

# **Geofairy iOS/Android App**

## **User Manual**

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## 1. Introduction

Geofairy is an award-winning App trying to realize one-stop location based service (LBS) for users to retrieve geospatial information (GI) via their mobile devices. It has 8 source datasets and more than 100 data layers covering the whole globe, including most developing countries. The information types include weather, vegetation, elevation, soil moisture, land cover, atmosphere, and precipitation. For developing countries these information are very helpful but lack or hard to retrieve due to rare open earth observation projects and inappropriate data use. Geofairy could provide everyone in developing country with free geospatial information to help them make decisions about agriculture, biodiversity, climate, disaster, ecosystems, health and weather. This User Manual (UM) provides the information necessary for mobile users to effectively use the Geofairy system on the smart phones.

## 2. Overview

The key feature of Geofairy is real-time and location based. Users can access Geofairy on any time to retrieve the latest trends in Earth dynamics about their real-time location. Its system architecture is shown in Figure 1.



Figure 1. System Architecture (blue boxes - software components; green boxes - data)

The system is composed of client and server module. Server side is maintained by Center for Spatial Information Science and Systems (CSISS) in George Mason University. Users only need download the client App onto their devices. Geofairy server resides in GeoBrain cloud which is a private cloud hosted also in CSISS. Geofairy client is a uniform mobile-style interface, which provide three modes allowing users to view the information from various perspectives. To run Geofairy App, a smart phone with no less than 1GB memory, 1GHz CPU and 1GB memory is required.

The born of Geofairy is inspired by our daily difficulties in gathering and retrieving all kinds of spatial information in practice. Each App is designed to provide some specific information in a relatively static way, e.g., Google Maps for maps and satellite images, AccuWeather for current weather and weather forecast, Climate FieldView for agricultural field related information and ArcGIS for spatial data viewing and analyzing. The Apps have different transfer channels and

separated outlets. Users have to download and install an App to acquire the contained information at one time. Besides, extra operations are often needed such as signing up, subscribing services, learning user guide and formalizing recognizable requests. It is complicated and very inconvenient for most users. A simplified App one-stop serving all kinds of GI has been widely recognized as a public desire, especially in emergent scenarios like response actions to disasters like earthquakes, flooding, wildfires and hurricanes. However, there are very few progresses towards this direction yet. The main challenge comes from the high heterogeneity and poor interoperability of the involved data and service interface.



Figure 2. Use Geofairy on street

As shown in Figure 2, Geofairy can be used in anywhere anytime.

### 2.1 Conventions

This document provides screen prints and corresponding narrative to describe how to use the Geofairy App.

When an action is required on the part of the reader, it is indicated by a line beginning with the word "Action:" For example:

Action: Click on OK.

Fields or buttons to be acted upon are indicated in bold italics in the Action statement; links to be acted upon are indicated as links in underlined blue text in the Action statement.

**Note**: The term 'user' is used throughout this document to refer to a person who has a device with Geofairy correctly installed.

LBS - location based service

GI – geospatial information

- CI cyberinfrastructure
- VI vegetation information
- GIS geographic information system
- VM virtual machine
- SDK software development kit
- HPC High performance computing
- NASA National Aeronautics and Space Administration
- NOAA National Oceanic and Atmospheric Administration
- USGS U.S. Geological Survey
- ESA European Space Agency
- EEA European Environment Agency
- CSISS Center for Spatial Information Science and Systems
- GMU George Mason University

#### 2.2 Cautions & Warnings

By downloading, accessing or using Geofairy Mobile App or any page of this app, you signify your assent to this disclaimer. The contents of this app, including without limitation, all data, information, text, graphics, links and other materials are provided as a convenience to our app users and are meant to be used for informational purposes only. We do not take responsibility for decisions taken by the reader based solely on the information provided in this app.

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## 3. Getting Started

This section gives a quick-start tutor to Geofairy.

## 3.1 Set-up Considerations

Geofairy is designed to be viewed at a minimum screen resolution of 800 x 450. To optimize your access to the Geofairy:

- 1. Please enable location service prior to attempting access to the Geofairy.
- 2. In iOS, required iOS 8.0 or higher. Search "Geofairy2" in Apple Appstore and install it.
- 3. In Android, required Android 5.0 or higher. Search "Geofairy" in Google Play Store and install it.
- 4. Device must have networking. Disconnection from the Internet will make Geofairy stop functioning.

## 3.2 User Access Considerations

Geofairy doesn't have extract user restriction. Anyone who have access to the host device will be able to use Geofairy.

## 3.3 Accessing the System

To access Geofairy, users must acquire the user credentials of the host devices. No user ID or password are required to access Geofairy, but user can create own account from a GeofairyGroundTruthServer Portal (please refer to the GeofairyGroundTruthServer Portal section)

### 3.4 System Organization & Navigation

Geofairy interface is organized into two parts: view body and navigator (*Figure 3*). The navigator has 5 view icons: Home, Utilities, Ground, Air, and Settings. User can change a view by clicking the view icon.



Figure 3. Geofairy User Interface

## 3.5 Exiting the System

There is no exit function on Geofairy App. Simply click the home button on iPhone to exit. For android phones, click either back button or home button.

## 4. Using the Geofairy App

The following sub-sections provide detailed, step-by-step instructions on how to use the various functions or features of the Geofairy.

## 4.1 Geofairy Home View

The Geofairy Home view shows current user's current location and its real-time weather information (Figure 4).



Figure 4. Geofairy Home View

The map area can be changeable between map view and satellite view by clicking layer selector button located in the top right corner of the map area. The home button in the map area can move the map center to user's current location. User can set a point-of-interest (POI) location by

clicking on map area. The map also shows the latitude and longitude values of the POI.

The location-based weather Information is acquired from the *OpenWeather* service. The following weather information is showing:

Current temperature, Weather status, Wind speed, Visibility, Min and Max temperature, Humidity, Pressure, Sunrise and sunset, Hourly weather information, weekly weather information.

### 4.2 Utility Apps View

The Utility Apps view shows built-in App list in the Geofairy App. User can execute a bult-in App by clicking the App icon. Currently, three built-in Apps are installed: Ground Truth App, Irrigation App, and Tweets App.

#### 4.2.1 Utility Apps Main

The Utility Apps main view shows three built-in Apps (Figure 5-a). When user click a built-in App icon, the App is shown, and user can go back to the main view by clicking *Back* button at the top left of the screen.



Figure 5. Utility Apps Main and its Apps

There are three built-in Apps in the Utilities view: Ground Truth App for submitting ground truth information to a *GeofairyGroundTruth* server (Figure 5-b), Irrigation App for supporting Irrigation Decision Support (IDS) information (Figure 5-c), and Tweets App for showing the newest useful Irrigation-relative tweets (Figure 5-d).

#### 4.2.2 Ground Truth App

The Ground Truth App is for collecting ground truth information (Figure 6). Administrator accounts in each GeofairyGroundTruth server can create and/or edit projects with input fields for collecting ground truth information. On Geofairy App side, the input fields are shown when user selects a project after signed in one of GeofairyGroundTruth servers. App user can submit the ground truth information with user's location information, such as latitude, longitude, altitude, and accuracy.



Figure 6. Ground Truth App

When user launch the Ground Truth App on the Utilities view, the App shows a project select screen (Figure 6-a). A signed-in username and GeofairyGroundTruth server name shows the upper right corner above the map area. The username or server name doesn't correct, please sign-in into the proper GeofairyGroundTruth server with a registered account (Chapter 4.5 Settings View). As a default GeofairyGroundTruth server, GMU\_Ground\_server is selected. If user didn't change anything, or if user select a GeofairyGroundTruth server but didn't sign-in, a default preset user in the server will be selected. When user click the "Please select a project" selector, all projects that are the user allowed to submit ground truth information will be shown, and user can select one of them. The listed projects are shown both public projects and private projects the user is joined.

When user selects a project, all input fields are shown in the screen (Figure 6-b). All input fields are defined by registered project in the server. Editing the fields, defining a new project, editing participant users can be manageable in a portal of the selected GeofairyGroundTruth server. User can input ground truth values, and then submit into the selected server (Figure 6-c). The submit results will be shown in the screen (Figure 6-d).

#### 4.2.3 Irrigation App

The Irrigation App shows useful assistant information for target date and location-based irrigation decision (Figure 7). The irrigation decision assistant information is supported by the Irrigation Decision Support (ISD) system in GMU.

The irrigation decision assistant information is a recommended irrigation ratio and its useful descriptions.



Figure 7. Irrigation Decision Support Information

#### 4.2.4 Tweets App

The Tweets App shows useful Tweet messages from irrigation relative Tweet accounts (Figure 8).



#### Figure 8. Useful Tweets

Current configuration set to fetch the newest top 20 tweets from the following Tweet accounts: NASA Harvest (@NASAHarvest), Farm Service Agency USDA (@usdafsa), Group on Earth Observation (GEO) (@GEOSEO), World Health Organization (WHO) (@WHO), United Nations (@UN), World Bank (@WorldBank), OECD Agriculture (@OECDagriculture), WBG Agriculture

(@WBG\_Agriculture), and one of official Department of Agriculture tweet account of state in US only if user is in the state in US.

### 4.3 Ground View

The Ground View shows user location-based useful farming information (Figure 9). It shows farming and gardening suggestions about the best plant and harvest dates for crops such as potatoes, maize, oats, soybeans, sweet potatoes, and wheat.

The view also shows useful visitation indexes of the interested area, such as NDVI, RNDVI, RMNDVI, MVCI, and VCI with daily, weekly, and/or biweekly periods.



**Figure 9. Ground View** 

### 4.4 Air View

The Air View shows current air quality information of user's location (Figure 10). The air quality information consists of various information such as Air Quality Index (AQI) and its health advisory description, values of current Ozone, Carbon Monoxide, Carbon Dioxide, Nitrogen Dioxide, PM 2.5, PM 10, and Sulfur Dioxide. The information is acquired from *World Air Quality Index* project.





### 4.5 Settings View

The Settings View shows about the Geofairy App information (Figure 11). This view supports signing-in function into one of GeofairyGroundTruth server with registered account. This view also supports a WMS 1.3.0 client function.



Figure 11. Settings View

User can select a GeofairyGroundTruth server in the list after clicking "USER ACCOUNT" button (Figure 11-a). After selecting a server, user can sign-in with registered account (Figure 11-b). If user do not sign-in, a default preset user will be chosen. User can create his/her own account at the server's portal.

This view also has a WMS 1.3.0 client (Figure 11-c). User can type in a service endpoint URL into the text area, the App will fetch a *GetCapabilities* context from the service endpoint. After parse by clicking "PARSE" button, user can select a layer form given layer list, and see the layer at the main map area.

## 5. Troubleshooting & Support

### 5.1 Error Messages

If Geofairy complains about location error, make sure you have enabled location services of your phone.

If Geofairy shows blank, double check your Internet connection.

Still got error messages, please contact us.

## 5.2 Special Considerations

Users with disabilities may contact us to tell your difficulties in using Geofairy.

### 5.3 Support

#### Table 1 – Support Points of Contact

Contact	Organization	Phone	Email	Role	Responsibility
Liping Di	CSISS, GMU	+1 703 993 6114	<u>ldi@gmu.edu</u>	Director	
Ziheng Sun	CSISS, GMU	+1 703 993 6124	<u>zsun@gmu.edu</u>	Development Leader	

## Appendix A: Record of Revision

Instructions: Provide information on how the development and distribution of the User Manual will be controlled and tracked. Use the table below to provide the version number, the date of the version, the author/owner of the version, and a brief description of the reason for creating the revised version.

Version Number	Date	Author/Owner	Description of Change
1.0	08/29/2018	Ziheng Sun (CSISS)	Initiated version
		Liping Di (CSISS)	
1.1	06/15/2022	Ziheng Sun (CSISS)	Updated to Geofairy2
		Liping Di (CSISS)	
		Gil Heo (CSISS)	

#### Table 2 – Record of Changes