

Zebra HD4000 Head-Mounted Display SDK v2.1

Updated: Aug 16, 2021

This is the SDK package to interface to the Zebra HD4000 Head-Mounted Display (HMD/HUD).

File Contents

HD4000_Service_v2.6.3.apk	Required: main Android Service to communicate with the HD4000
HD4000_Firmware_Updater_v2.6.3.apk	Required (one-time): Android app to update the HD4000 firmware
ZebraHudService.apk	Optional: Android Service supporting an intent-based interface
zebrahud.aar	Main Android Library supporting the SDK APIs available for the customer client app
ZebraHudDocs.zip	Javadocs documentation for the SDK APIs
ZebraHudTest.zip	Source code to test all the SDK APIs
DemoClock.zip	Source code for a minimal demo app, using the <code>showMessage</code> API
DemoPick.zip	Source code for a more functional demo app, using the <code>showJim</code> API
JsonImageModel_Schema.json	JSON schema for the <code>showJim</code> API
ZebraHudScreenMirroring.zip	Source code for a screen-mirroring demo app, using the Android Service lifecycle APIs

SDK v2.1 Updates

- Android apps now require Camera permissions to access the HD4000 camera
- Screen-mirroring: UI toggle switch in the HMD Service menu
- Android Presentation Mode: UI toggle switch in the HMD Service menu
- Reduced power consumption
- Various fixes for the customer-reported camera and mic issues

New to SDK v2.0

- Android 10 support
- HD4000 firmware improvements: camera-control functionality and reduced power usage
- "Direct" method APIs to show images without any pre/post-processing, for increased throughput
- Separate Android Service supporting an intent-based interface
- Support for Android Service lifecycle calls (as well as the Activity lifecycle calls)

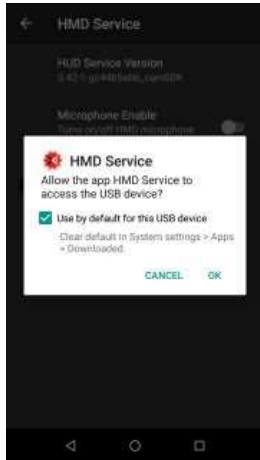
Deprecated APIs from SDK v1.0

- `getOperationMode/setOperationMode` – screen mirroring is now included as sample code
- `setCameraEnabled` – replaced by `startCameraCapture/startCameraCaptureRawJpeg` and `stopCameraCapture`
- `ImuData` (from `onImuData` callback) – the Quaternion vector ("Q" value) has been deprecated

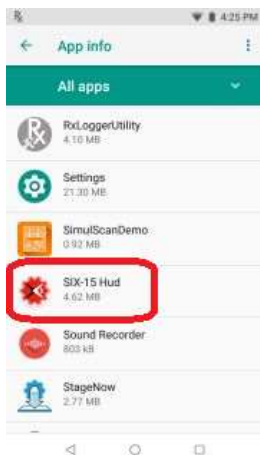
Updating the HD4000 Firmware

There is a mandatory one-time manual step to update the HD4000 firmware.

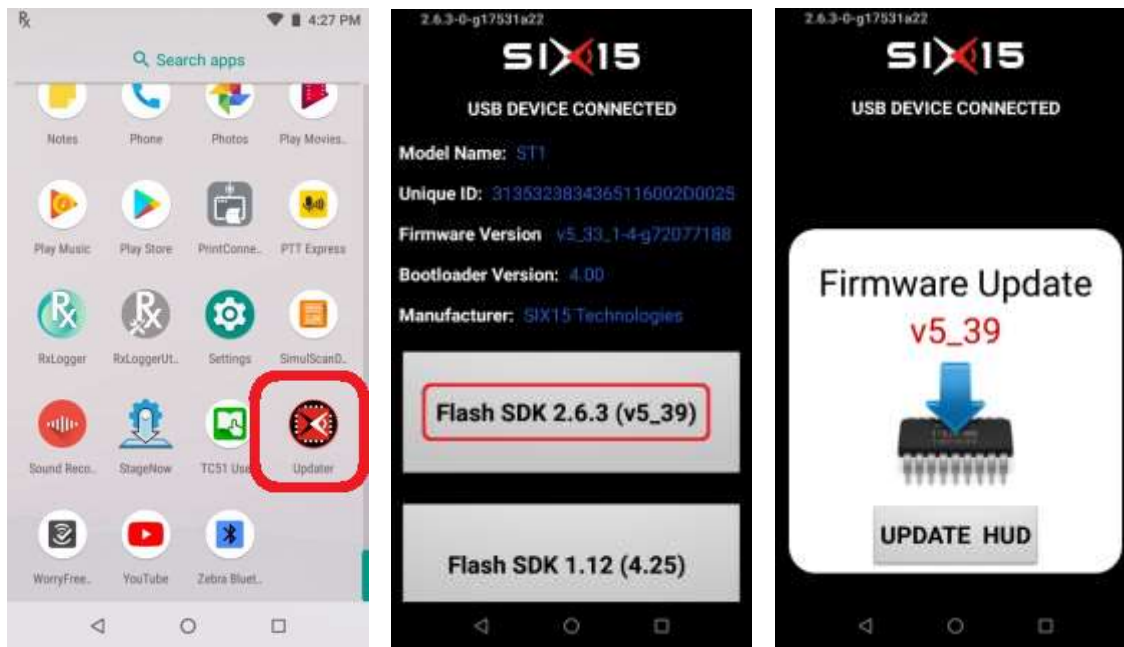
1. Ensure the target Zebra device does not have a low battery level
2. Note: whenever the USB permissions popup appears, check the checkbox, and press OK



3. Uninstall the older v1.x (and v2.0) SDK Service: Settings > Apps > "SIX-15 Hud" > Uninstall



4. Install the firmware-updater apk
5. Install the Service apk
6. Disconnect all cables from the device, and connect the HD4000
7. Run the firmware-updater app named "Updater", and follow the on-screen instructions to update the firmware to 5.39



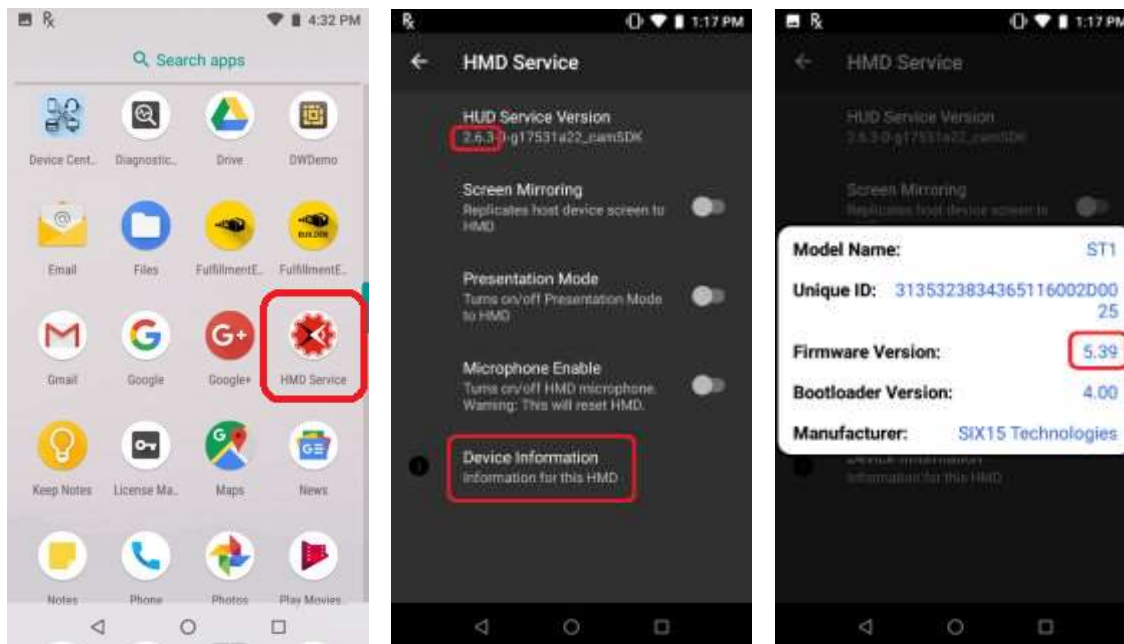
8. After the firmware update is complete, the HD4000 will reset. When powered, the HD4000 should display the following text on the bottom-right corner

FW: 5.39

9. Uninstall the firmware-updater app: Settings > Apps > "Updater" > Uninstall
 10. Restart the device and ensure the HD4000 is connected.
 11. Run the "HMD Service" app, and verify the following version details (press the "Device Information" entry for the firmware):

HUD Service Version: 2.6.3

Firmware Version: 5.39



Note that currently, there is no method to automate or remotely-execute this firmware update process. To update multiple HD4000 units, use a single Zebra device with the firmware-updater app installed, and update all the HD4000 units sequentially.

ZebraHudService – Intent-based Interface

ZebraHudService is a separate Android Service, that uses broadcast intents to interface between your application and the HD4000. It is useful for applications that:

- Wants to display simple images, text, or JIM data
- Does not need to use the HD4000 camera or IMU sensor
- Does not want to integrate/compile the SDK API library

ZebraHudService.pdf is the documentation for the intent interface, and ZebraHudService_command.txt lists all the ADB shell commands, to test the intents.

Main SDK library: zebrahud.aar

zebrahud.aar is the main Android SDK library, providing our full API interface to the HD4000. Along with the Javadocs documentation (in ZebraHudDocs.zip), the included test and demo apps source code demonstrates how the API interface is used.

ZebraHudTest

ZebraHudTest is our main test tool, to demonstrate and exercise all the SDK APIs. Updates to this tool (from v1.0) includes:

- displaying FPS and image details from the Camera
- time taken for the various 'show image' standard and direct method APIs

This code is useful for examining how the Camera APIs and Callback functions work. Please note that since this is test code used to validate all the SDK APIs, the code does not necessarily use Android coding best-practices (such as the continual polling for the various 'get' state APIs).

DemoClock

Android Activity source code, to demonstrate the minimum set of API calls required to display an image using the simple `showMessage` API. It also details the minimum set of libraries that the SDK requires: AndroidX, Kotlin and GSON. This sample source code should be used as a starting template for a new Android Activity.

DemoPick

Android Activity source code, to demonstrate a more functional application that displays dynamic images using the `showJim` API. The JIM (JSON Image Model) format allows applications to describe the image, using attributes like the TextView and ImageView native widgets. It also uses string-substitution to populate various user-data fields and to dynamically show/hide widgets.

JsonImageModel_Schema.json is the JSON schema, and the template JIM files used are located at:

DemoPick\app\src\main\res\raw\cart.json

DemoPick\app\src\main\res\raw\location.json

ZebraHudScreenMirroring

Source code for an Android Activity, which runs a locally-bound Service – highlighting 2 features:

- using the Service lifecycle calls to access the SDK library
- mirroring the device-screen to display on the HD4000

The Service source code interfaces with the SDK library to perform the actual screen-mirroring. Once the HD4000 is connected, the user can press the Home button to minimize the Activity, and the screen-mirroring will continue to operate.

IMU Sensor Data

The IMU sensor data returned by the onImuData callback is raw data from the accelerometer ("A"), gyroscope ("G"), magnetometer ("M"), and temperature ("T") in Celsius. The Quaternion vector ("Q") has been deprecated.

Notes for Building Your Application

- Included source code was originally built with Android Studio 4.1.1, and most recently with Android Studio 2020.3.1
- **AndroidX, ConstraintLayout, Kotlin and GSON** and are used by the SDK library, so your application (built with Android Studio or Xamarin) will also need to include these libraries. Refer to the following gradle files:

```
DemoClock\build.gradle  
DemoClock\gradle.properties  
DemoClock\app\build.gradle
```

- Steps to import an Android Library .aar file into a project:
<https://developer.android.com/studio/projects/android-library#AddDependency>
- The SDK library was built with the following:

```
minSdkVersion 21  
targetSdkVersion 29  
compileSdkVersion 29
```
- Ensure your application is calling the matching ZebraHud API functions for the standard Android Activity/Service lifecycle calls - refer to the demo source code.

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For more information

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