

Location Assistant

Technical Reference Manual

ZICHENG WAN, YUAN GAO

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Description

The app provides real time location data. It allows parents to monitor the children's location and activity with GPS tracking technology. The real-time locations of the family members within the same group are displayed on a map. When a monitored user reaches a certain location, such as school or home, the app provides automatic notifications to the guardian user. A built-in message system allows all users within the same group to send messages to each other without accessing SMS.

This technical reference manual will give brief instructions on the technical information of this application, including technical features, application functionalities, database design, and PHP scripts.

Technical Features

- GPS: GPS monitors user's location, provides navigation according to the preset route.
- Camera: Camera is used to take photos for the user accounts.
- Google Cloud Messaging (GCM): Google Cloud Messaging for Android (GCM) is a free service provided by Google that allows sending data to an Android-powered device, and also to receive messages from the device. It is used for the built-in message system and push notification services.
- SQLite: The internal SQLite database records the user information, location history and the message history.
- MySQL: The external MySQL database maintains the user's credentials with other account information and settings, users' group information, detailed location history, all the message history, and monitored places.
- Google Maps Android API utility library: This open-source library contains utilities that are useful for a wide range of applications using the Google Maps Android API.
 - Marker clustering: handles the display of a large number of points;
 - IconGenerator: display text on your Markers;
 - Poly decoding and encoding: compact encoding for paths, interoperability with Maps API web services.
- Picasso: Picasso is a powerful image downloading and caching library for Android. (<http://square.github.io/picasso/>). It allows for hassle-free image loading in our application.
- Android Image Cropper: Android Image Cropper is a powerful (Zoom, Rotation, Multi-Source), customizable (Shape, Limits, Style), optimized (Async, Sampling, Matrix) and simple image cropping library for Android. It is used to crop the photos for the users' profiles.

Application Functionalities

1. User Registration:

The app supports two kinds of users, including guardians and children. The parents or guardians can track children's location information, view children's location history and receive notifications for certain alerting situations with their children. They can also choose either to share their locations to other users or pause sharing for a certain time. On the other hand, the children will always have their locations shared to guardian. And they don't receive as many alerts as their parents.

- The user needs to register before using the app.
- The user will choose to create a new family group or join the exist one. When creating a new family group is chosen, the app will create a unique invitation code for such group, which allows other family members to join the group by enter the correct invitation code.
- The user can use the camera to take a photo for the profile, or they can choose any existing pictures on the phone instead.

2. Location Map:

The app displays the real time location for all family members who are sharing their locations in a map.

- Users with a photo in their profiles will have their photos shown on the map with their location marker.
- The app detects the user's activity with Google's API, returns the status with an associated confidence, such as IN_VEHICLE, ON_BICYCLE, ON_FOOT, etc., and displays it on the location information page.
- The location information page displays all location related information for the current user.
- Each user on the map is clickable for detailed location history.

3. Location History:

Besides checking the current location for all monitored users instantly, another functionality feature of the app is that all the past location histories remain available for future view.

- The app can display the location history for selected user according to a timeline.
- The app can change the time span for display from last 24 hours to last 7 days.

4. Push Notification:

The app helps the users to manage their activities by sending useful notifications generated from its location services.

- **Places Alerts:** The guardians are alerted when their children arrive at school, at home or even if they are nearby or far away from a place you have determined in the location map.

- **Battery Alerts:** The users are notified when their batteries approach a low level. At the same time, the guardians are alerted as well.

5. Group Messenger:

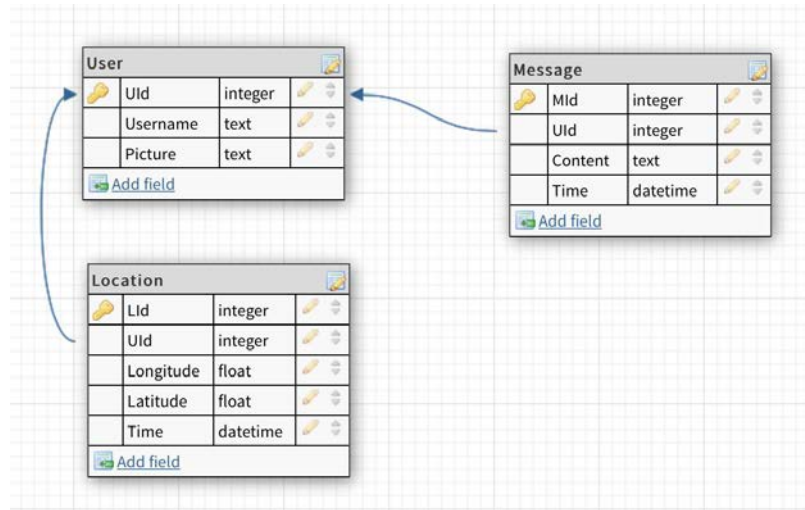
All users can send and receive text messages within the group using the built-in message system.

Database Design

1. Internal Database

Internal Database has 3 tables which record the user information, location history, and message history.

- User Table: the table stores user information.
 - UId: primary key, auto-increment
 - Username: string as username
 - Picture: picture of user
- Location Table: the table stores the current location information
 - LId: primary key, auto-increment
 - UId: foreign key to the User table
 - Longitude: float variable to store current longitude
 - Latitude: float variable to store current latitude
 - Time: datetime variable to store the timestamp when the location changes
- Message Table:
 - MId: primary key, auto-increment
 - UId: foreign key to the User table
 - Content: string as message content
 - Time: datetime variable to store the timestamp when the message record creates or changes



2. External Database

External Database has 5 tables including User, Family, Location history, Message history and Place.

- User Table: the table stores user information.
 - UId: primary key, auto-increment
 - FId: foreign key to the Family table
 - Username: string as username
 - Email: string as email
 - Password: string as password
 - Picture: picture of user
 - Guardian: boolean variable to determine whether the user is guardian or child
- Family Table: the table stores family information
 - FId: primary key, auto-increment
 - FamilyName: string as family name
 - InvitationCode: string as invitation code
- Location Table: the table stores the current location information
 - LId: primary key, auto-increment
 - UId: foreign key to the User table
 - Longitude: float variable to store current longitude
 - Latitude: float variable to store current latitude
 - Time: datetime variable to store the timestamp when the location changes
- Message Table: the table stores message information
 - MId: primary key, auto-increment
 - UId: foreign key to the User table
 - Content: string as message content
 - Time: datetime variable to store the timestamp when the message record creates or changes
- Place Table: the table stores favorite place information
 - PId: primary key, auto-increment
 - Name: string to store the name of the favorite place
 - Longitude: float variable to store the longitude of the favorite place
 - Latitude: float variable to store the latitude of the favorite place
 - FId: foreign key to the Family table

'Location' table stores the history records of people for others tracking them.

'Place' table stores the common places a family usually go. It is for detecting people's arriving.

'Message' table is for a group chat in a family.

User		
UId	integer	
FId	integer	
Username	text	
Email	text	
Password	text	
Picture	text	
Guardian	boolean	
Add field		

Family		
FId	integer	
FamilyName	text	
InvitationCode	text	
Add field		

Place		
PId	integer	
Name	text	
Longitude	float	
Latitude	float	
FId	integer	
Add field		

Location		
LId	integer	
UId	integer	
Longitude	float	
Latitude	float	
Time	datetime	
Add field		

Message		
MId	integer	
UId	integer	
Content	text	
Time	datetime	
Add field		

PHP Scripts

- `config.php`:
 - The purpose of this script is to set up configuration information for external database
- `Createfamily.php`
 - The purpose of this script is to create a new user together with creating a new family group
 - The output of this script, prints a JSON file containing the UId, FId, and invitation code
- `Joinfamily.php`
 - The purpose of this script is create a new user to join an existing family group by inputting the invitation code
 - The output of this script, prints a JSON file containing the UId, FId, and invitation code
- `Login.php`
 - The purpose of this script is login a user with email and password
 - The output of this script, prints a JSON file containing the UId, FId, and invitation code
- `Getlocation.php`
 - The purpose of this script is to download the location information and display all the active users on the map
- `Updaterrecord.php`
 - The purpose of this script is to upload the location information of current user to the external database
- `Message.php`
 - the purpose of this script is to send chat message content to the server
- `getMessage.php`
 - the purpose of this script is to acquire text message update from the server
 - the output of this script is the message updates after the timestamp
- `history.php`
 - the purpose of this script is to acquire a single user's history location
 - the output of this script is the history location of a user in the past 24 hours
- `get_7days_history.php`
 - the purpose of this script is to acquire a single user's history location
 - the output of this script is the history location of a user in the past 7 days
- `downloadpics.php`
 - the purpose of this script is to acquire a user's whole family's profile picture path
 - the output of this script is all family members' picture path
- `gcm.php`
 - the purpose of this script is to
 - the output of this script is
- `add_place.php`
 - the purpose of this script is to add a place to current user's geofencing list
 - the output of this script is if the action is successful
- `get_place.php`
 - the purpose of this script is to get al places in current user's geofencing list
 - the output of this script is current user's geofencing list

- `remove_place.php`
 - the purpose of this script is to remove a place to current user's geofencing list
 - the output of this script is if the action is successful