ROBOTICS & DISCRETE AUTOMATION

RobotStudio® AR Viewer
User Manual

Contents

PREPARED		STATUS	SECURITY LEVEL		
2021-03-22	Marcin Walus	Approved	Public		
APPROVED		DOCUMENT KIND			
2021-03-22	Ekhi Laniesse	User manual			
OWNING ORGANIZATION		DOCUMENT ID.	REV.	LANG.	PAGE
Robotics & Discrete Automation		9AKK107680A3308	E	en	1/20

Introduction

1.1.   What is RobotStudio® AR Viewer mobile app?

The RobotStudio® AR Viewer mobile app allows you to view the portfolio of ABB robots and robot solutions in augmented reality (AR). It also enables to view your own simulations in AR prepared in the ABB RobotStudio® desktop app.

The RobotStudio® AR Viewer app can be used to get an idea of the size and scale of a robot or robot cell, and how it can be deployed on a factory floor to fit around any existing production equipment.

1.2.   How do I get RobotStudio® AR Viewer mobile app?

You can download the RobotStudio® AR Viewer mobile app for free from Apple App Store, Google Play Store and HUAWEI AppGallery (for Android users in China).

1.3.   Which devices does RobotStudio® AR Viewer support?

You can install RobotStudio® AR Viewer on a mobile device that has iOS/iPadOS or Android operating system. To be able to view robots and robot solutions in augmented reality, your mobile device should support ARCore (for iOS/iPadOS) or ARKit (for Android) services. The table below presents more specific device requirements.

iOS, iPadOS

Minimum system version	13.0
Devices	iPhone, iPad
ARKit-enabled devices	https://www.apple.com/augmented-reality/

Android

Minimum system version	8.0 (Oreo)
Devices	phone, tablet
ARCore-enabled devices	https://developers.google.com/ar/discover/supported-devices#google_play_devices

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	2/20

Application overview

The RobotStudio® AR Viewer interface consists of five tabs: Robots, Solutions, My Solutions, Downloads and Side menu.

Image – Main page view

2.1.   Robots

This tab contains the ABB robot portfolio with the accompanying information. You can download each robot model version and visualize it in augmented reality.

–   Tap on the selected robot to access the information about it. You can find the robot versions displayed at the bottom of the selected robot. You can download a robot version by tapping on it. The green icon next to the robot version indicates that robot model has been successfully downloaded. Once the robot model is downloaded, tap on it to visualise it in augmented reality. Please refer to "Working with simulations" section in this user manual for instructions and tips for viewing simulations in augmented reality.

–   You can cancel a download in progress by tapping a download progress icon ⟳2 in the upper right corner and selecting "Cancel all" option.

–   You can filter the robot portfolio list by using the funnel icon ▼ in the upper right corner. Tap "Apply" to set the selected filters. The red dot next to the funnel icon indicates that the filter has been applied. You can clear out the applied filters by going back to the filter menu options and tapping the "Reset" button.

Tip: If you are going to be in a location that has no internet connectivity, download robot models in advance, so they will be available offline.
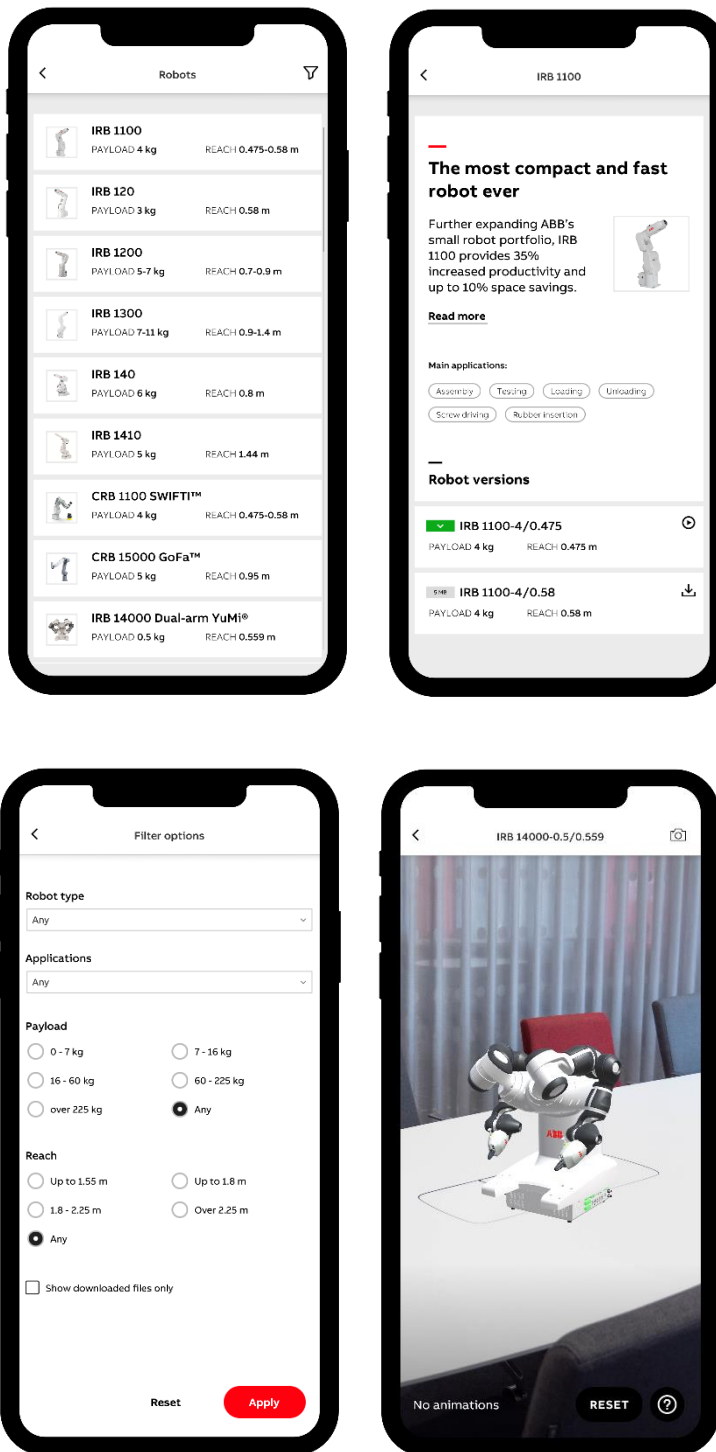
STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	3/20

Image 1 – Robot portfolio page
Image 2 – Robot details page
Image 3 – Robots filtering options
Image 4 – Robot visualization in augmented reality

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	4/20

2.2. Solutions

This tab contains the ABB robot solutions portfolio with the accompanying information. You can download each robot solution and visualize it in augmented reality.

– Tap on the selected robot solution to download it. The green icon on the robot solution preview photo indicates that the robot solution has been successfully downloaded. Once the robot solution is downloaded, tap on it to visualise it in augmented reality. Please refer to "Working with simulations" section in this user manual for instructions and tips for viewing simulations in augmented reality.

– You can cancel a download in progress by tapping a download progress icon ⟲2 in the upper right corner and selecting "Cancel all" option.

– You can filter the robot solutions portfolio list by using the funnel icon ▼ in the upper right corner. Tap "Apply" to set the selected filters. The red dot next to the funnel icon indicates that the filter has been applied. You can clear out the applied filters by going back to the filter menu options and tapping the "Reset" button.

Tip: If you are going to be in a location that has no internet connectivity, download robot solutions in advance, so they will be available offline.

Image 1 – Robot solutions portfolio page
Image 2 – Robot solutions filtering options
Image 3 – Robot solution visualization in augmented reality
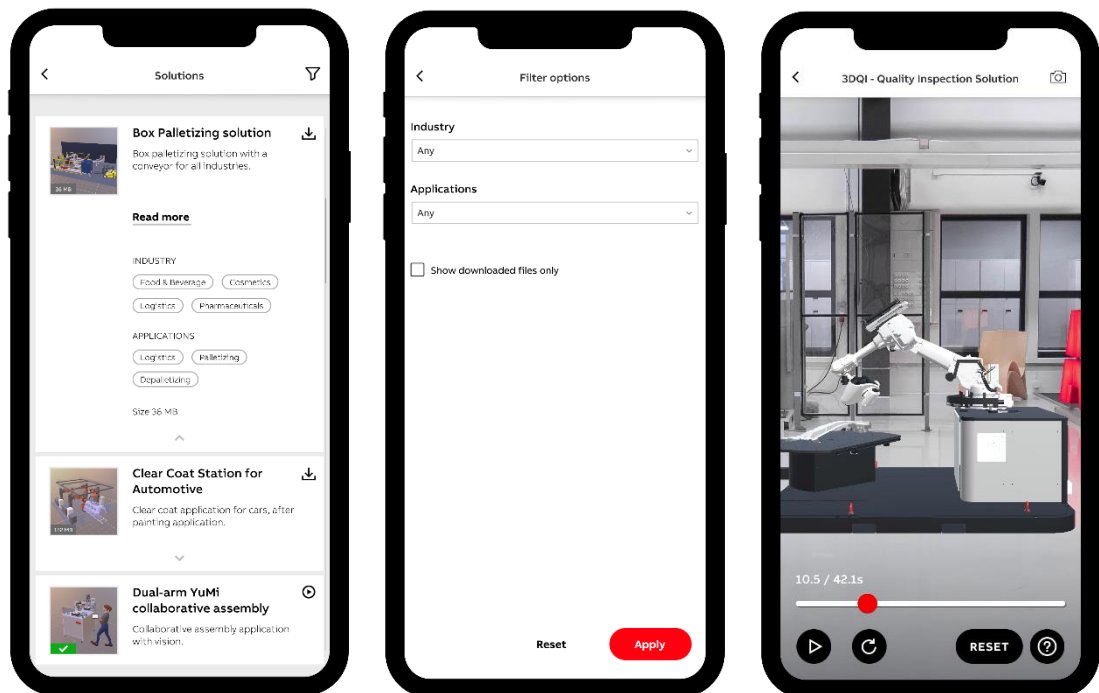
2.3. My Solutions

This tab contains the list of simulations imported by you. You can import a simulation prepared in the ABB RobotStudio® desktop app and saved in GLB file format. Please refer to "Exporting stations and simulations as GLB files" section in this user manual for the instructions how to export a simulation as GLB file using the ABB RobotStudio® desktop app. Once exported, transfer your simulation in GLB file format to your mobile device to be able to view it in augmented reality using RobotStudio® AR Viewer mobile app.

To view your own simulation in the app, tap on the plus red button + to import a new simulation from a person cloud. Once the simulation is imported, tap on it in order to display it in augmented reality. You can delete the imported simulations using the bin icon 🗑 in the upper right corner.

Image 1 – Import a new simulation view
Image 2 – Personal simulation visualization in augmented reality
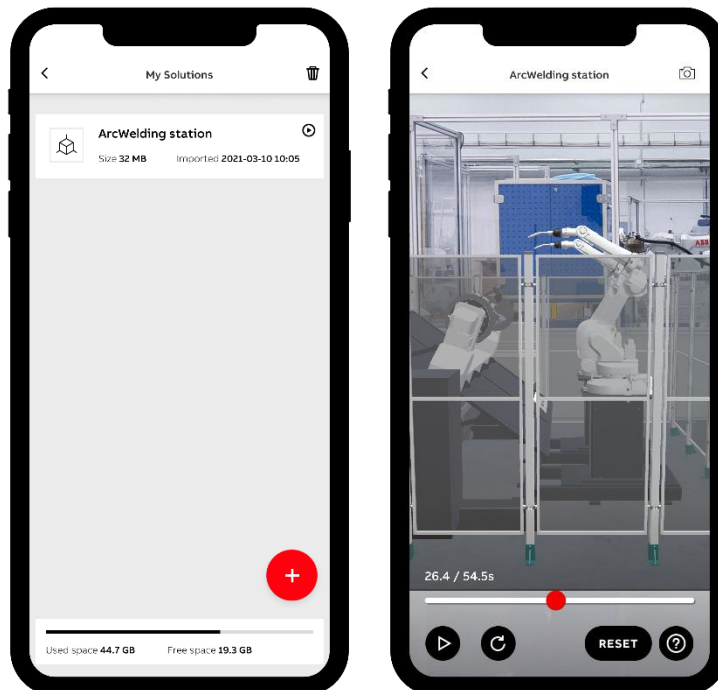
2.4. Downloads

The Downloads tab contains the robots and robot solutions that you either downloaded from the app or imported to the app by yourself. Also, the files which download was cancelled or failed, will also be displayed in this section with the respective information tag. You can delete the files in the Downloads section one by one, by category using the filters option, or all at once using the bin icon 🗑 in the upper right corner.

Image 1 – Downloads view
Image 2 – Downloaded files filtering options
Image 3 - Deleting downloaded files
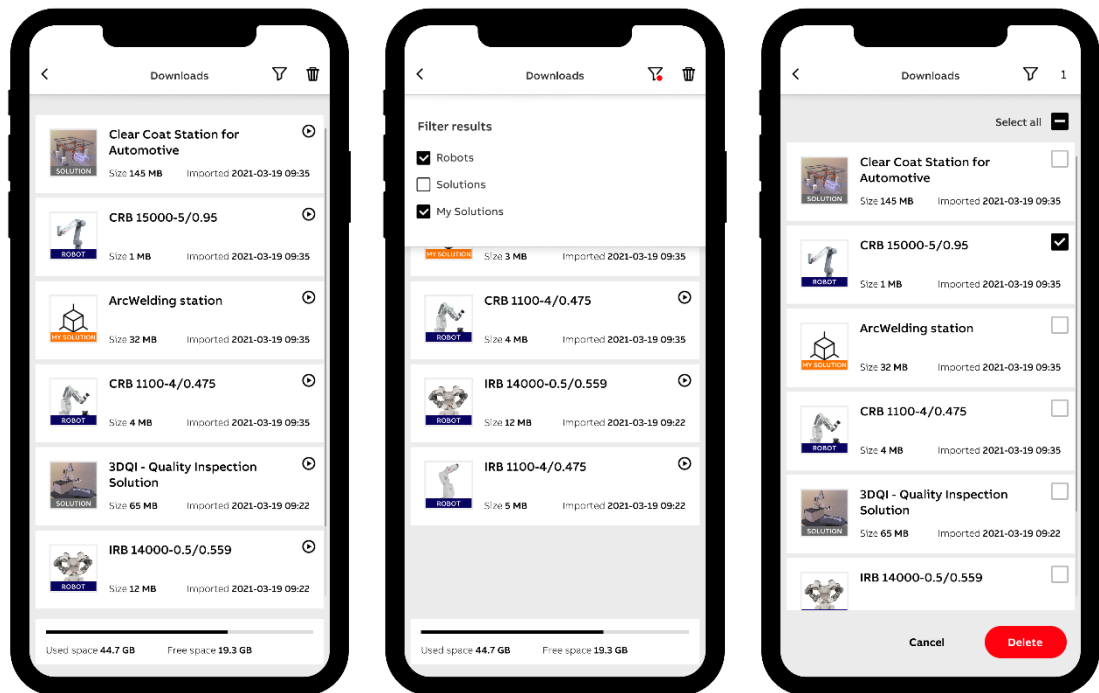
2.5. Side menu

The Side menu tab consists of four sections: Help, Acknowledge-ments, Privacy Policy and About. You can access the Side menu tab in the upper left corner.

– Help section contains the link to this user manual and a link to a forum where you can raise technical questions regarding the app.

– Acknowledgements section includes acknowledgments for the third parties whose software has been used in RobotStudio® AR Viewer app.

– Privacy Policy section specifies what personal data is collected by the app, along with information how the data is processed and for what purposes.

– About section shows the version of the app and specifies the contacts to raise business related questions.

Image – Side menu view
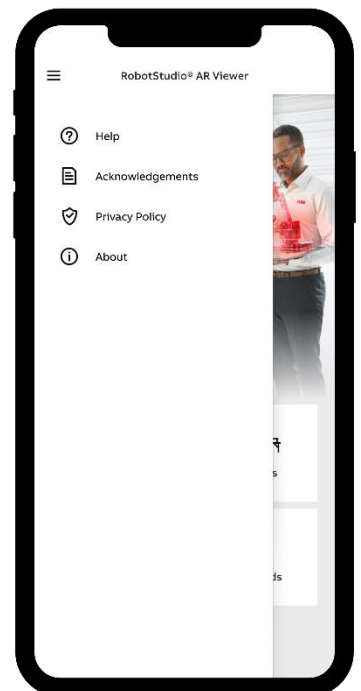
STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	7/20

Exporting stations and simulations as GLB files

3.1. How to export a station as GLB file

To export a station designed in the ABB RobotStudio® desktop app, use "Save Station as Viewer" feature.

– Open or create a station, add graphic components.

– Click "File" tab (1), select "Share" (2) and then "Save Station as Viewer" button (3).
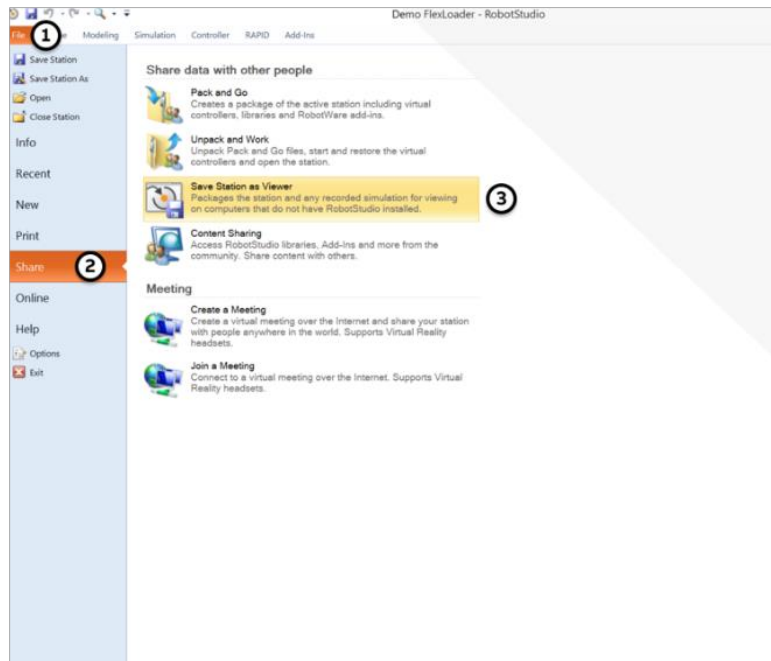
– In "Save As" dialog set "Save as type" option (1) to "glTF files (*.glb)". Confirm by clicking "Save" button (2).

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	8/20
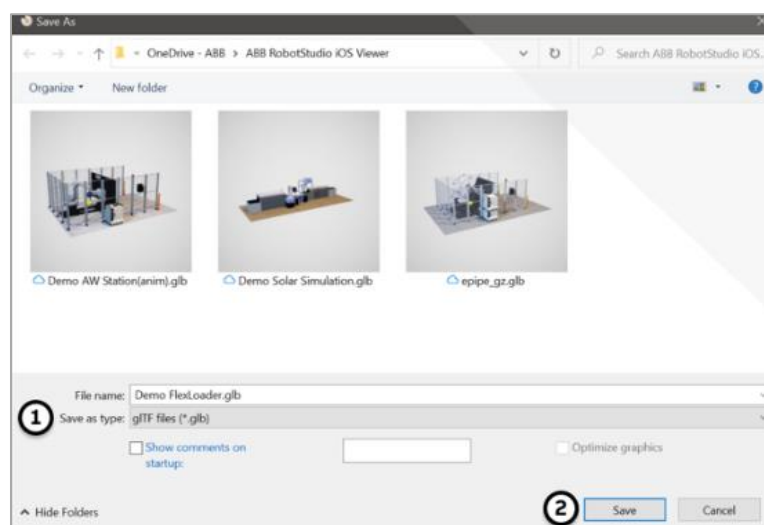
3.2.   How to export a simulation as GLB file

To export a simulation (with animations) designed in the ABB RobotStudio® desktop app, use "Record to Viewer" feature.

- Open or create a station with a virtual controller, and program a path.
- Click on "Simulation" tab (1) and click down arrow in Play button (2). Select "Record to Viewer" option from the drop-down menu (3).

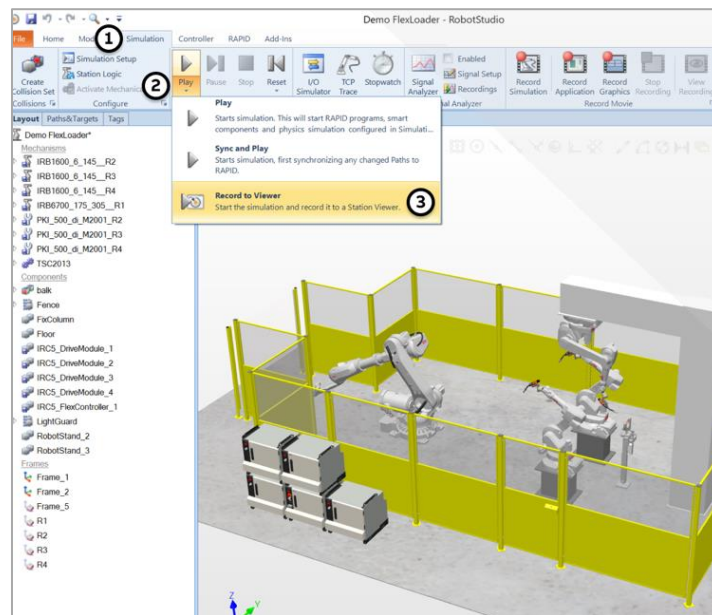

- After playing a simulation, in "Save As" dialog set "Save as type" option (1) to "glTF files (*.glb)". Confirm by clicking "Save" button (2).

3.3.   How to export a simulation as GLB file including SafeMove geometries

- Open or create a station with virtual controller and SafeMove 2 option.
- Click on "Controller" tab and click "Safety" button to open "Visual SafeMove" tab.
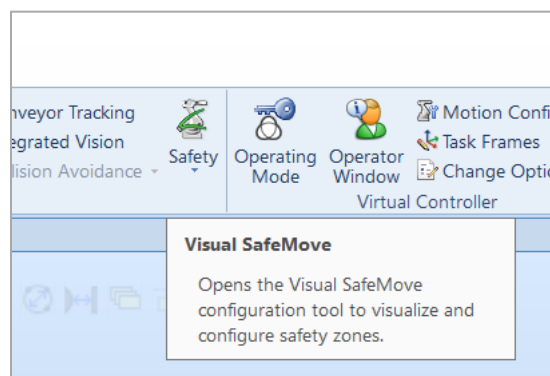
– Configure the safety volumes.
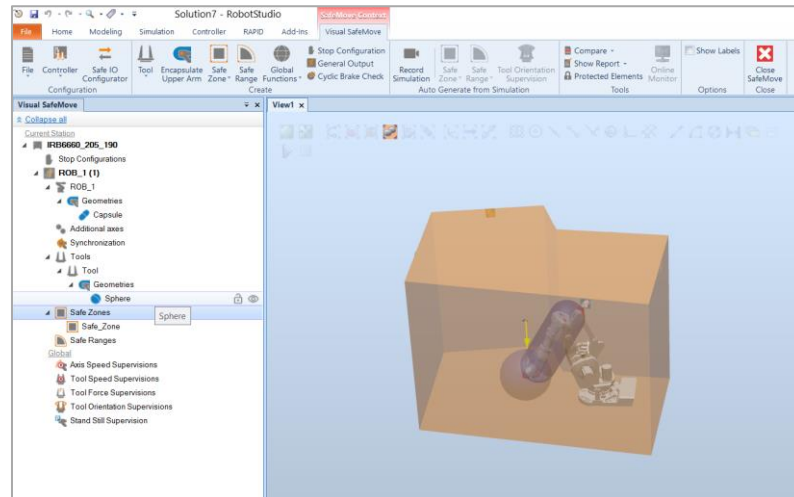
– Keeping the "Visual SafeMove" tab open, go to "Simulation" tab and click down arrow in Play button. Select "Record to Viewer" option from the drop down menu.
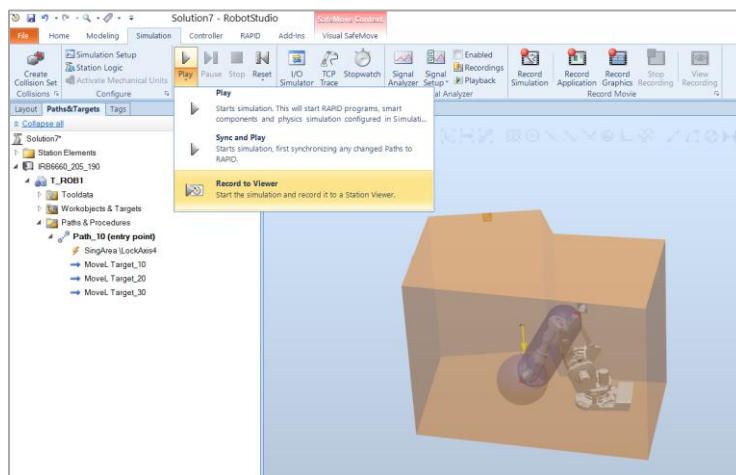
– After playing a simulation, in "Save As" dialog set "Save as type" option (1) to "glTF files (*.glb)".

– Check the options "Include SafeMove Geometries" and "Include SafeMove Zones". Confirm by clicking "Save" button (2).
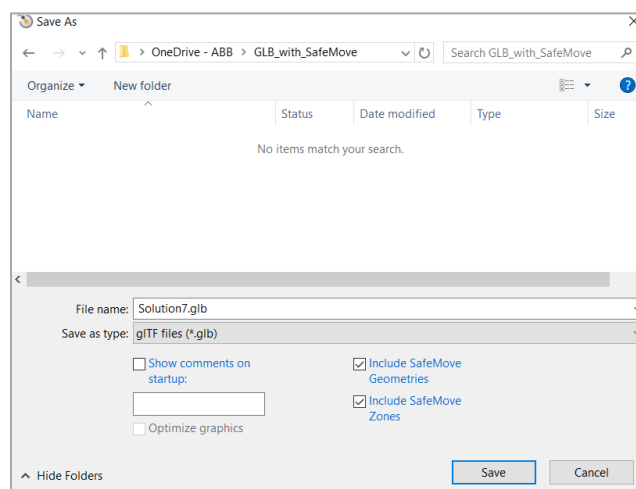
STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	10/20

3.4.   Tip: Optimize your GLB file

Optimize your GLB file, so it imports faster and displays smoother in the app. Optimization could be done by reducing 3D graphics (number of triangles), reducing textures, shortening cycle time, and removing invisible graphic components.

Optimization should be done in the RobotStudio desktop app before exporting file in GLB.

- In "Home" tab, right click on a graphic component object of the station layout and click "Modify" and "Graphic Appearance".
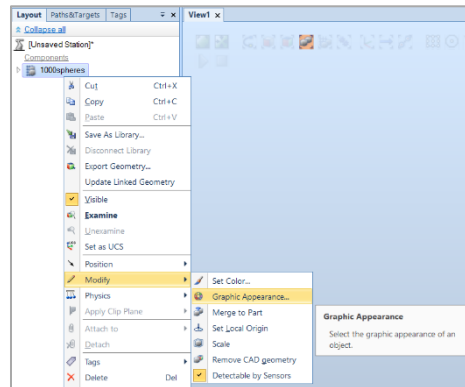
- In the "Graphic Appearance" window, click "Properties" and "Optimize Graphics". The number of faces, vertices, and the size should reduce.
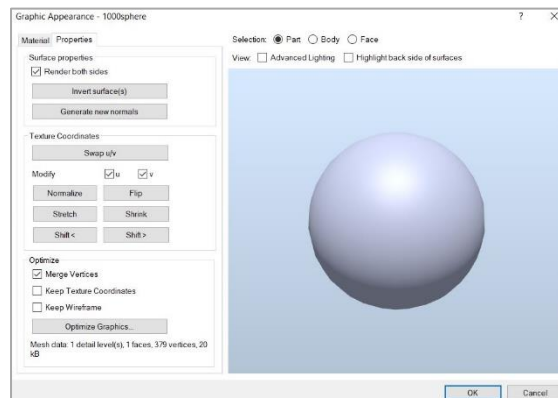
- This operation can be repeated with all graphic components of the station.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	11/20

Working with simulations

4.1.   How to visualize a simulation in augmented reality

Steps to view a simulation:

1. Move your phone and point toward a flat surface, e.g. the floor.

2. When the surface gets detected, a red circle will indicate a place where a simulation will be placed.

3. Tap the screen to place the simulation loader.

4. After the simulation gets loaded, it will be displayed in the selected spot.

Note: A surface might not be recognized if it does not have any texture (e.g. white wall) or if it is transparent (e.g.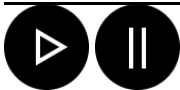 glass). Also, excessive motions (e.g. moving the camera too fast or shaking), too dark or too bright environment might hinder accurate surface detection.

4.2.   Simulation display options

After loading a simulation, the additional buttons are displayed at the bottom of the screen.

Button	What it means	What it does
▶ ⏸	Play/Pause animation	Allows to play/pause animation in a simulation
↻	Reset animation	Allows to reset animation to the initial state
⃝?	Available touch gestures	Shows the available touch gestures to interact with a simulation. You can move, resize, rotate and lift a simulation
RESET	Reset a simulation to the initial position	Allows to restore a simulation original position, rotation and zoom level

Note: The buttons to control animations are displayed only when the loaded simulation contains the animation. The "Reset" button appears only after you changed simulation position or size.

Tip: Tap in centre of the screen to hide the top bar and the buttons at the bottom. Tap again to bring back the top bar and the buttons at the bottom.

4.3.   Simulation control gestures

Below are the available touch gestures:

Gesture name	How to perform a gesture	What it does
Move	Slide with one finger horizontally	Move sideways
Lift	Slide with two fingers vertically	Lift up and down
Resize	Spread two fingers apart Pinch two fingers together	Zoom in Zoom out
Rotate	Rotate with two fingers	Rotate in the direction you move your fingers

When you are resizing a simulation, a notification will appear on the screen showing what percent scale the simulation is. The 100 percent scale indicates true size.

Note: You cannot use more than one gesture at a time.

Taking photos and recording videos

The app allows to take photos and record videos of the loaded simulation. Tap camera button 📷 in upper right corner to switch to camera mode. Tap the close button ✕ in the upper right corner to close camera mode.

Image 1: Viewer with camera button
Image 2: Camera mode/Photo mode
Image 2: Camera mode/Video mode
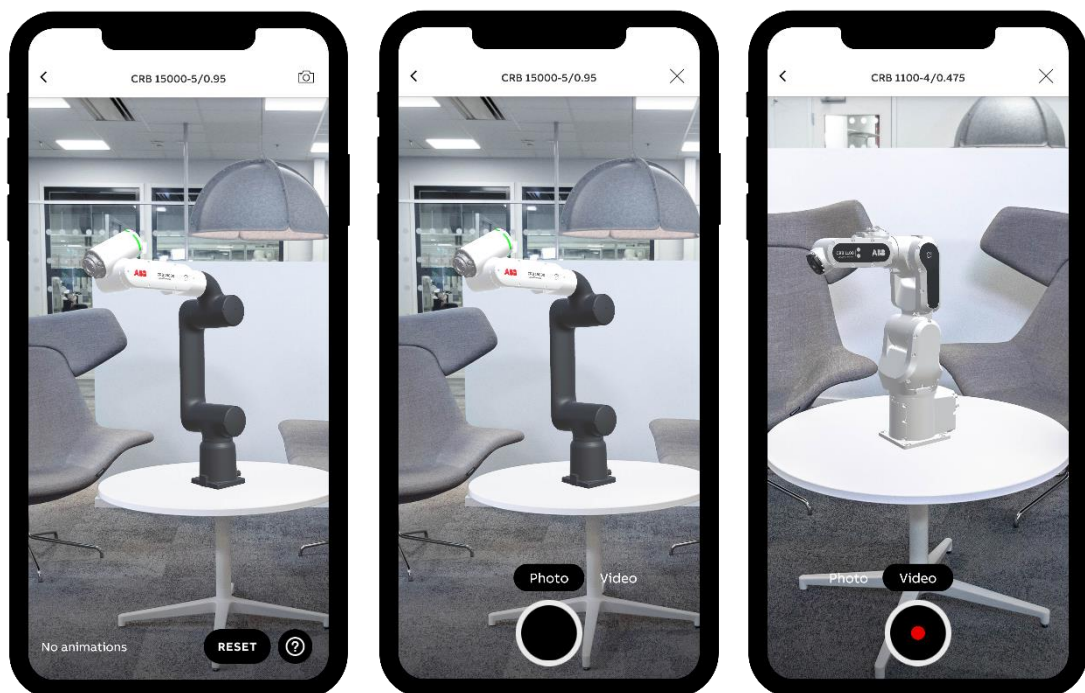
Taking photos: In camera mode tap the "Photo" button to take a photo of the current view. After the processing, a screenshot dialog is displayed with option to share the taken photo or to resign. Tap the "Share" button on dialog to display the system's share panel. You can share the photo using social media app or save it to any cloud drive provider (e.g., OneDrive).

Recording videos: In camera mode tap the "Video" button to start recording. The video recorder captures the full screen. Tap on the screen in order to finish video recording. After processing, the video system share panel is displayed. You can share the video using social media app or save it to any cloud drive provider (e.g., OneDrive).

Image: Photo share dialog

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	14/20
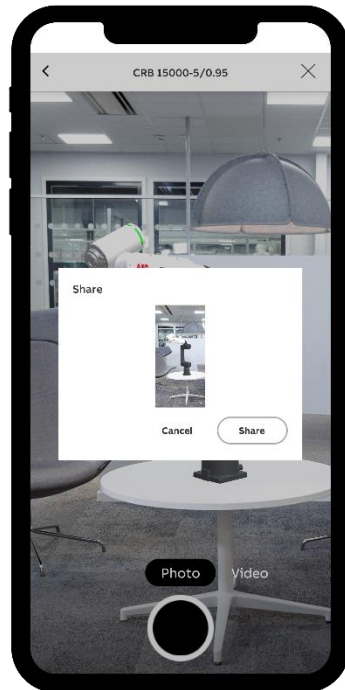
Our commitment to privacy and security

We protect the privacy of users in our app using technical and organizational measures. We respect all data-protection laws, and our approach is detailed in the Privacy Policy.

RobotStudio® AR Viewer has been thoroughly tested and assessed for security vulnerabilities by security professionals in the company. The extensive security assessments of the RobotStudio® AR Viewer mobile application showed that the app delivers on our promise of protection and transparency: no suspicious behaviors or functions.

Some of the RobotStudio® AR Viewer application functionalities require an access to the Internet. It is your sole responsibility to ensure a secure connection between the RobotStudio® AR Viewer application and network.

What is GLB file extension and why we use it

RobotStudio® AR Viewer makes use of the widely available Graphics Library Transmission Format (glTF) to store model data. For 3D user experience, the app displays simulations stored in GLB file format. The GLB format works well for augmented reality because it supports both motion and animation.

The GLB and glTF formats were developed by Khronos Group in 2015. GL Transmission Format (glTF) is an open-source 3D file that supports static models, animation, and moving scenes. GLB is a binary version of glTF. Khronos promotes the GLB and glTF formats as the JPEG of 3D. Many of the most popular 3D modeling products used by engineering and marketing teams already support this format. You can read more details on their website: https://www.khronos.org/gltf/

Acknowledgements

Component
AppCenter: https://github.com/Microsoft/AppCenter-SDK-Unity-Extension
License: MIT License
Visual Studio App Center SDK for Unity Editor Extensions
Copyright (c) Microsoft Corporation. All rights reserved.

Permission is hereby granted, free of charge, to any person obtaining a copy of this soft-ware and associated documentation files (the "Software"), to deal in the Software without re-striction, including without limitation the rights to use, copy, modify, merge, publish, dis-trib-ute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Soft-ware is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or sub-stantial portions of the Software.

THE SOFTWARE IS PROVIDED *AS IS*, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Component
UnityGLTF: https://github.com/KhronosGroup/UnityGLTF
License: The MIT License (MIT)
Copyright (c) 2017 AltspaceVR

Permission is hereby granted, free of charge, to any person obtaining a copy of this soft-ware and associated documentation files (the "Software"), to deal in the Software without re-striction, including without limitation the rights to use, copy, modify, merge, publish, dis-trib-ute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Soft-ware is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or sub-stantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Component
Json.Net: https://github.com/jilleJr/Newtonsoft.Json-for-Unity
License: The MIT License (MIT)
Copyright (c) 2019 Kalle Jillheden (jilleJr)

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Component
Unity3dAsyncAwaitUtil: https://github.com/svermeulen/Unity3dAsyncAwaitUtil
Licence: MIT License
Copyright (c) 2016 Modest Tree Media Inc

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Component
UnityNativeShare: https://github.com/yasirkula/UnityNativeShare
Licence: MIT License
Copyright (c) 2017 Süleyman Yasir KULA

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish,

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	9AKK107680A3308	E	en	17/20

distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Component
DiskUtils: https://github.com/dkrprasetya/simple-disk-utils
Licence: MIT License
Copyright (c) 2016 M Dikra Prasetya

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Component
LeanTween: https://github.com/dentedpixel/LeanTween
Licence: The MIT License (MIT)
Copyright (c) 2017 Russell Savage - Dented Pixel

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY,

WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

TERMS OF USE - EASING EQUATIONS
Open source under the BSD License.
Copyright (c)2001 Robert Penner
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

Neither the name of the author nor the names of contributors may be used to endorse or promote products derived from this software without specific prior written permission. THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Revisions

Rev.	Description	Date Dept./Init.
A	User manual created	2020-02-06
B	User manual updated to application version 1.1	2020-06-30
C	Extended section on how to export GLB file	2020-07-31
D	User manual updated to application version 2.0	2021-03-19
E	Supported devices links updated	2021-03-22