


Guidelines for Geopose-enabled Mobile Camera Imagery Data Collection

Urban Digital Twin Interoperability Pilot– October 2024

Urban Digital Twin Lab
SCHOOL OF MODELING, SIMULATION AND TRAINING University of Central Florida

Guidelines for Geopose-enabled Mobile Camera Imagery Data Collection

Contents

Version Control

Date	Modified by	Description	Version
09/27/2024	Kyle Shervington	Initial draft development	1.0
10/01/2024	Kalp Thakkar	Expanded and refined draft by expanding content & adding screenshots	1.1
10/01/2024	Soheil Sabri	Added Cover Page, ToC, Acknowledgment, and Contact sections. Provided feedback for revisions.	1.2
10/02/2024	Kalp Thakkar	Added Executive Summary & Draft Formatting	1.3
10/02/2024	Benjamin Lee	Adjusted formatting and ToC	1.4
10/02/2024	Soheil Sabri	Final review	1.5

Executive Summary

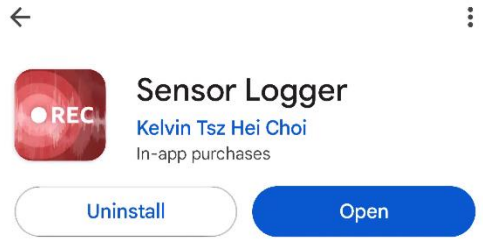
This document outlines the process of data collection and extraction and guidelines as part of the Urban Digital Twin Interoperability Pilot (UDTIP) led by the Open Geospatial Consortium (OGC) and sponsored by the Korea Land and Housing Agency. It outlines each process phase, from the initial setup of data acquisition tools to the final extraction of GeoPose metadata. It begins with step-by-step instructions for downloading and configuring the Sensor Logger application on mobile devices, followed by guidelines for the installation of mounting equipment to ensure stable and precise data collection. The document also details the data collection phase, explaining how to accurately record sensor data, including position, orientation, and imagery, with a focus on setting the right frequency for synchronizing timestamps for optimal interoperability. Once data is collected, the guide explains the transfer process and post-processing steps, which involve integrating the imaginary and geospatial data into the pipeline for GeoPose extraction explained in delivery D101 (Camera Imagery Interoperability) of UDTIP. Overall, the document serves as a complete guide to ensuring the accuracy, consistency, and interoperability of data collected for different applications, including road categorization, and quality analysis.

Acknowledgment

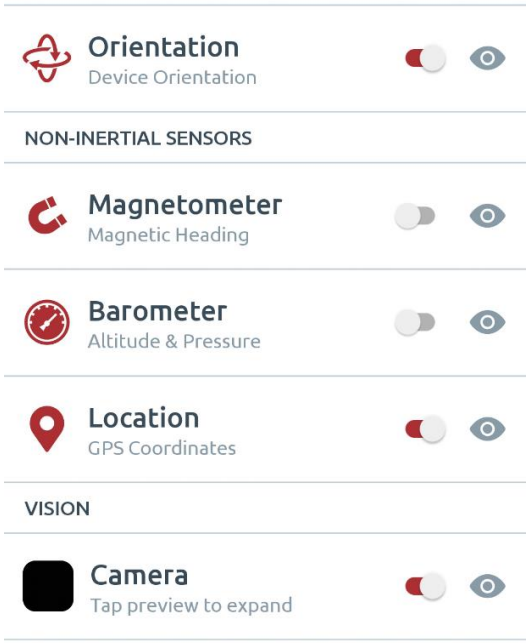
We would like to acknowledge the Open Geospatial Consortium and the Korea Land and Housing Agency for their sponsorship of the Urban Digital Twin Interoperability Pilot (UDTIP). We would also like to appreciate the guidance and support of the UDTIP management and collaborators.

Application Download & Setup

1. Download the **Sensor Logger** app



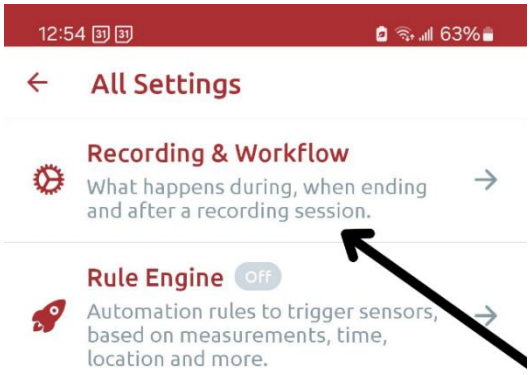
   - Click here for IOS
   - Click here for Android
2. Enable location services for your mobile device
3. Launch the Sensor Logger app
4. Toggle **ON** the following sensors:
   - Orientation
   - Location
   - Camera



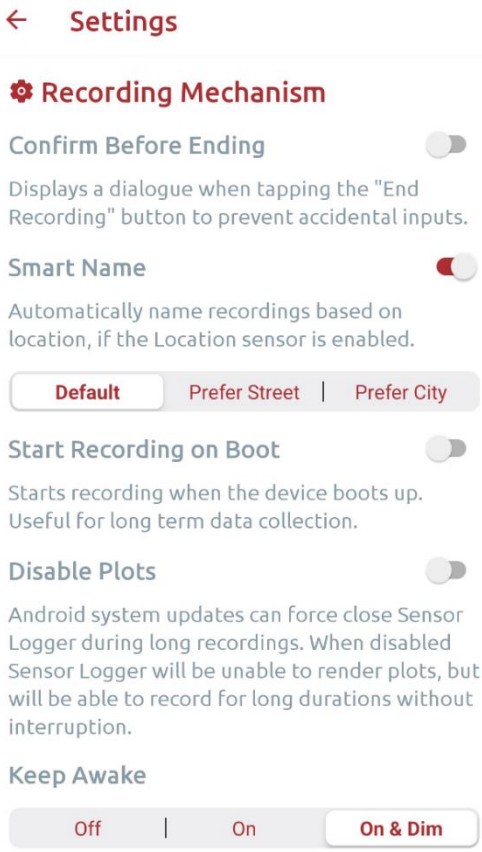
Configure Settings

1. Tap the gear icon, on the home screen, to enter the settings menu
2. Ensure the following settings are configured:

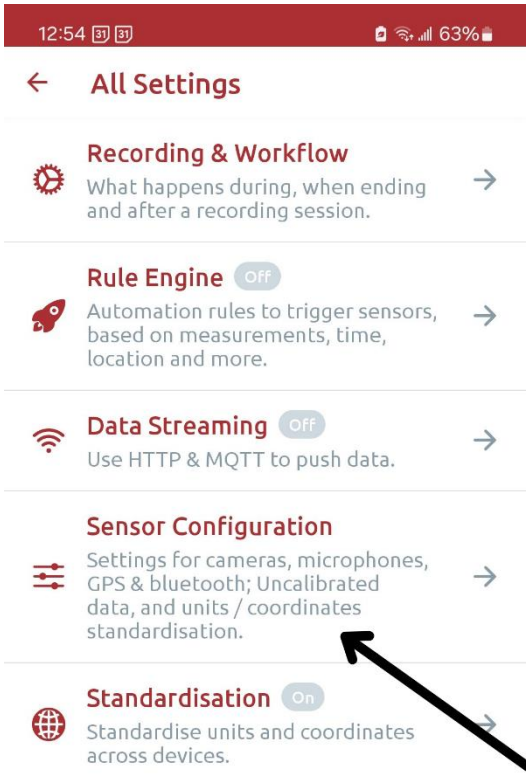
   a) Recording & Workflow



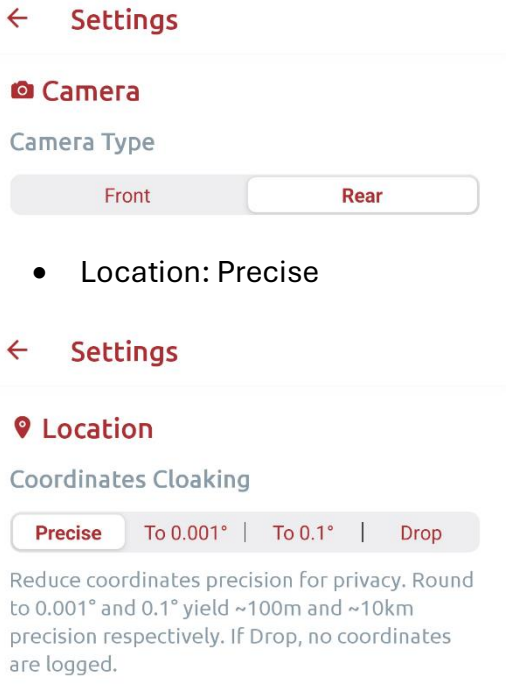
   - Keep Awake: On & Dim



b) Sensor Configuration

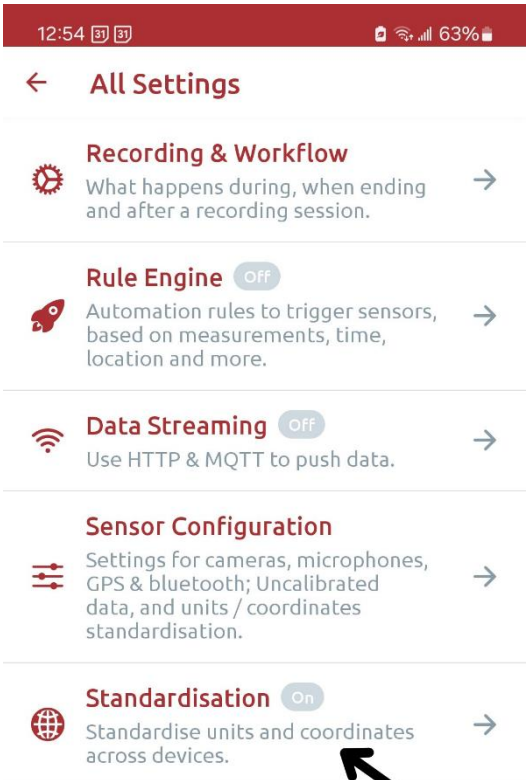


- Camera Type: Rear

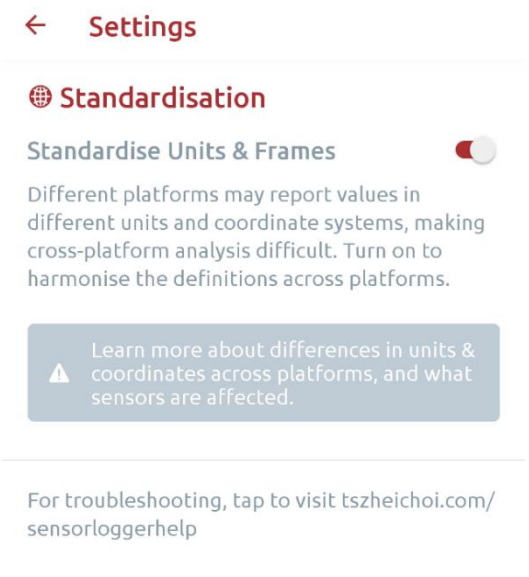


- Location: Precise

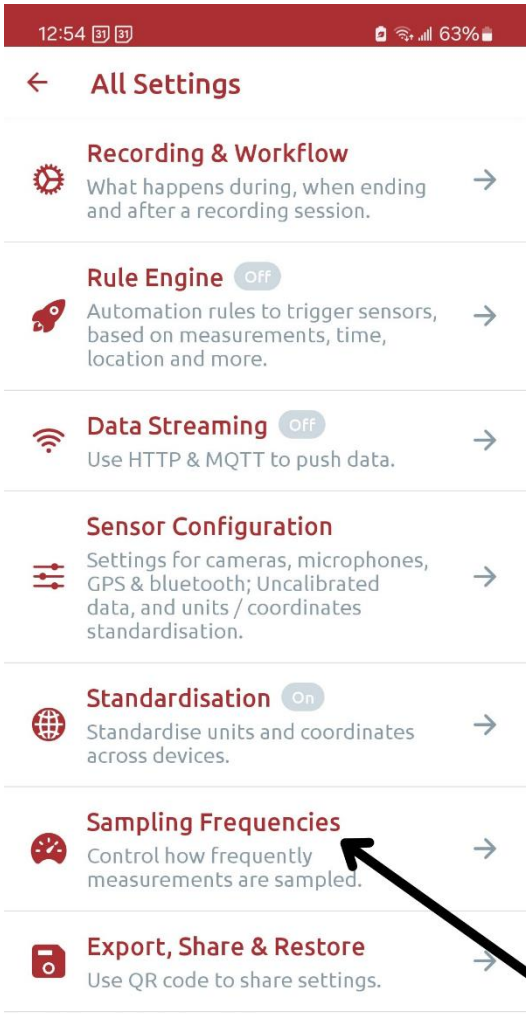
c) Standardization



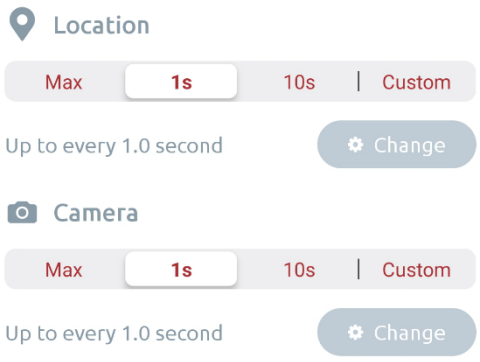
- Standardise Unit & Frame: ON



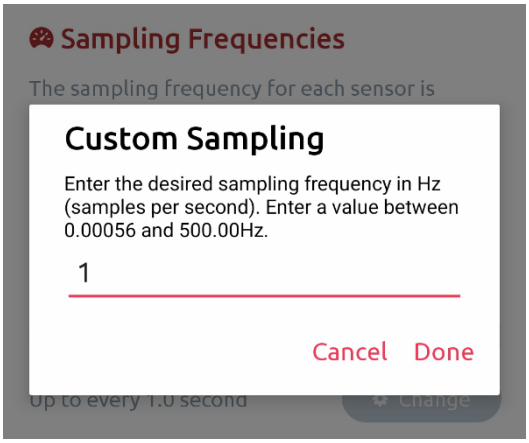
d) Sampling Frequencies

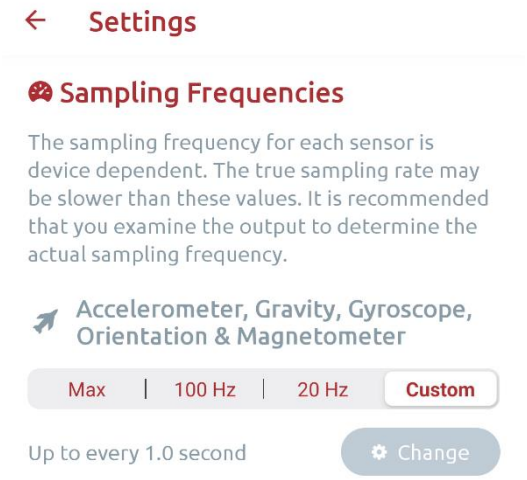


- Location: 1s
- Camera: 1s



- Accelerometer, Gravity, Gyroscope, Orientation & Magnetometer: Custom (*Enter '1' as the value for "desired sampling frequency". After closing the dialog box, the text under this option should say "Up to every 1.0 second"*)





3. Return to the home screen and leave the app open

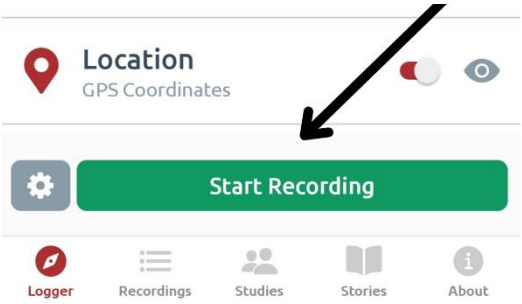
Mounting Setup

1. Clean surface of the vehicle where the phone will be mounted. *70% isopropyl alcohol and microfiber towel is sufficient. Alternatively, use soap and water*
2. Follow instructions included with mount to attach it to the vehicle. *The Delkin Devices Fat Gecko Stealth suction mount was used during experimentation*
3. Attach cell phone tripod mount adapter to the suction mount. *The KDD Cell Phone Tripod Mount Adapter was used during experimentation*

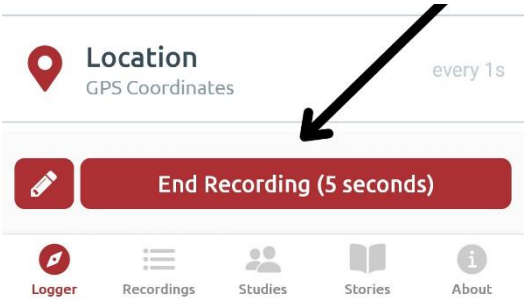
4. Adjust equipment according to achieve desired orientation and positioning
5. Place mobile device securely in the cell phone mount adapter

Data Collection Phase

1. Tap the green **Start Recording** button in the Sensor Logger app. *The screen should dim to conserve battery and begin recording selected data*



2. Tap the red **Stop Recording** button in the Sensor Logger app. *If you are unable to see the button due to low screen brightness, try tapping in the location where the **Start Recording** button was until you tap the **Stop Recording** button*

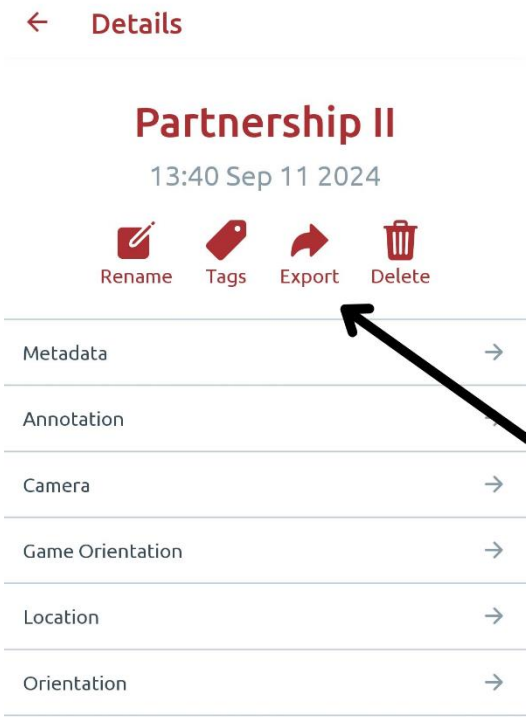


Data Transfer

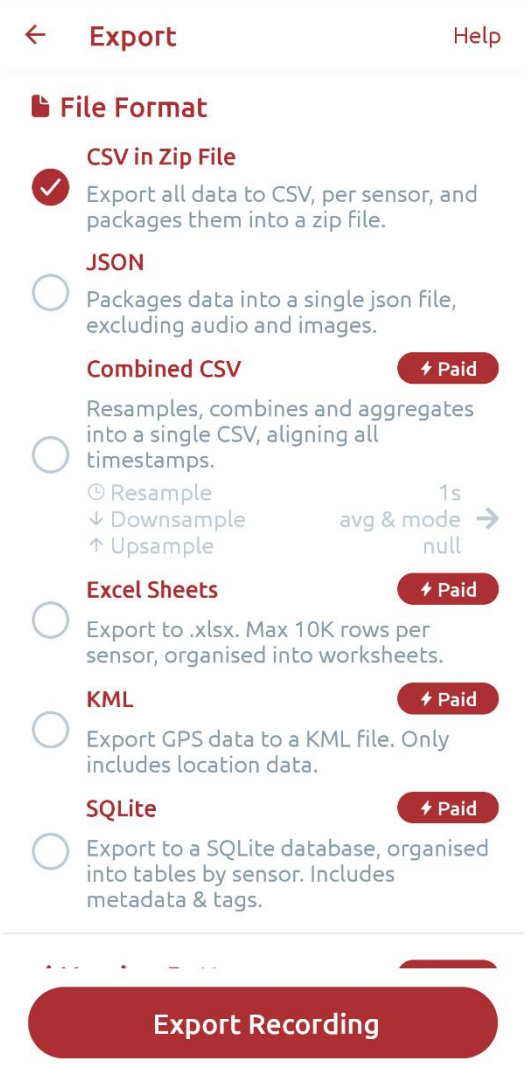
Export data from Sensor Logger app

1. Navigate to the **Recordings** screen via the nav bar on the bottom of the app
2. Tap the most recent recording

3. (optional) Explore the collected data. The app offers many visualizations
4. Tap the **Export** button



5. Export data in your desired format. (*CSV is recommended as it contains all data, including imagery)*



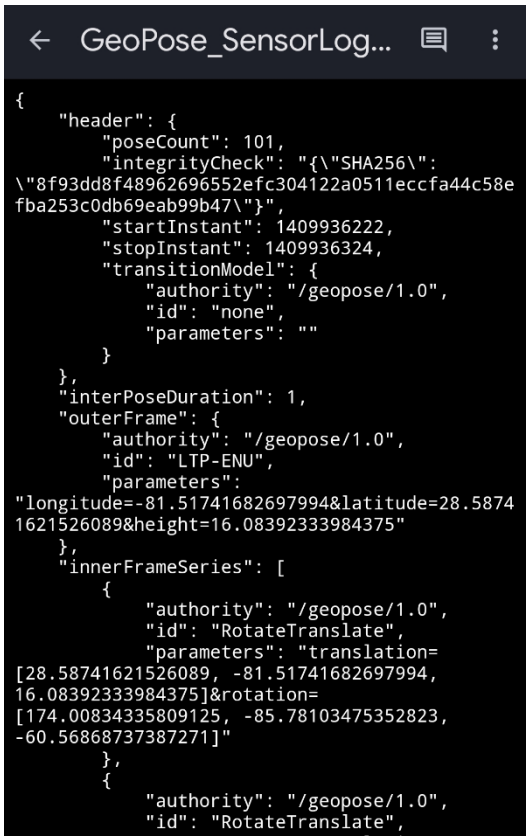
Upload data to desired destination

1. Save the ZIP file to desired destination
2. Upload extracted files to a cloud-accessible location (e.g. Google Drive) if performing the post-processing task online.

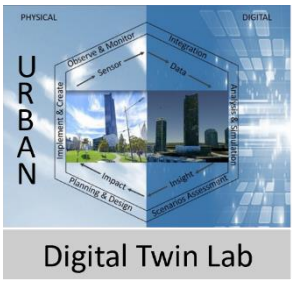
Post-Processing & GeoPose Extraction

Code for the D101 Pipeline can be accessed here.

1. Run Data Through the Developed Pipeline
   - Ensure that the data collected from mobile camera imagery and geospatial sensors is accessible for processing.
2. Adjust File Paths
   - Modify the file paths in the code to point to the directory where the uploaded data is stored.
3. Configure Parameters
   - Setup processing parameters within the code according to the specific requirements and nature of the dataset.
   - Ensure that all configurations align with the intended goals of the data collection and desired output, thus enabling proper flow control throughout the pipeline.
4. Run the Pipeline
   - Execute the pipeline to process the collected data
5. Output Generation
   - Upon successful completion of the pipeline, the GeoPose data will be generated as output files.
   - Extracted GeoPose would be in a standardized JSON format.



Contact



Urban Digital Twin Lab
School of Modeling Simulation and Training
University Central Florida, FL, USA
Email: soheil.sabri@ucf.edu