Release Notes

Intel® RealSense^{TM} SDK Release

F200 Gold
R200 Gold
SR300 Gold

SDK version 10.0.26.0396

These release notes covers Intel® RealSense™ SDK for use with Intel® RealSense™ Camera, model F200, R200, and SR300. Please review the **"Intel RealSense SDK License.rtf"** for licensing terms. Please refer to attributions.rtf for third party attributions and third_party_programs.txt for third party licenses.

IMPORTANT! PLEASE READ!

- This release supports 3 cameras:
  - The **Intel® RealSense™ Developer Kit (F200)**, which can be ordered on the Intel RealSense Website (https://software.intel.com/en-us/realsense/devkit)
  - The **Intel® RealSense™ Developer Kit Camera (R200)**, which can be ordered on the Intel RealSense Website (https://software.intel.com/en-us/realsense/devkit)
  - The **Intel® RealSense™ Developer Kit Camera (SR300)**, which can be ordered on the Intel RealSense Website (https://software.intel.com/en-us/realsense/devkit)
- This package is the Software Development Kit. It does not include the driver/service (DCM) for the camera. Please download the Camera Driver / DCM Package from the Intel RealSense downloads website.
  - F200 Camera: DCM version 1.4.27.41944 or later
  - R200 Camera: DCM version 2.1.24.9476 or later
  - SR300 Camera: DCM version 3.1.25.1077 or later
- If installer requests that you reboot, **please reboot**, or your system will not install correctly.
- F200 Camera OS:
  - Microsoft* **Windows* 8.1 x64 August Update required**.
  - **Microsoft* Windows* 10 Threshold 2**
- R200 Camera OS:
  - Microsoft* **Windows* 8.1 x64 August Update required**.
  - **Microsoft* Windows* 10 Threshold 2**
- SR300 Camera OS:
  - **Microsoft* Windows* 10 Threshold 2**

Contents

SDK Features

Please note that SDK features are at various levels of maturity in this release as follows:

Maturity	F200 Feature	R200 Feature	SR300 Feature
Gold	• SDK essential interfaces and color/depth/IR data streaming • Face Tracking • Hand Tracking • Speech Recognition and Synthesis • Unity* Toolkit • Object Tracking • 3D Scan (except Object) •	• SDK essential interfaces and color/depth/IR data streaming. • Speech Recognition and Synthesis • 3D Scan (except Object) • Scene Perception • Enhanced Photography (except: Measurement and Tracking)	• SDK essential interfaces and color/depth/IR data streaming • Speech Recognition and Synthesis • Hand Tracking: Cursor Mode • Background Segmentation
Beta	• RealSense Web Support • Blob Tracking • Touchless Controller • 3D Scan (Object) • Background Segmentation	• RealSense Web Support • Face Tracking • Blob Tracking • 3D Scan (Object)	• RealSense Web Support • SDK UWP Support • Face Tracking • Blob Tracking • Hand Tracking • Touchless Controller • 3D Scan
Alpha			
Preview	• Java* language and Processing* framework support	• Person Tracking • Object Recognition • EP Measurement, EP Tracking, EP Real-time depth enhancement	• Person Tracking • EP Measurement

Hardware Requirements

- 4th Generation Intel® Core™ Processor (code name Haswell), or later. Core i5/i7 recommended.
- 8 GB free hard disk space
- The Intel RealSense Camera
    - o F200 PRQ Camera
    - o R200 Camera
    - o SR300 Camera
- The Intel RealSense Camera may have known defects and errata which will be provided with the product.
- A USB 3 port for the Intel RealSense Camera.

    IMPORTANT NOTE: To support the bandwidth needed by the camera, a **USB3** interface is required.

Software Requirements

- One of the following operating systems:
    - o F200 Camera OS:
        - ▪ Microsoft* Windows* 8.1 x64 August Update required
        - ▪ Microsoft* Windows* 10 Threshold 2
    - o R200 Camera OS:
        - ▪ Microsoft* Windows* 8.1 x64 August Update required.
        - ▪ Microsoft* Windows* 10 Threshold 2

- o SR300 Camera OS:
  - ▪ Microsoft* Windows* 10 Threshold 2
- Microsoft Visual Studio* 2010-2015 with the latest service pack or update
- Microsoft .NET* 4.0 Framework for C# development
- Unity 5.2.3.p3 or later for Unity game development
- Processing* 2.1.2 or higher for Processing development
- Java* JDK 1.7.0_11 or higher for Java development
- Any of the following browsers for JavaScript* development:
  - o Microsoft Internet Explorer* 11.0.9600
  - o Microsoft Edge* 20.10240.16384.0
  - o Google* Chrome* 42.0.2311
  - o Mozilla* Firefox* 37.0
- Intel® Iris™ and HD Graphics Driver for Windows* 10/8.1 64-bit
  - o Please install the latest drivers appropriate for your system
- R200 Only:
  - o OpenCL™ 1.2 required for the Scene Perception and Enhanced Photography & Videography modules.

* OpenCL and the OpenCL logo are trademarks of Apple Inc. used by permission by Khronos.

Installation steps for SDK

This is for developer systems ONLY
- Remove any previous SDK packages. Cleanup the destination directory if needed.
- **Reboot your computer to allow a complete uninstallation.**
- If not already installed, run the DCM installer(s):
  - o intel_rs_dcm_f200_1.4.27.41944.exe or later for the F200 camera
  - o intel_rs_dcm_r200_2.1.24.9476.exe or later for the R200 camera
  - o intel_rs_dcm_sr300_3.1.25.1077.exe or later for the SR300 camera
- **Run the SDK offline installer** (intel_rs_sdk_offline_package_r_10.0.26.0396.exe).
- **Reboot your computer again.**

SDK Interface Changes

- SDK 2016 R2:
  - o The PXC[M]Projection interface added the ability to return projection mapping without clipping. See SelectOption.
  - o The PXC[M]VideoModule interface extends ProcessSample, SetProjection and SetGPUExec functions for advanced usages. The SetGPUExec is implemented by the user segmentation algorithm.
  - o The PXC[M]PersontrackingConfiguration/Data interfaces added the following changes:
    - **New**: GestureConfiguration (PersonData), and ExpressionsConfiguration (PersonExpressions).
    - Deprecated the properties field of the configuration interfaces. You can use the functions to configure.

- **New**: Head pose, person orientation, and head bounding box in person tracking.
- The PXC[M]FaceData interface added the following extensions:
  - **New**: The LandmarksGroupType enumerator added LANDMARK_GROUP_RIGHT_EAR and LANDMARK_GROUP_LEFT_EAR.
  - **New**: The RecognitionData interface extends to report top matches. See QueryNumberOfMatches and QueryMatches.
- The PXC[M]EnhancedPhoto interface changes:
  - **New:** exposed a paste on surface feature to paste stickers on surfaces rather than planes.
  - **New:** Added a multiple sticker support for paste on plane and on surface feature. Added functions AddSticker(), UpdateSticker(), and RemoveSticker().
  - **New:** An ID number is introduced for keeping track of the multistickers. Backward compatibility is preserved if Id numbers are not used in function calls.
  - **New:** A PreviewEnhancedDepth() function is added to preview the enhanced depth map in a video pipeline at every frame before actually applying the enhancement algorithms.
- The PXC[M]CursorData interface added the ResetAdaptiveById function to reset the adaptives.
- The PXC[M]Image interface added the pixel format PIXEL_FORMAT_DEPTH_CONFIDENCE.
- The PXC[M]Capture interface added the stream option: STERAM_OPTION_DEPTH_CONFIDENCE.
- The PXC[M]3DSeg interface changes:
  - **New:** implemented a new SetGPUExec() function that is exposed by the PXC[M]VideoModule for enabling CPU or GPU processing.
- The PXC[M]ScenePerception sample and interface behavior were modified to support following features
  - **Update**: IsGravitySensorSupportEnabled can be called after PXCSenseManager::Init to check if gravity sensor was found on the platform and used for tracking. If gravity sensor was found and no external pose was supplied to SetInitialPose and Reset; the scene perception volume, mesh and voxels will be automatically aligned with gravity.
  - **Update**: IsInertialSensorSupportEnabled can be called after PXCSenseManager::Init to check if inertial sensors (accelerometer 3D and gyrometer 3D) were found on the platform and used for tracking.
  - **Update:** List of supported scene perception stream configurations now includes streams with any sensor settings (gain, exposure, etc.) on depth and color.
  - **Update:** EnableSceneReconstruction can be turned off on first frame and is no longer enforced/enabled automatically. This provides flexibility to skip first frame from integrating in to the mesh, volume and mesh.
  - **Update:** DoReconstruction supports integrating stream in to the mesh, volume and voxel even before passing first frame after creating the module or after calling Reset.
  - **Update:** ExportSurfaceVoxels is now thread safe from tracking and can be run in parallel with tracking.
  - **Update:** Unity RF_ScenePerception was modified to support all available scene perception stream resolutions.
  - **Update:** Unity RF_ScenePerception switched to native rendering which provides ~50%+ performance gain on higher color resolutions (720p & 1080p color).

- **Update:** Unity RF_ScenePerception refactored code to avoid thread contention on obtaining tracking results when tracking is running.
- **Update:** Unity RF_ScenePerception displays hint messages on UI to guide user on how to achieve high accuracy tracking.

o The PXC[M]3DScan configuration was extended with the following properties to address new usages:
- **New**: maxTextureResolution can be used to limit the generated texture size for systems with such constraints.
- **New**: flopPreviewImage can be enabled to horizontally invert the preview image when the SR300 is used as a (world facing) peripheral.
- **New**: useMarker can be used to improve camera tracking when scanning objects with shape self-similarity (e.g. cylindrical shapes). See documentation for usage details.

o The PXC[M]3DScan SetConfiguration returns PXC_STATUS_FEATURE_UNSUPPORTED when using face scanning without landmarks on F200 and SR300. This usage is replaced with face scanning with landmarks (which requires the Face Tracking module), or by using Variable scanning mode with SetArea().

o The PXC[M]3DScan SetConfiguration returns PXC_STATUS_NO_ERROR when using head scanning with an SR300 peripheral camera. In prior releases, this case returned PXC_STATUS_FEATURE_UNSUPPORTED.

o The PXC[M]3DScan configuration was extended with the following properties to address new usages:
- **New**: maxVertices can be used to limit the number of vertices generated in the output mesh for systems with such constraints.

o The PXC[M]Projection interface changes:
- **New**: Added new API SelectOption to select different projection function implementation with specific options.
- **Fixed bug**: Removed incorrect rounding of depth values in QueryVertices API for F200 and SR300 cameras.

- SDK 2016 R1:
o The PXC[M]ScenePerception interface extends the following features:
- **New**: IsGravitySensorSupportEnabled allows users to check if gravity sensor based support is enabled
- **New**: IsInertialSensorSupportEnabled allows users to check if inertial sensor based support is enabled
- **New**: GetVolumePreview allows users extract volume projection, vertices and normals from given pose
- **Bug Fixed**: ExtractPlanes fails (returning error) when using any color stream other than VGA and QVGA
- **Update**: SP_AugmentedRealitySP sample updated to support all streams supported by scene perception. Sample shows how to deal with offset in volume vertices image when color and depth aspect ratios are different

o The PXC[M]EnhancedPhoto interface changes:
- **New:** Added new User Assisted Measurement feature
- Subgrouped the depth refocus (Init & Apply),Motion Effects (Init & Apply), measurement (Euclidean & User Assisted), and depth mask

(computeMaskFromThreshold, ComputeMaskFromCoordinate and Init) into subclasses DepthRefocus, MotionEffects, Measurement and DepthMask respectively.

- **New:** Added new API to perform commonFOVPreview to perform commonFOV in preview mode.
- The PXC[M]Photo interface changes:
    - Renamed QueryColorImage to QueryImage
    - Renamed QueryRawDepthImage is now QueryRawDepth
    - Renamed QueryDepthImage is now QueryDepth
    - **New:** subsampling options to LoadXDM
- The PXC[M]ObjectRecognitionConfiguration interface is extended to configure localization mechanism.

SDK Development Improvements

- Unity
    - XML is provided in Plugins.Managed Directory - Enabled IDE IntelliSense giving Parameter info and Quick info about the interfaces. Information will be refined in future releases.
    - NativeTexturePlugin for updating Unity Texture2D natively using graphics API Direct3D*9, Direct3D*11 and OpenGL*2.0 on Unity 5.2.3.p3 or higher.

F200 Release Notes

The following items apply to the F200 camera.

F200 SDK Features
Gold Features
- SDK essential interfaces
    - Session management
    - SenseManager pipeline programming
    - File recording and playback
- Color and Depth Streaming
    - Read color, depth and IR samples from the camera.
    - Map coordinates among color, depth coordinates, and world coordinates.
    - Recording/playing back device property changes.
- 3D Scan
    - 3D Scan and reconstruction of face
- Face Tracking
    - Default value of SmoothingLevelType in face configuration was changed from 'LANDMARKS_SMOOTHING_LOW' to LANDMARKS_SMOOTHING_MEDIUM'. This change yields a stronger temporal smoothing of the facial landmark points over frames.
- Hand Tracking
    - Full Hand Mode:
        - Easing Calibration - calibration is now achieved in an average time of less than 0.75 seconds.
        - **Fixed Bug:** Calling UnsubscribeAlert during OnFiredAlert used to cause a crash
- Object Tracking
    - RGB+Depth marker-less tracking for 2D objects.

- o Edge-based 3D object tracking.
- o ToolBox: Camera Calibration, creation of object model and configuration files for 3d feature based and edge based tracking
- o Instant 3D tracking (SLAM) feature to create a map of the scene and start tracking automatically.
- o Extensible learning mode for 2D/3D tracking.
- o Map Creation Interfaces
- Speech Recognition and Synthesis
  - o Command And Control
  - o Dictation
  - o Text To Speech
  - o Support for US English, British English, Latin American Spanish, Brazilian Portuguese, Italian, German, French, Japanese, and Chinese Mandarin languages.
  - o Note: Due to large size, speech redistributables will be provided as a separate installer, which will be available on the Intel® RealSense™ Technology developer website.
- Support for Unity* ToolKit
  - o Scripts and prefabs for easy game development for all RealSense capabilities such as face tracking, hand tracking, object tracking and speech recognition.
  - o Samples included to illustrate the use of the scripts and prefabs.
  - o New for the R5 release:
    - ▪ Improved performance (FPS) for Unity* Toolkit.
- Utilities
  - o Fixed Euler angle conversion in a non-default Euler order.

Beta Features
- 3D Background Segmentation
  - o Segment the user from the background (e.g. background removal/replacement)
  - o Usage cues (fading) at near/far extents
  - o Optional callback support for user enter, too close and too far events.
- 3D Scan
  - o 3D Scan and reconstruction of objects
- Blob Module
  - o **Fixed Bug:** Flickering Blob in color segmentation was fixed.
  - o Filtering according to Blob Area
  - o Filtering according Max pixel count as well as min pixel count
  - o Mapping Blobs to color stream (added Segmentation_Image_Type)
  - o Better separation between object that are close but not touching
  - o Improved closest point stability
  - o Consolidated contour and mask smoothing to one
  - o Over all improved segmentation
- RealSense Web Support
  - o Support blob tracking.
  - o Support hand tracking.
  - o Support face tracking.
  - o Support speech command and control.

Alpha Features
- Face recognition

Preview Features
- Java*/Processing*:
    - Support Java language programming. Used under the JDK environment or under the Processing framework.

F200 Known Issues and Limitations

SDK Core/SDK Framework

Issue	Recovery/Workaround
High CPU use / low FPS seen in various scenarios, particularly when running multiple applications simultaneously	Will be addressed in future releases.
If running in the GUI mode, the runtime installer shows a Modify/Remove dialog when the runtime of the same version is already installed on the system.	Use the runtime installer in the silent mode by specifying the installer command line options: --silent --no-progress --acceptlicense=yes

Face Detection, Pose Detection and Landmark Tracking

Issue	Recovery/Workaround
The camera mirror mode is unsupported.	Mirror images in the application, if needed.
In some scenarios when using face recognition high CPU utilization may occur.	Disable face recognition when not required for your solution. Fix to be introduced in a future release.
Some expressions are still in the alpha quality (especially brows).	Use the landmarks directly.
In face_tracking sample, with RealSense camera connected, 2D mode cannot be used	This will be addressed in an upcoming update
When working with the camera and requesting face to work in 2D mode Face still works in the 3D mode only.	Support for Face in 2D mode will become available in a future update release.
In a scenario when one application is setting the camera profile (resolution, FPS etc.) to an unsupported configuration by Face, Face behavior is unexpected	Ensure camera profile is set to one of the supported Face configurations

Hand Tracking and Gesture Recognition

Issue	Recovery/Workaround
Hand module cannot by instantiated twice in a single application	Ensure each instance is properly destroyed before creating a new one
In a scenario when one application is setting the camera profile (resolution, FPS etc.) to an unsupported configuration by Hands, accuracy might be impacted	Ensure camera profile is set to one of the supported Hands configurations
Hands Viewer sample code has a small memory leak. This does not affect the Hands Module or the other Hands samples	N/A
Wave Gesture shouldn't be used with Side Swipes.	Enable only required gesture instead of enabling all and then disabling the undesired ones.

Blob Segmentation

Issue	Recovery/Workaround
Enabling 1920, 1080 color stream will result in fps drop.	Enable lower resolution color stream instead
Blob segmentation on SKL-Y supports 20 fps.	N/A

3D Background Segmentation

Issue	Recovery/Workaround
When multiple people are in range, the segmentation mask quality degrades	None. The module is implemented to work with one person at a time. We are planning to add support for multiple people in a future release.
Glossy or IR absorbing materials (e.g. glasses, watches, headphones, hats and scarves) can degrade segmentation mask quality	Remove these items. Will improve in future releases.
The module fails to segment dark long hair	With plain background in another color – hair is segmented better.
The module confuses black objects from background that are at the same camera eye level of the user's head.	Will improve in future releases
Background Segmentation fails to segment when the user touches the background	Drop hands to sides and face the camera.
Background between fingers can be seen in some cases	Increase or decrease the distance between fingers or move hand away from head/object.
Wrong segmentation when user touches objects and then leaves FOV	Cover the camera and then uncover or move objects which remain
Small slice of user is not segmented in FOV right edge on certain resolutions	Move toward the center of the camera image
When holding objects or hands close to the head, mask quality is degraded	Move object, head or hands to avoid this case
Thin objects (1-2 mm) are not segmented correctly	None
A memory leak may occur when stopping the pipeline when segmentation is enabled. The size of the leak depends on the image resolution. The specific graphics driver version may also influence the leak.	The memory leak issue has mostly addressed in R5 release. The remaining small leak will be fixed in future release.

Object Tracking

Issue	Recovery/Workaround
When the edge based 3D tracking from CAD models is enabled, the initial pose coordinate system is always on and considered as a detected object until the target object in the scene is detected. After that point the initial rendered coordinate system is replaced by the new detected coordinate system.	None. The initial pose coordinate system must be ignored by the application if it is not desired

Unity Toolkit

Issue	Recovery/Workaround

Editing Rules on multiple objects is currently not working.	User must Edit each rule separately.
Continuous tracking option causes left/right hand confusion sometimes	Need to be used with care.
PointCloud mesh is 9th of the maximum depth resolution due to Unity's mesh limitation	N/A.
Working on AR mode (with "Sense AR" prefab) requires the game to be in a specific aspect ratio. Currently there is no automatic check and the objects are not falling at the right spot with respect to the RGB image	Set the game aspect ratio manually to 4:3.
Speech in Unity Toolkit may work on very low FPS.	Check the DF_Speech Unity sample implementation that does not utilize the Unity Toolkit.

Nuance Speech Recognition and Synthesis

Issue	Recovery/Workaround
The release does not include redistributable components for speech recognition and synthesis.	Due to large size, speech redistributables will be provided as a separate installer, which will be available on the RealSense developer website.
Speech recognition can fail if another version of SDK is installed immediately after a speech recognition app is run and closed, and without a system reboot.	If you read the workaround before you do the SDK update, just close all samples and SDKVoiceServer*.exe in task manager, or just reboot the system before the update. If you already have this problem, kill SDKVoiceServer*.exe in task manager and reinstall corrupted language pack using modify mode
Speech recognition can hang in rare cases after hibernation.	Release recognition session before hibernation and start after wake up.

Frameworks Support (C#, Unity, Web support, Java and Processing)

Issue	Recovery/Workaround
Unity: Unity Editor may hang on close if application that uses Hand/Face module alert callbacks is running	Stop the application before closing Unity Editor
JavaScript: Web samples may stop streaming after waking pc from sleep or hibernate	Open Task Manager. Restart "Intel(R) Technology Access*" services.
JavaScript Hands Module: Only one instance of Hands Module (example: FF_HandsViewer.html sample) will run in a browser.	This is a known limitation for the Hands Module. It only allows one instance per process. If a separate browser process is started, additional instances of Hands Module can be instantiated.
JavaScript: webapp runtime components from older releases cannot be installed if newer "Intel(R) Technology Access*" version is installed	Remove ITA Install WebApp Install latest ITA
Sample Browser/Processing: The Processing sample does not run out of box. You need to set the sketch folder location in the Processing sample before running the sample.	Set the sketch folder location in the Processing Preferences to $(RSSDK_DIR)/framework/Processing.

Unity: libpxcclr.unity VS project does not successfully build on certain machines.	Right Click the Project -> Add Reference "[Unity Install Directory]/Editor/Data/Managed/UnityEngine.dll". Also, make sure .Net target framework is 3.5.

Touchless Controller

Issue	Recovery/Workaround
The Pinch gesture is intentionally ignored in the lower part of FOV.	Perform the gesture in the upper half of the FOV.

3D Scan

Issue	Recovery/Workaround
If the camera distance is too far, the rear portion of the scan (relative to the starting camera/object orientation) may be missing (beyond a cut plane) which can lead to large holes, lost tracking and/or unexpected surfaces (e.g. solidification).	Restart the scan from a closer range. The ideal distance from the camera to the front of the object is 30cm for F200 (or SR300) and 65cm for R200.
Backlighting can cause exposure problems (too dark).	Make sure the camera faces away from windows during the scan.
The mesh is not generated or is corrupt.	Read the included 3D Scan documentation. Ensure the scanning volume contents are stationary for the duration of the scan.
The first preview image after scanning starts is unexpectedly black.	None. We expect to fix this in a future release.
Reconstruct can only be called once per scan.	The record and playback system can be used to process the same scan using various options.

Utilities

Issue	Recovery/Workaround
None	

R200 Release Notes

The following items apply to the R200 camera.

R200 SDK Features

Gold Features

- SDK essential interfaces
  - o Session management
  - o SenseManager pipeline programming
  - o File recording and playback
  - o C#, Java*/Processing* and Unity* C#.
- Color and Depth Streaming
  - o Read color (YUY2), depth and IR (left/right) samples from the camera.
  - o UV mapping functions to map depth to color coordinates.
- 3D Scan
  - o 3D Scan and reconstruction of face, head or body

- Scene Perception
  - Real-time camera pose estimation (tracking & relocalization) in 6 degrees of freedom using depth, color, inertial sensor support and gravity sensor support in table top scenario targeted towards augmented reality with region of interest 2X2X2 meter^3 on devices equipped with integrated R200 and platform inertial measurement unit (IMU) sensors such as HP Spectre x2. Also supports real-time dense reconstruction, provides access to volume information in real-time, live mesh generation, loading & unloading of scene perception state to & from disk. Also provides utility function to extract planes visible in a camera view.
- Enhanced Photography
  - Depth of field, two-layer segmentation, object segmentation, 6 DOF motion effects, depth enhancement, color/depth resize, Common FOV, Crop, Rotate, XDM File IO, Paste on surface, and Paste on plane.
  - Supports platform camera snapshot.
  - **Fixed Bug:** Taking a photo on some platforms may result in a darker effects closer to the edges. The issue is fixed with intel_rs_dcm_r200_2.1.24.9476.exe or later and the latest SkyCam driver.

Beta Features
- Blob Module
  - **Fixed Bug:** Flickering Blob in color segmentation was fixed.
  - Filtering according to Blob Area
  - Filtering according Max pixel count as well as min pixel count
  - Mapping Blobs to color stream (added Segmentetion_Image_Type)
  - Better separation between object that are close but not touching
  - Improved closest point stability
  - Consolidated contour and mask smoothing to one
  - Over all improved segmentation
- 3D Scan
  - 3D Scan and reconstruction of objects
- RealSense Web Support
- Blob Tracking

Alpha Features
- 3D Scan
  - Stationary 3D reconstruction of object, face, head (R200 only) and body (R200 only)
  - Standard OBJ, PLY, STL output formats
  - Optional solidification (hole filling)
  - Optional texture generation
  - C# Samples (DF_3DScan.cs.exe)

Preview Features
- Person Tracking:
  - Person detection and registration
  - Person tracking support 1 person tracking
  - Re-identification during tracking
  - Person bounding box
  - Center of mass
  - Person segmentation
  - 6 points skeleton tracking
  - Head location

- o   Head pose
- o   Person recognition – build of Face recognition, integrated into person middleware
- Object Recognition
  - o   34 supported objects
  - o   Recognition using ROI window
  - o   Localization using depth plane segmentation
  - o   Object tracking
- Enhanced Photography
  - o   Euclidean and User Assisted Measurement.
  - o   Layer and Object Tracking
  - o   Real-time depth enhancement
  - o   **Fixed Bug:** R200 Enhanced Camera does not work on RF_MeasurementEP sample

R200 Known Issues and Limitations

SDK Core/SDK Framework

Issue	Recovery/Workaround
There have been sightings with some R200 cameras that samples or applications using depth and RGB data while running at 60 FPS QVGA may freeze and exit unexpectedly after live stream starts.	User to switch to 30 FPS.
The timestamp format on certain systems does not align with the IMU time stamp format thus the depth/IMU synchronization is lost.	Will be fixed in future releases. Disable IMU in Scene Perception.
If running in the GUI mode, the runtime installer shows a Modify/Remove dialog when the runtime of the same version is already installed on the system.	Use the runtime installer in the silent mode by specifying the installer command line options: --silent --no-progress --acceptlicense=yes

Face Tracking

Issue	Recovery/Workaround
R200 Face recognition low accuracy	Will be improved in future releases
Distance up to 3 meters – user can be anywhere from 50cm to 3m from the camera and face tracking is expected to be working	
Camera rotating up to 10 degree per second - for this Alpha release the use of IMU is very limited thus the support for camera rotation is rather limited	
Motion of up to 1 meter per second	To achieve face tracking quality, user cannot move faster than 1 meter per second
60 fps resolutions and VGA YUY2 are not supported on R200.	N/A

Scene Perception

Issue	Recovery/Workaround
The module may randomly return error during saving the mesh in Win32 configuration due to memory limitation.	Avoid saving a large mesh file in Win32. In a future release the module will return dedicated error code to indicate this limitation.

Tracking is inaccurate or fails when scanning monotonous areas, reflective surfaces, flat walls, large black areas or scene with very few visible details/geometry structure.	This behavior will be reduced in the later releases.
Fast movement invokes faulty mesh and inaccurate pose.	This behavior will be reduced in the later releases.
Using VoxelResolution::HIGH_RESOLUTION might reduce the tracking robustness.	Use the VoxelResolution::HIGH_RESOLUTION when camera is expected to move slowly in rather small scene (max 1mx1mx1m), and use VoxelResolution::LOW_RESOLUTION when the camera is expected to move in a room-sized environment scene and a region of interest of about 2mx2mx2m
Sometimes high error in camera pose estimation is observed when transitioning from LOW to MED accuracy tracking with inertial sensor support enabled.	This behavior will be reduced in the future release.
Tracking and rendering on a same thread causes in rare occasions and on some devices a temporary freeze (~2.0 seconds).	We recommend executing rendering commands in a separate thread from that used to call the tracking. A good practice is to make sure that the rendering frame rate is not tied to the tracking frame rate which in turn is mostly dependent on the camera frame rate.
Tracking on devices without integrated R200 or platform inertial sensor or when inertial sensor support is disabled provides lower robustness.	On devices equipped with integrated R200 camera and platform inertial sensor, enable inertial sensor support.
Large scale scanning or augmented reality (room sized 4X4X4 meter3 or more) and object scanning (using HIGH voxel Resolution) are in Beta maturity.	These usages will turn into Gold maturity in future releases.
The scene perception CHM documentation does not launch in the Microsoft* Help Viewer.	Please use the HTML or PDF documentation as a workaround.

Enhanced Photography

Issue	Recovery/Workaround
XDM files that were generated by WM4 are not supported in WM5.	Capture new images using WM5 based capture utility
Inaccurate Euclidean measurement when one of the selected points is on the edge.	Use the new user assisted measurement feature for edge points.
Incorrect measurement in areas where the camera doesn't return depth data or returns inaccurate depth data.	Change camera position so the object of interest has good depth data.
Sticker paster will not be accurate when the user tries to paste on a non-planar area.	Select another two points to paste-on that fall on a plane with depth data or use the new paste on surface feature.
EP features may output distorted results when applying them on areas for which the camera does not return depth data. This is a result of limitations in the camera technology.	Take pictures with good depth quality using the depth quality feedback API.
All EP features work with depth and color resolutions that have the same aspect ratio.	This is an XDM requirement. User can use common FOV to fix aspect ratios.

This is conforming to the XDM file format standard.	
EnhanceDepth supports real time hole filling which may result in a sub-optimal depth map.	Use the high quality hole filling for still image features
EnhanceDepth real time isn't running with 30fps	This will be fixed in a future release
Noise model map is compressed before being outputted within the XDM file. This may lead to loss of data.	This will be fixed in a future release.
Layer and object tracking runtime are not optimal.	Run capture and tracking on separate threads
Applying EPV experiences on a BAD quality photo may lead to sub-optimal results.	Retake a GOOD quality photo for processing
DepthBlend feature is removed from the Module	
Measurement API is in Preview quality and separated to a Measurement subclass.	
Layer tracking API is in preview quality.	
When LR is enabled saveXDM will fail	Will be fixed in a future release
If Segmentation Dispose is not called before SenseManager Dispose the app crashes	Dispose module features (segmentation, refocus, etc.) before disposing the sense manager.
Adding a scribble in locations that are not extending from the initial mask or object may result in an inaccurate mask.	Will be fixed in a future release.
Object segmentation is not accurate around hair.	Will be fixed in a future release.
Objects in close depth layers may get partially segmented together.	Will be fixed in a future release.
Samples are not compensating for changing the tablet from portrait to landscape mode and vice versa.	Will be fixed in a future release.
The Enhanced Depth algorithm might smooth fine details/edges of objects	Algorithmic limitation
Paste on Surface will not work in a multi-threaded mode.	Only use sticker paster calls in one thread.
Layer segmentation will not segment accurately when objects are more than 20 meters from the camera.	Take pictures within the camera range.
Flickering might occur over windowed applications while pasting stickers with paste on surface.	Will be fixed in a future release.
Flickering might occur over windowed applications while initializing motion effects.	Will be fixed in a future release.

Frameworks Support (C#, Unity, Web support, Java and Processing)

Issue	Recovery/Workaround
Unity: Unity Editor may hang on close if application that uses Face module alert callbacks is running	Stop the application before closing Unity Editor
Unity: RF_ScenePerception unity sample may cause graphics driver crash on quit in editor mode on Win 10.	Graphics driver recovers immediately. Use Task Manager to end Unity Editor Task if required or

	Switch from Auto Graphics API to OpenGLCore Graphics API in Player Settings->Rendering
JavaScript: Web samples may stop streaming after waking pc from sleep or hibernate	Open Task Manager. Restart "Intel(R) Technology Access*" services.
JavaScript: webapp runtime components from older releases cannot be installed if newer "Intel(R) Technology Access*" version is installed	Remove ITA Install WebApp Install latest ITA

Utilities

Issue	Recovery/Workaround
32 bit sdk_info tool may stop working after switching from Camera tab to Version tab	Use 64 bit sdk_info tool to get Camera information
64 bit sdk_info tool does not display camera firmware version	Use 32 bit sdk_info tool to get camera firmware version

3D Scan

Issue	Recovery/Workaround
Same as for F200	Same as for F200

Person Tracking

Issue	Recovery/Workaround
C# API for person tracking is not stable	Will be improved in future releases
RF_PersonTracking app crashes when clicking stop button immediately after start button	Will be fixed in future release

R200 Supported Configuration

Color / Depth(Left/Right)	No Stream	628x468 60 fps	628x468 30 fps	480x360 60 fps	480x360 30 fps	320x240 60 fps	320x240 30 fps
No Stream	---	OK	OK	OK	OK	OK	OK
1920x1080 15 fps YUY2	OK	X	X	OK	X	OK	X
1920x1080 30 fps YUY2	OK	X	OK	OK	OK	OK	OK
640x480 15 fps YUY2	OK	X	X	OK	X	OK	OK
640x480 30 fps YUY2	OK	X	OK	OK	OK	OK	OK
640x480 60 fps YUY2	OK	X	X	X	X	X	X
1920x1080 15 fps RGB32	OK	X	X	X	X	OK	X
1920x1080 30 fps RGB32	OK	X	OK	X	OK	OK	OK
1280x720 15 fps RGB32	OK	X	X	X	X	OK	X
1280x720 30 fps RGB32	OK	X	OK	X	OK	OK	OK
640x480 15 fps RGB32	OK	X	X	X	X	OK	X
640x480 30 fps RGB32	OK	X	OK	X	OK	OK	OK
640x480 60 fps RGB32	OK	X	X	X	X	X	X

320x240 15 fps RGB32	OK	X	X	X	X	OK	X
320x240 30 fps RGB32	OK	X	OK	X	OK	OK	OK
320x240 60 fps RGB32	OK	X	X	X	X	X	X

Scene Perception

Color	Color Framerate	Depth	Depth Framerate
320X240	30	320X240	30
640X480	30	320X240	30
1280x720	30	320X240	30
320X240	60	320X240	60
640X480	60	320X240	60
1920X1080	30	320X240	30
320X240	30	480X360	30
640X480	30	480X360	30
320X240	60	480X360	60
640X480	60	480X360	60
1280x720	30	480X360	30
1920X1080	30	480X360	30

SR300 Release Notes

The following items apply to the SR300 camera.

SR300 SDK Features

Gold Features
- SDK essential interfaces
  - Session management
  - SenseManager pipeline programming
  - File recording and playback
  - C#, Java*/Processing* and Unity* C#.
- Cursor Module
  - Accurate & Responsive 3D cursor point tracking
  - Improved robust gestures: Click gesture, Circle (CW/CCW), Hand Closing, Hand Opening.
  - Adaptive Point: Enabling the option to work in natural ROI and limited World Box for minimal movement. This normalized point allows an easy way to convert to any screen resolution. Added ability to reset the adaptive point to a specific location.
  - Engagement: Enables the option to work with hands which are engaged with the specific system. That minimizes false hands showing on user's screen.
  - Improved Power & Performance - less than half compare to Full Hand mode.
  - No latency, No Calibration
  - Improved ranges - 115cm & Hand Speed - 2 meter/sec.
  - Fixed: Previous detection range was 70cm, no identified till 100 cm.
- Color and Depth Streaming
  - Read color (YUY2), depth and IR (left/right) samples from the camera.
  - UV mapping functions to map depth to color coordinates.
- Background Segmentation

- o   Segment the user from the background (e.g. background removal/replacement)
- o   Usage cues (fading) at near/far extents
- o   Optional callback support for user enter, too close and too far events.
- o   Segmentation Quality Improvements using Depth HDR and other algorithm changes: Dark hair, finger webbing & other artifacts can be better detected.

Beta Features

- Face Tracking
  - o   Default value of SmoothingLevelType in face configuration was changed from 'LANDMARKS_SMOOTHING_LOW' to LANDMARKS_SMOOTHING_MEDIUM'. This change yields a stronger temporal smoothing of the facial landmark points over frames.
- Core SDK API
  - o   SDK UWP Support
- Depth Streaming
  - o   SDK UWP Support

Alpha Features
- Face tracking and landmark detection support for Universal Windows Platform for SR300.
- Face recognition
- Background Segmentation

Preview Features
- Person Tracking
- Enhanced Photography
  - o   Euclidean and User Assisted Measurement.

SR300 Known Issues and Limitations
SDK Core/SDK Framework

Issue	Recovery/Workaround
Clip files recorded in HDR mode may have incorrect timestamp difference between first 2 frames resulting in playback hang in realtime mode.	Remove first frame from the clip using clip_editor tool.

Background Segmentation

Issue	Recovery/Workaround
When multiple people are in range, the segmentation mask quality degrades	None. The module is implemented to work with one person at a time. We are planning to add support for multiple people in a future release.
Glossy or IR absorbing materials (e.g. glasses, watches, headphones, hats and scarves) can degrade segmentation mask quality	Remove these items. Will improve in future releases.
Incorrect segmentation for transparent objects	Will be addressed in future release
The module confuses black objects from background that are at the same camera eye level of the user's head.	Will improve in future releases
Incorrect segmentation for hair and background with similar color tone	Will be addressed in future release
Background between fingers can be seen in some cases	Increase or decrease the distance between fingers or move hand away from head/object.

Incorrect segmentation for bright blond hair	Will be addressed in future release
When holding objects or hands close to the head, mask quality is degraded	Move object, head or hands to avoid this case
Thin objects (1-2 mm) are not segmented correctly	None
Incorrect segmentation for mixed light (artificial + natural)	Will be addressed in future release
The FF_3DSeg samples may crash when recording streams with intel HD graphics card disabled.	Keep Intel HD graphics enabled for recording.
Clip files recorded in HDR mode may have incorrect timestamp difference between first 2 frames resulting in playback hang in realtime mode.	Remove first frame from the clip using clip_editor tool.

Cursor Module / Hand Tracking

Issue	Recovery/Workaround
By default power state is off.	N/A

Face Detection, Pose Detection and Landmark Tracking

Issue	Recovery/Workaround
The camera mirror mode is unsupported.	Mirror images in the application, if needed.
In some scenarios when using face recognition high CPU utilization may occur.	Disable face recognition when not required for your solution. Fix to be introduced in a future release.
Some expressions are still in the alpha quality (especially brows).	Use the landmarks directly.
In face_tracking sample, with RealSense camera connected, 2D mode cannot be used	This will be addressed in an upcoming update
When working with the camera and requesting face to work in 2D mode Face still works in the 3D mode only.	Support for Face in 2D mode will become available in a future update release.
In a scenario when one application is setting the camera profile (resolution, FPS etc.) to an unsupported configuration by Face, Face behavior is unexpected	Ensure camera profile is set to one of the supported Face configurations
Face UWP is limited to detection and landmarks, rest features are not supported	Use the landmarks directly.

Object Tracking

Issue	Recovery/Workaround
Object Tracking Sample: Sample may initially not working after SDK installation.	Install SDK and then restart the system.

Frameworks Support (C#, Unity, Web support, Java and Processing)

Issue	Recovery/Workaround
Unity: Unity Editor may hang on close if application that uses Hand/Face module alert callbacks is running	Stop the application before closing Unity Editor

JavaScript: Web samples may stop streaming after waking pc from sleep or hibernate	Open Task Manager. Restart "Intel(R) Technology Access*" services.
Processing: SDK only supported Processing 2.1.2 and higher 2.x version, but not the latest 3.x versions	None due to some deprecated Processing core methods.
JavaScript: webapp runtime components from older releases cannot be installed if newer "Intel(R) Technology Access*" version is installed	Remove ITA Install WebApp Install latest ITA