CUbiPark Documentation

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Provided is documentation for the CUbiPark demo application that we have developed. CUbiPark is an Android application that that was developed to supplement our paper *CUbiPark: Sensing Parking Availability*. This document serves as a brief introduction into the system and application.

There are twelve classes that make up the application.

**Accel.java:** This class is a class to create accelerometer objects. Each object has a x, y, and z value.

**ActivityRecog.java:** This class was created to hold activity recognition objects. An ActivityRecog object has a field for each state provided by the Google Activity Recognition API: still, foot, walking, running, bicycle, vehicle, tilting, and unknown.

**Constants.java:** This class is used to store constants used throughout the application. This includes global names, global variables, and most importantly parking lot information.

Each parking lot has a LinkedHashMap corresponding to the center of the lot, the point of interest for that lot, a loop point, the number of spaces, the last time it was updated, and its current status.

public static final LinkedHashMap<String, LatLng> *PARKING\_LOTS* = new LinkedHashMap<String, LatLng>();  
public static final LinkedHashMap<String, LatLng> *PARKING\_LOTS\_ENTRANCE* = new LinkedHashMap<String,LatLng>();  
public static final LinkedHashMap<String, LatLng> *PARKING\_LOTS\_POI* = new LinkedHashMap<String,LatLng>();  
public static final LinkedHashMap<String, LatLng> *PARKING\_LOTS\_LOOPS* = new LinkedHashMap<String,LatLng>();  
public static final LinkedHashMap<String, String> *PARKING\_LOTS\_SPACES* = new LinkedHashMap<String,String>();  
public static final LinkedHashMap<String, String> *PARKING\_LOTS\_STATUS* = new LinkedHashMap<String,String>();  
public static final LinkedHashMap<String, String> *PARKING\_LOTS\_LAST\_UPDATE* = new LinkedHashMap<String,String>();

**DataLogger.java:** The DataLogger class is used to save and store sensor data from the smartphone during a parking instance into a csv file for later analysis. The class both creates the csv file as well as takes in sensor data and writes the data into a new line of the csv file for each accelerometer data, activity recognition data, and location data.

**DetectedActivitiesAdapter.java:** Primarily used for debugging and display purposes of the Google Activity Recognition API output of detected activities. Populates UI elements with detected activities.

**DetectedActivitiesIntentService.java:** Intent service to handle incoming intents generated from the Google Activity Recognition API.

**GeofenceErrorMessages.java:** Helper class for debugging errors associated with Geofence creation.

**GeofenceTransitionsIntentService.java:** Helper class to act as a listener for geofence transition changes. Works with the TrialActivity to determine when to stop recording.

**MapsActivity.java:** Main activity that is shown to the user. Shows parking lots as markers on a Google Map. The color of the marker determines the availability. Clicking on a parking lot provides additional information relevant to the parking status.

**ParkingAnalyzer.java:** Primary class that handles all the estimation of parking availability. Contains all the feature identification and classification.

**ParkingParser.java:** Helper class used in ParkingAnalyzer.java. Used to take read csv files into usable arrays that can be interpreted in ParkingAnalyzer.java.

**TrialActivity.java:** Class that was used in testing and collection of data. Saves sensor data into csv files for later interpretation and analysis.