»Parcel« / Data Logging and Recording App

Overview

The application permanently records available sensor data and takes videos clips on movement. In regular intervals the captured data is pushed to a server and removed from the phone. The application is able to run in the background, also when the phone is locked.

Technology

The application is written in Kotlin, minimum SDK is Android 8.0, it uses native Android and Google frameworks and avoids to rely on third party libraries. The application is not submitted to the Play Store or distributed publicly. The app is running also when the phone is locked (screen turned off), PowerManager.WakeLock, foreground services and other measures are taken in order to ensure continuous operation.

For sensor logging android.hardware.SensorManager is used, all available sensors are recorded, there is a blacklist in the source code on which sensors should not be recorded. Values are only logged if a threshold to the prior value is exceeded in order to avoid cluttering. The collected data is saved as CSV (or Sqlite), including timestamp and name of the sensor. The naming convention of the files is sensors_yyyy_MM_dd_HH_mm_ss_SSS.

For video android.hardware.camera2 is used, camera resolution, camera direction and fps are selected in a dropdown. Format, bitrate, encoding, etc. are set in the source code. Sound is also recorded but can be disabled in the source code. The recording starts when some axis of the accelerometer sensor exceeds a minimum threshold (set in source code). The applications records for at least 30 seconds after the threshold is fallen short of again. If a recording is exceeding 60 minutes multiple video files are created. The naming convention of the files is video_yyyy_MM_dd_HH_mm_ss_SSS.

The GPS location is logged with FusedLocationProviderClient and saved as GPX including the time of each recorded point. The tracking does only occur on movement, like described in the camera paragraph of the document. The naming convention of the files is gps_yyyy_MM_dd_HH_mm_ss_SSS.

Surrounding wireless networks are scanned regularly and logged in form of newly found, respectively lost networks in a separate file. Scanning does only occur on movement, like described in the camera paragraph of the document. The collected data is saved as CSV (or Sqlite), including timestamp, SSID and MAC-address. The naming convention of the files is wifi_yyyy_MM_dd_HH_mm_ss_SSS.

After a predefined interval or on manual trigger the files are uploaded to a server endpoint with https POST. An URL can be specified in the interface of the application. After successful upload the files are deleted from the device permanently. An upload is also triggered if the phone's screen is turned on by the user. If the phone has no service the upload is postponed until there is a cellular connection again.

User Interface

The application offers minimal interaction. The following components can be found in one activity:

- Statistics on how much data has been recorded and when the last upload happened
- Text field to input http(s) URL for POST upload
- Number field to input the upload interval in minutes
- Button to manually start/stop all logging
- Button to manually trigger the upload
- Button to manually start/stop video recording
- Dropdown to select camera resolution, direction and fps (should be permanently stored on device)