Establishment of visitor safety early warning system for Siberian Tiger and Leopard National Park based on Android Studio

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Abstract: *This paper describes an Android based National Park Beast early warning solution APP, which uses Android Studio as the development platform, combined with SuperMap Imobile for Android's powerful class library support. This class library can efficiently complete software development, meets the vast majority of mobile phone adaptation, improves the development of a wide range of applicability. The system mainly completes the basic functions of early warning, distress and emergency rescue, and provides additional services such as zoo navigation, service facilities guidance, etc. . It uses the C/S Architecture to analyze the user's position and the user's current state through the integrated devices including GPS receiver, gyroscope, accelerometer and so on. Then the data result is transmitted to the background through the shared wireless signal in the park in real time. The B/S architecture is adopted in the background, and the mainstream SSH framework is used to collect, analyze and store the data, and the user interface is convenient and quick, which is helpful for the security personnel to protect the personal safety of the tourists.*
Key words: *Android Studio; safety early warning system; visitors*

I.   Introduction

In recent years, with the growing importance of environmental protection, the state has attached more importance to wildlife protection. In order to better protect the natural environment and endangered wildlife, several national parks have been set up throughout the country, and the protection of the natural environment is more professional and systematic. Although the state has made great efforts to promote the development of national parks, due to various reasons, there are still problems such as the lack of professional personnel for multi-aspect management of national parks and the lack of guarantee for the safety of tourists and nearby residents. At this point building a professional security early warning system for tourists is particularly necessary.

1 Development platform and system architecture
1.1 Development platform

The system is developed by using the popular version of Android Studio 3.2, which is both efficient and fully documented, and AndroidX support is added to Android studio 3.2 to replace the previously released support library. Because previous support versions were so confusing, each update required an upgrade to the various support libraries, which created a lot of hidden problems for development. But that would not exist with the introduction of AndroidX in the future. It is only needed to maintain the AndroidX version through the development, for the development and maintenance of the system is a great help in the future and upgrade process also effectively to prevent version conflicts caused unnecessary trouble[1].

1.2 System architecture

This system mainly uses the mainstream Afinal rapid development framework, Afinal is an android IOC, orm framework, it has four major module functions inside: Final Acitivity,Final B itmap,Final Db,Final Http. With final Activity, we can bind Ui and events with annotations. With final Bitmap, we can easily load Bitmap images without worrying about oom and other issues. With the Final DB module, we can add, delete, and edit an android sqlite database in one line of code. With the final http module, we can request http data in the form of ajax. With final Bitmap, you don't have to worry about Bitmap oom when it's loaded on android or picture loading position when it's swiped. Afinal's mission is to be concise, fast, and to do everything in one line of code, with conventions greater than configuration[2].

The functions above can basically meet all the functional modules needed by the system, together with the

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implementation of map browsing, spatial analysis and other functions related to the interface, can run efficiently and stably on Android 4.0 and above.

II. Function description

2.1 Early Warning function

The Early Warning function mainly completes to the user the early warning function, in advance informs the user to encounter the danger which may meet in the tour route. Guide users to visit the park's landscape facilities, effectively avoid the risk of visiting. The feature highlights where the beast might be on a map, quiets users when they're far away from a dangerous area, and vibrates multiple times when they're near the center of the marked area. Users will be alerted to the danger area for a long time after entering the danger area, and the danger information will be transmitted to the security personnel platform through the network, the security personnel can see the user's current location in real time through the map, stand by for rescue[3].

2.2 Help and rescue function

This function mainly completes the user in distress when the aggressive beast appears, and quickly send out the distress information. The feature calls on the phone's accelerometer, gyroscope and speaker, and lets users quickly wave the phone to send a distress signal when they spot a beast. Then the user's own location information is sent synchronously to the security personnel information platform on the patrol. When the user is running fast, the user's abnormal acceleration information will be sent back to the user. At this time, the user's mobile phone will emit the sound of the beast's natural enemy to drive away the beast. The current user's location information will also be posted on the map of the warning function to prevent unwitting tourists from straying into the area.

2.3 Other functions

The system also provides guided tours and other functions, the system will be based on the wild animal activity of the day, planning the best tour route for visitors. At the same time when visitors in the park sudden illness, a one-click rescue system can also be used to immediately notify medical workers to go to the rescue.

The system provides a sharing function, visitors can find in the yard to share the fun, nearby visitors will receive this share, according to the preferences of visitors to visit. The system also checks the user's movement record to remind the user where areas are available for visitors to rest and shop.

III. Key technologies

3.1 Map components

This component is the core of the whole system, the system mainly uses the Baidu map API interface to achieve map component support[4], using the method of superimap mobile for Android to achieve other related functions. First create the project in Android Studio and download the relevant jar package from the official Baidu map website and place the jar package under the app/libs path[5].

A central step in calling Baidu maps is to configure the AndroidManifest.xml file. You need to apply for your own AK (api-key) code in Baidu's official website, and use the following configuration to import map information:

```
<meta-data
android:name="com.baidu.lbsapi.API_KEY"
android:value="********AK 码******">
</meta-data>
```

Through the steps above you can achieve the call to Baidu map, at this time, the user interface appears near the map information. Put all the central points of danger area in the List collection, then loop through it and put inbuilder.include() method, build LatLngBounds, finally create the MapStatusUpdate object, pass in LatLngBounds and the width and height of the current MapView to realize the danger area identification function[6]. For other functions, such as early warning, route planning, one click rescue, sharing, and so on, you need to call the relevant method of SuperMap Imobile for Android in Android Studio. Classes such as BufferAnalystParameter, TransportationAnalystSetting, AggregatePointsOnline, and so on can implement these functions.

3.2 Sensor calls

3.2.1 Gyroscope

The use of mobile phone sensors is an innovation of the system. Create the SensorManager variable, create the sensor manager, and then get the service permissions for the system sensors using the following code:

```
MyManage = (SensorManager)getSystemService(SENSOR_SERVICE);
```

After getting permissions, start listening to bind the gyroscope, using the registerListener method. This

method requires three parameters:

Parameter 1: The class of the SensorEventListener interface, which invokes the onSensorChanged method when data arrives;

Parameter 2: The registered sensor obtained;

Parameter 3: The required response rate.

The code is as follows:

```
boolean enable = MyManage.registerListener(MySensor_listener,
MyManage.getDefaultSensor(Sensor.TYPE_GYROSCOPE),
SensorManager.SENSOR_DELAY_UI);
```

At this point, the system completes the monitoring function of the gyroscope in the mobile phone, and can transmit the data in real time[7].

3.2.2 Accelerometer

Using accelerometer in Android will help you identify your phone's posture and movement status[8]. The accelerometer method is much the same as for other sensors, and can be implemented by calling the system API[9]. It mainly includes the following steps.

1. Get The SensorManager;
2. Use The SensorManager to get accelerometer;
3. Create a custom sensor listener function and register;
4. Correspondingly, the logout listener call is implemented in the proper place.

IV.   Conclusion

In recent years, there have been increasing reports of animal attacks on zoo visitors. Siberian Tiger and Leopard National Park is the main distribution area of Siberian tiger and leopard in our country. In view of this, this article designs the Siberian Tiger Leopard National Park Visitor Security Early Warning System based on the android platform, combines the handset to bring the gyroscope and the acceleration sensor function, provides the enormous convenience for the visitor through the handset APP, is an innovative direction for Android development. Visitors can use the APP to provide early warning, calling for help, emergency rescue and other functions. Once an animal attacks human, that visitor can use the APP for rescue. We hope that this system can provide more visitors with convenience and security.

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