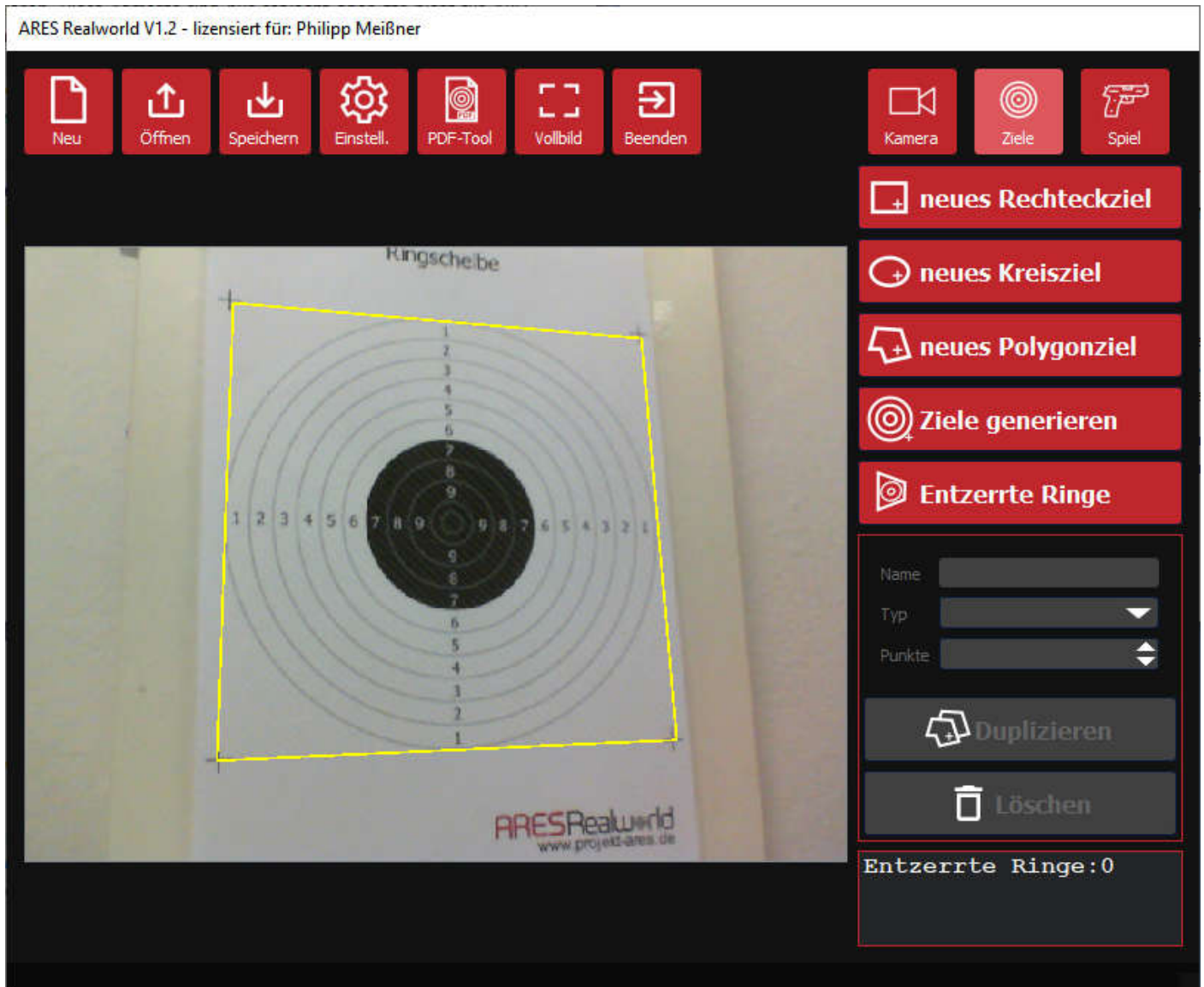
Once you have created a target object for rectified rings, the option to display a target instead of the camera image opens up in the game menu. This looks similar to the one that can be created in the target generator for printing and there are some options to change the appearance, especially the number of rings.
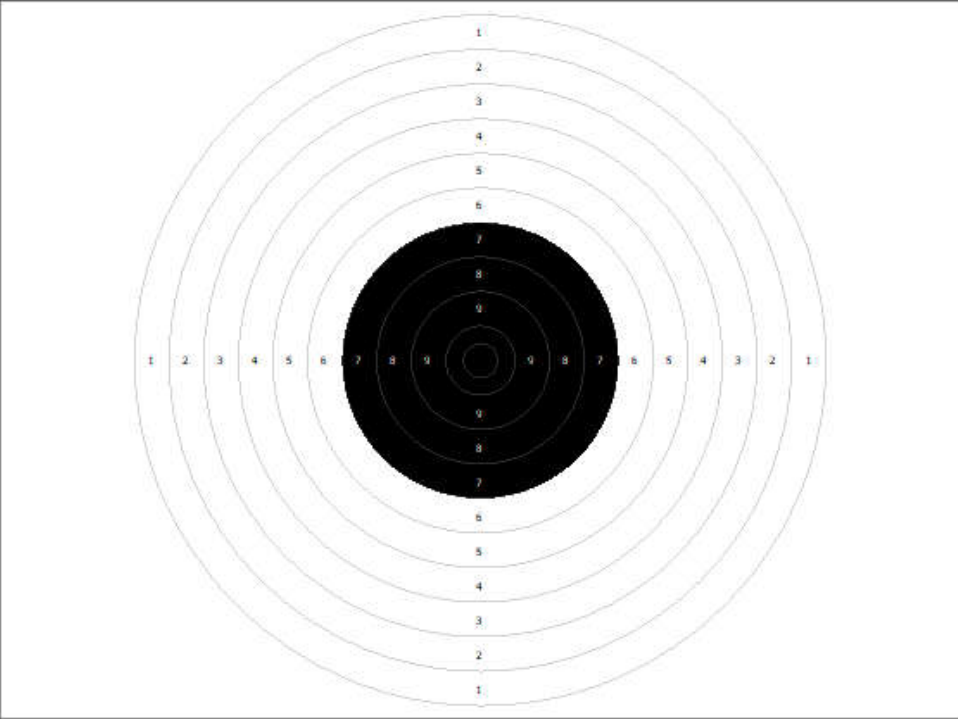
If this target display is active, all detected hit positions are converted and displayed on the target in their correct position. Likewise, the scored points of the hits are calculated, and their size is included in the calculation. The size of the hits can be changed in the settings.

In the target display only the game mode "Targets" can be selected but not the time game mode.

Targets configured as start buttons still work in this mode, even if they are no longer visible.