Village GIS Application

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1. Introduction

The Village GIS (VGIS) application is an IT based mobility solution to reliably capture and digitize the information related to geographical data in remote villages. The VGIS is a generic software that can be configured to cater to different needs. This Guide describes the VGIS configured for Pest Management of Red Gram. All the data is photographed and saved on the mobile device using easily available technologies like Android mobile phones. Whenever the device is connected to the internet through Wi-Fi, GPRS or 2G, data is uploaded to a centralized server and stored in a database.

2. Solution Architecture

The solution comprises of a client and server application. The client is an Android application that runs on a mobile device and is used to capture the data on site. Multiple mobile devices can be used to capture data from each location as well. The server application runs on cloud, captures the uploaded data and stores it in a database. Reports are then generated from this centralized data repository.

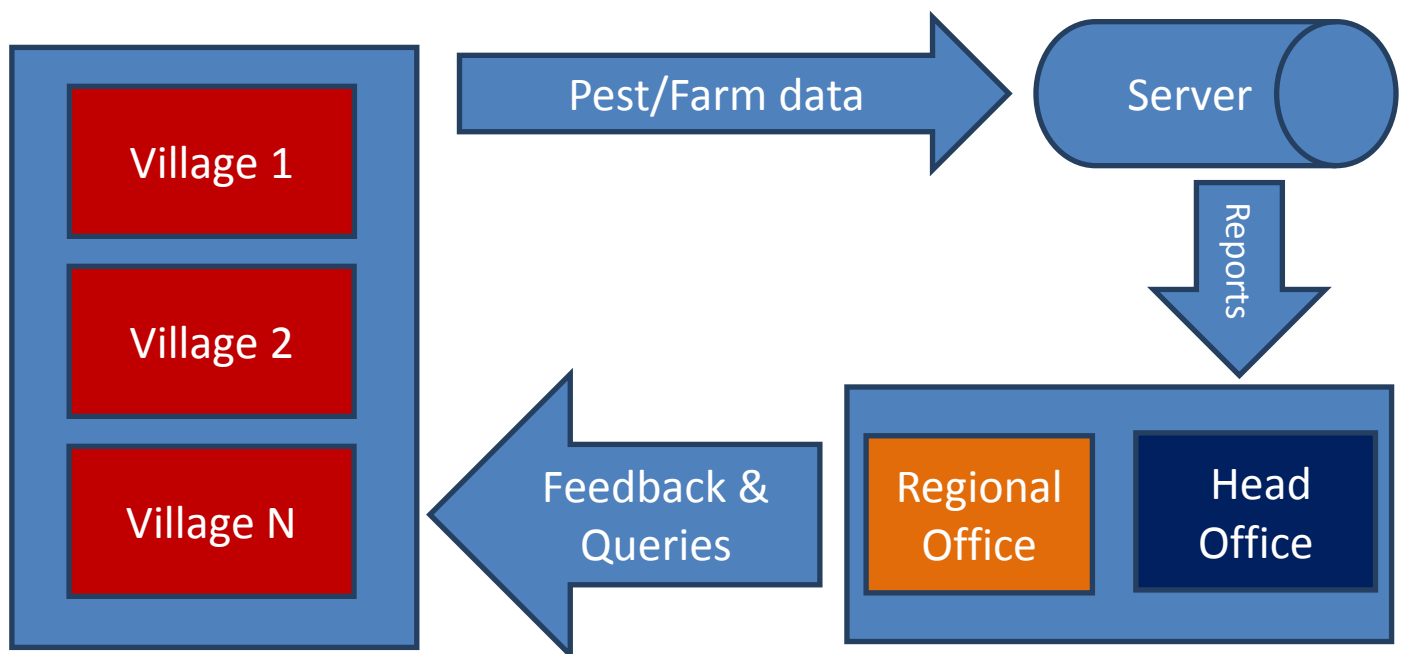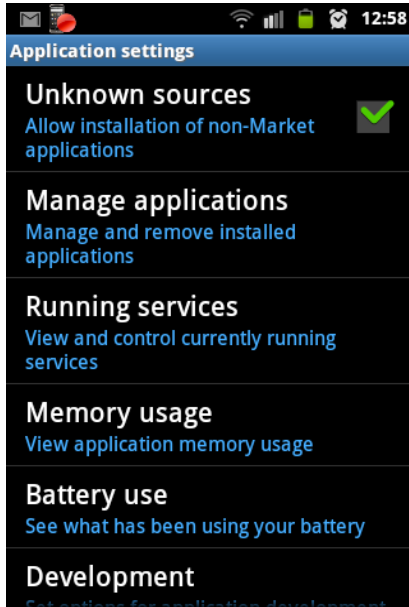The overall data process flow is as depicted in Figure 1.

Figure 1: Data Flow Diagram

3. Installation

Supported Android OS: Version 2.3 and above.

Preparing the mobile device: Enable Unknown Sources in the Security Settings.

Enable GPS in the Security Settings

Go to Settings and select Location and Security
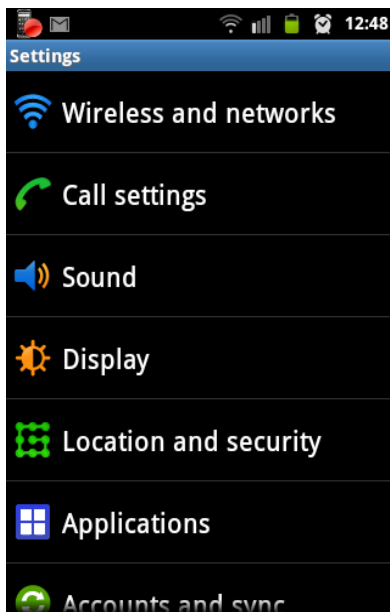
Under Locations and Security Enable

- Use Wireless Networks
- Use GPS Satellites
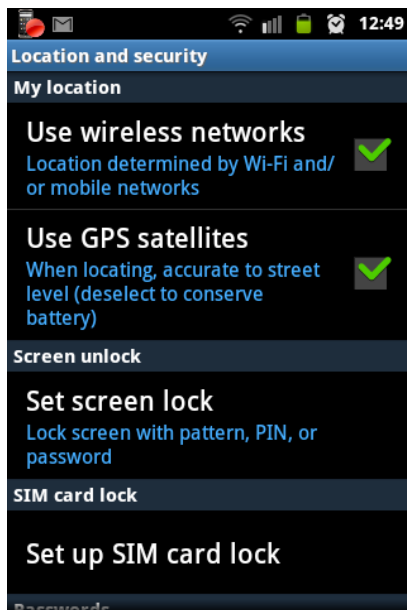
Note : The GPS has to connect to at least 7 satellites to get location information.

Download the VGIS Android Client (VillageGIS_V01_04_04.apk) on the Android mobile device.

Installation: Now navigate to the directory where you have copied or downloaded your APK file. Mostly, it's stored in the "Downloads" folder on your Android device. Once in the directory, tap the APK icon and an installation dialogue box will pop-up. Hit the install button to install the APK on your Android.

Download the VGISResource folder in the same location as the VGIS folder. This folder contains the resources used by the applications. The resources can be in local language. This guide shows resources in English language. The VGISResource folder has three sub-folders :

- FeatIcons
- PropIcons

3.1 Layers

The VGIS for Pest Management of Red Gram has only one Layer. The icon for this should be placed in the VGIS/FeatIcon folder. Since there is only one layer it is called L1_

The "Number" icon at the bottom indicates the number of surveys that have been saved on the phone.

Touch the icon above to proceed to the next screen.

3.2 Application Features
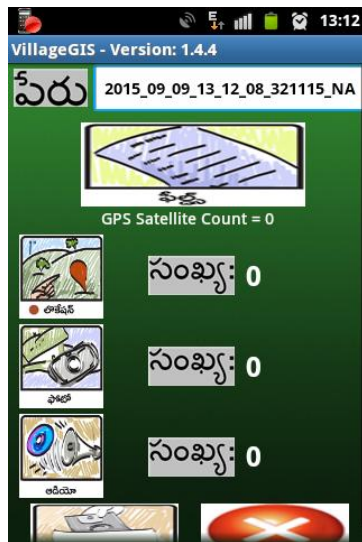
The features are represented by graphical icons. These icons should be placed in the VGIS/AppIcons folder. The application features are :

- Geo-tagging
- Photgraph
- Audio recording
- Properties

Name – The survey will be saved with this name

Fields – This icon represents Properties. Text data can be captured against each of the properties. Click on this icon to proceed to the next screen where you can enter text data about the survey.

Entering data in the Property Fields

The properties have to be entered as text or numbers, or can be selected from pre-filled drop down menus.
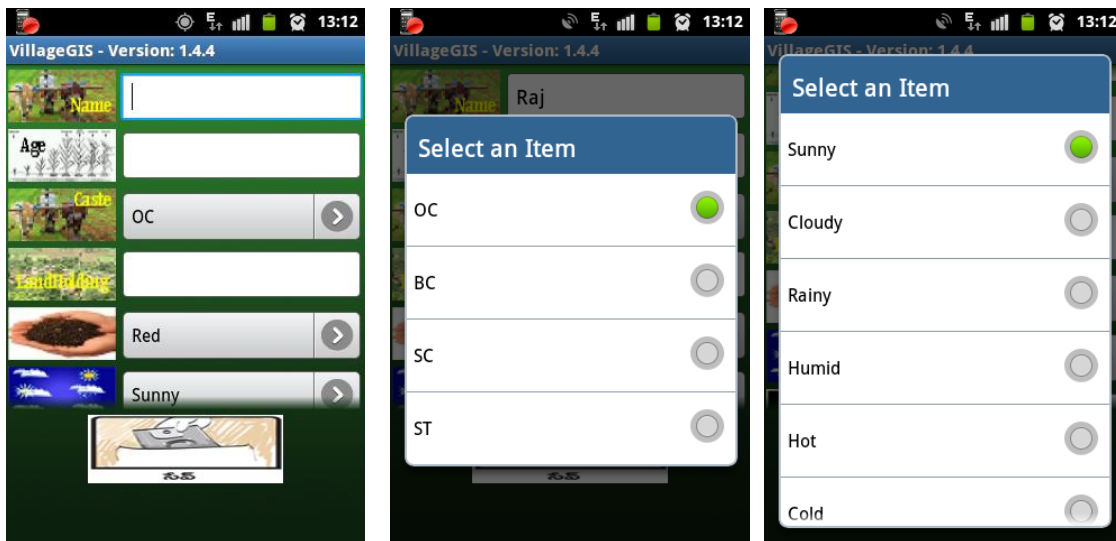
Name (text field) – Enter the name of the farmer

Age (Integer Number) – Enter the age of the farmer

Caste – Select one option from the drop-down list

Land Details (Decimal number) – Enter a decimal number

Type of Soil – Select one option from the drop-down list

Weather – Select one option from the drop-down list

Click on the Save icon to save all these parameters.

The count on the main screen will be increased by one.
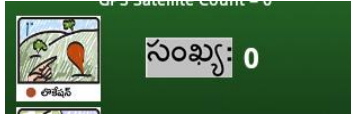
The Circle – This icon is used for geo-tagging of the field. Click on this icon to mark the point. Multiple points on the field can be marked. A polygon will be constructed joining the marked points. The number next to the icon indicates the number of surveys saved.

Note : GPS has to be enabled to capture location information. The device should be help open to sky so that the Satellite Count is at least 7.
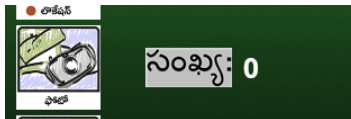
Camera – This icon indicates taking photographs of the field. Click on the icon to click a photograph. Multiple photographs can be taken. The number next to the icon indicates the number of photographs saved.

Loudspeaker – The icon indicates recording of audio. Click on the icon to record audio comments about the survey. The number next to the icon indicates the number of audio recordings saved.

Click on the green circle to start the audio recording. Click on it one more time to stop the recording.
Click on the blue arrow button to play back the recorded audio
The audio recording can be saved with a specific name.
Multiple audio recordings can be taken.

The last two icons at the bottom are to Save the survey or to Cancel the survey.

3.3 Application properties

The image icons for the application properties are placed in the folder VGISResource/FeatIcons. These properties can be configured in the xml file. This process is explained in the Appendix section of this document. Once the images and properties have been configured for an application, the VGISResource folder can be copied to all the other mobile devices that will be used for this application. Each user does not need to modify any of the properties configured.

3.4 Save the captured data on the mobile

The count indicates the number of survey that have got saved on the device

3.5 Upload Data to the Server
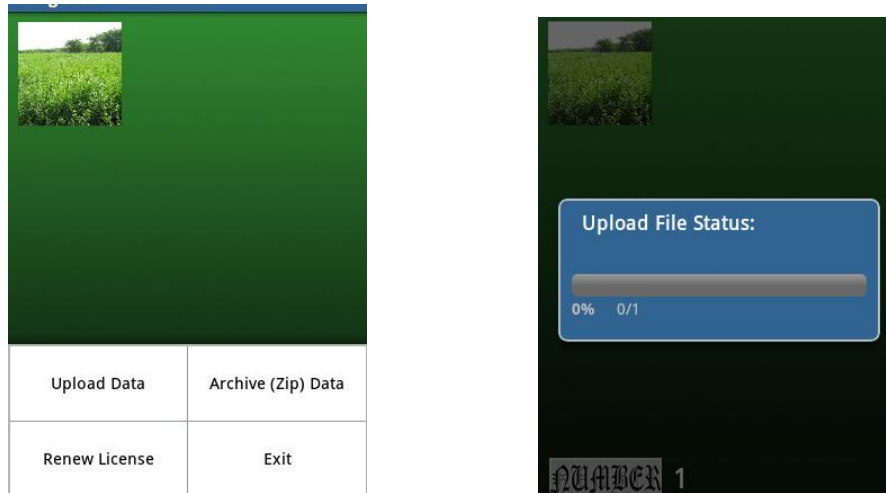
The Upload Data option will upload the saved survey to the server

If there is no connectivity to the server, the Save button will result in data being saved locally in the mobile device in a folder called VGISOutbox.

3.6 Trouble-shooting

If the Location mapping is not getting enabled, it means the GPS is not enabled.

Enable the GPS in the mobile device's Settings.

The mobile device should be open to the sky to get satellite data for location marking. The GPS Satellite Count should be at least 7 or more to get accurate latitude and longitude values of the place.

3.7 User Tips

1. Make sure you have GPS and wireless communication enabled.
2. Do not move the phone during a photo capture.
3. Report any errors or connectivity problems ASAP

Appendix A - Configuration of Layers and Properties

The Layers and the properties on each layer can be configured for specific applications. The layers are named L1, L2, L3 and so on. In each layer, you can have properties configured depending on the specific application. The properties are named L1_P1, L1_P2, L3_P3 and so on.

For this application of Red Gram Pest Management, the top-most layer is called L1. and the properties are configured through the L1_FieldsConfig.xml file. This config file should be placed in the VGISResource folder. The contents of the file are given below :

```
<Feature name = "l1_RedGram">
        <OFeatureName>l1_RedGram</OFeatureName>
        <FeatureName>Red Gram</FeatureName>
        <Field name = "l1_p1_FarmerName">
                <OFName>l1_p1_FarmerName</OFName>
                <FName>Farmer Name</FName>
                <FType>FIELD_TEXT</FType>
                <FDefVal>Raj</FDefVal>
                <FBitmap>l1_p1_FarmerName.png</FBitmap>
        </Field>
        <Field name = "l1_p2_FarmerAge">
                <OFName>l1_p2_FarmerAge</OFName>
                <FName>Farmer Age</FName>
                <FType>FIELD_INT</FType>
                <FDefVal>0</FDefVal>
                <FBitmap>l1_p2_FarmerAge.png</FBitmap>
        </Field>
        <Field name = "l1_p3_FarmerCaste">
                <OFName>l1_p3_FarmerCaste</OFName>
                <FName>Farmer Caste</FName>
                <FType>FIELD_LIST</FType>
                <FDefVal>OC</FDefVal>
                <FBitmap>l1_p3_FarmerCaste.png</FBitmap>
                <FListValues>
                        <Item>OC</Item>
                        <Item>BC</Item>
                        <Item>SC</Item>
                        <Item>ST</Item>
                </FListValues>
        </Field>
        <Field name = "l1_p4_FarmerLand">
                <OFName>l1_p4_FarmerLand</OFName>
```

```xml
                    <FName>Farmer Land</FName>
                    <FType>FIELD_DOUBLE</FType>
                    <FDefVal>0.0</FDefVal>
                    <FBitmap>l1_p4_FarmerLand.png</FBitmap>
            </Field>
            <Field name = "l1_p5_SoilType">
                    <OFName>l1_p5_SoilType</OFName>
                    <FName>Soil Type</FName>
                    <FType>FIELD_LIST</FType>
                    <FDefVal>Red</FDefVal>
                    <FBitmap>l1_p5_SoilType.png</FBitmap>
                    <FListValues>
                            <Item>Red</Item>
                            <Item>Black</Item>
                            <Item>Alluvial</Item>
                    </FListValues>
            </Field>
            <Field name = "l1_p6_Weather">
                    <OFName>l1_p6_Weather</OFName>
                    <FName>Weather</FName>
                    <FType>FIELD_LIST</FType>
                    <FDefVal>Sunny</FDefVal>
                    <FBitmap>l1_p6_Weather.png</FBitmap>
                    <FListValues>
                            <Item>Sunny</Item>
                            <Item>Cloudy</Item>
                            <Item>Rainy</Item>
                            <Item>Humid</Item>
                            <Item>Hot</Item>
                            <Item>Cold</Item>
                    </FListValues>
            </Field>
            <Field name = "l1_p7_PestType">
                    <OFName>l1_p7_PestType</OFName>
                    <FName>Pest Type</FName>
                    <FType>FIELD_LIST</FType>
                    <FDefVal>Sunny</FDefVal>
                    <FBitmap>l1_p7_PestType.png</FBitmap>
                    <FListValues>
                            <Item>Maruca</Item>
                            <Item>GrassHopper</Item>
                            <Item>Worms</Item>
```

```
                </FListValues>
        </Field>
</Feature>
```

Description of each field

The top-most layer is called l1_RedGram

```
<Feature name = "l1_RedGram">
        <OFeatureName>l1_RedGram</OFeatureName>
        <FeatureName>Red Gram</FeatureName>
```

If there is one more layer, another such block should be added into the config xml file.

For this layer the properties are configured as fields as explained below :

```
<Field name = "l1_p1_FarmerName">
                <OFName>l1_p1_FarmerName</OFName>
                <FName>Farmer Name</FName>
                <FType>FIELD_TEXT</FType>
                <FDefVal>Raj</FDefVal>
                <FBitmap>l1_p1_FarmerName.png</FBitmap>
</Field>
```

The name of the property is "l1_p1_FarmerName" which means it is property 1 of layer 1. The text FarmerName has been added into the name only to make it explicitly clear what the property is about.

```
<FType>FIELD_TEXT</FType>
<FDefVal>Raj</FDefVal>
```

The type of the property is FIELD_TEXT and the default value is Raj. The default value can be changed as required.

```
<FBitmap>l1_p1_FarmerName.png</FBitmap>
```
This specifies the image that will be shown on the mobile corresponding to this property. In case the image file is not available, the text specified in the
```
<FName>Farmer Name</FName>
```
Will be shown.

The fields can be of following types :

FIELD_TEXT

FIELD_INT
FIELD_DOUBLE
FIELD_LIST

A default value can be specified for each of the types. The value to be specified as the default should be placed within
<FDefVal></FDefVal>
For e.g. the default value for Integer is zero which is specified as
<FType>FIELD_INT</FType>
<FDefVal>0</FDefVal>

The drop-down list is specified as FIELD_LIST. The options to be shown in the list should be placed within the <FListValues> </FListValues> options. For e.g. this is the list for soil types.
<FListValues>
        <Item>Red</Item>
        <Item>Black</Item>
        <Item>Alluvial</Item>
</FListValues>

About mSpace Technologies

mSpace Technologies Private Limited is founded by former IIT and IIM graduates with over 80 man years of experience in conceptualizing and implementing Information technology solutions. We provide Mobile Business Advantage to businesses across verticals (Infrastructure, Logistics, Utilities etc) by providing the following quality services:

- Business Consultancy
- Mobile Strategy - Solution conceptualization
- Design and Build Mobile Applications and end to end solutions
- Managed Solution Design Expertise - Hosting and Maintenance

These solutions are aimed at tracking and optimizing any business process or activity spread across various geographies thereby allowing near real-time monitoring of operations. This results in not only major savings in time, material and management but can also be used to significantly optimize operations through analysis of the data collected.

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