
MRF Grader Blade Up/Down Sensor

User Manual

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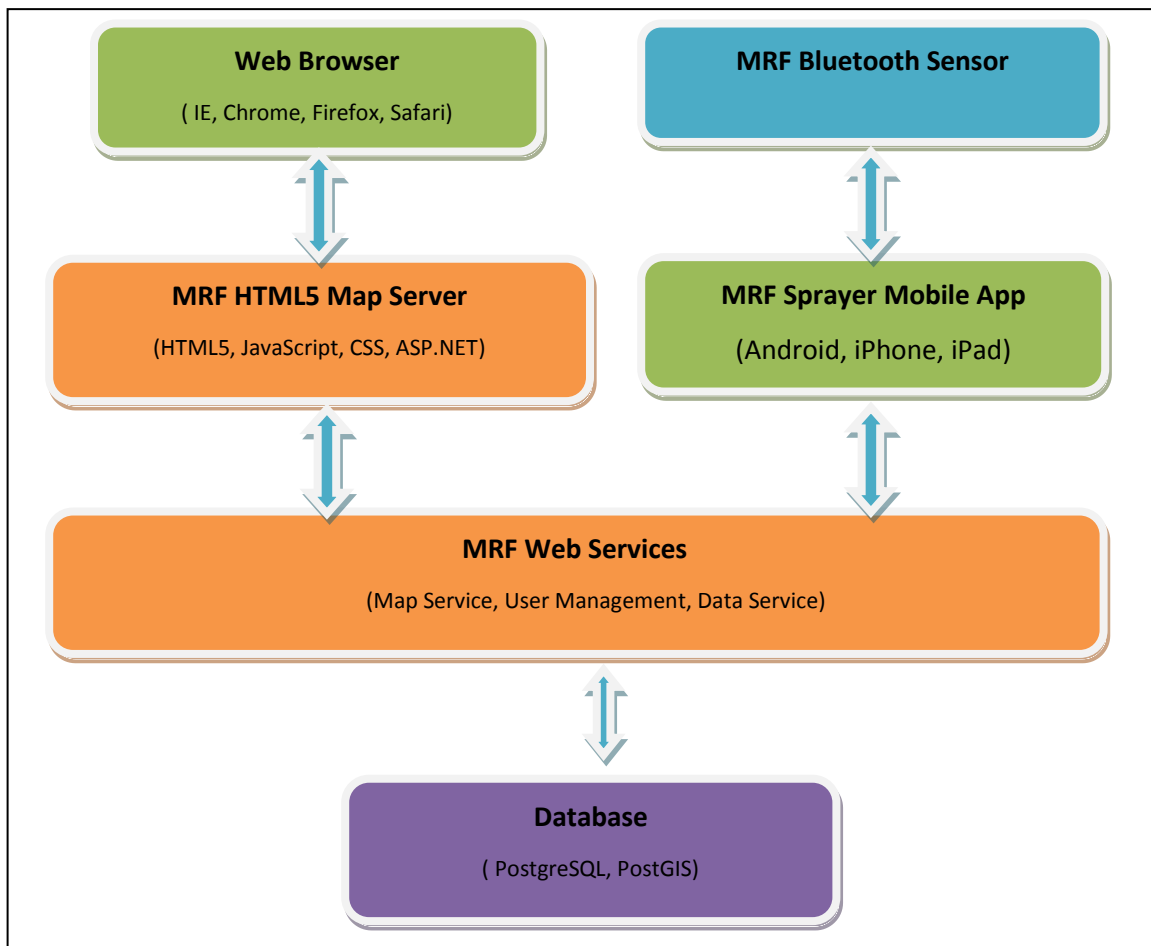
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1. Introduction

Spray service companies and municipal field personnel want to identify spray areas for management records and client reports. MRF Sprayer Solution can get this recording and reports done automatically. With the help of this sprayer map app, the spray records will be detailed, systematic and professional. And much more, it's done automatically, so it will help to reduce the time on preparing the reports and tracing the record. MRF designed a small Bluetooth sensor attached to the sprayer gun and developed an app for recording the sprayed area via the smartphone (Patent Pending). The completed tasks can be viewed online on desktop computers, smartphones and tablets.

2. Architecture

The following diagram shows the system architecture:



3. MRF Bluetooth Sensor

To start, the Bluetooth sensor needs to be attached to a sprayer gun.

Please refer to “Appendix A – MRF Bluetooth Sensor Installation Guide” for sprayer sensor installation instructions.

4. MRF HTML5 GIS Website

The GIS website provides access for users to view/manage spraying tasks on a map interface. Users can view areas covered by spraying work in a simple and straightforward way.

After you subscribe to MRF website service, MRF will setup the following user IDs for you:

- Company User: eg. MRF
- Subordinate User: eg. emp1@MRF

The company user is able to create tasks and assign tasks to employees.

The subordinate (employee) user will see the list of assigned tasks after they login to the website.

4.1 User Login

Use the credentials provided by MRF to login to the MRF Sprayer GIS website at

<http://mrfsprayer.com/SprayerWeb/logon.aspx>

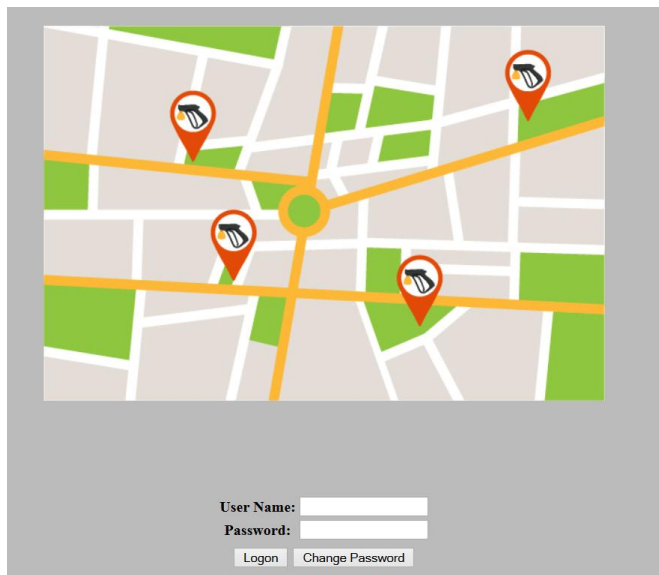


Fig.1. User login page

The user interface will be different depending on the user type (Company User or Subordinate User):

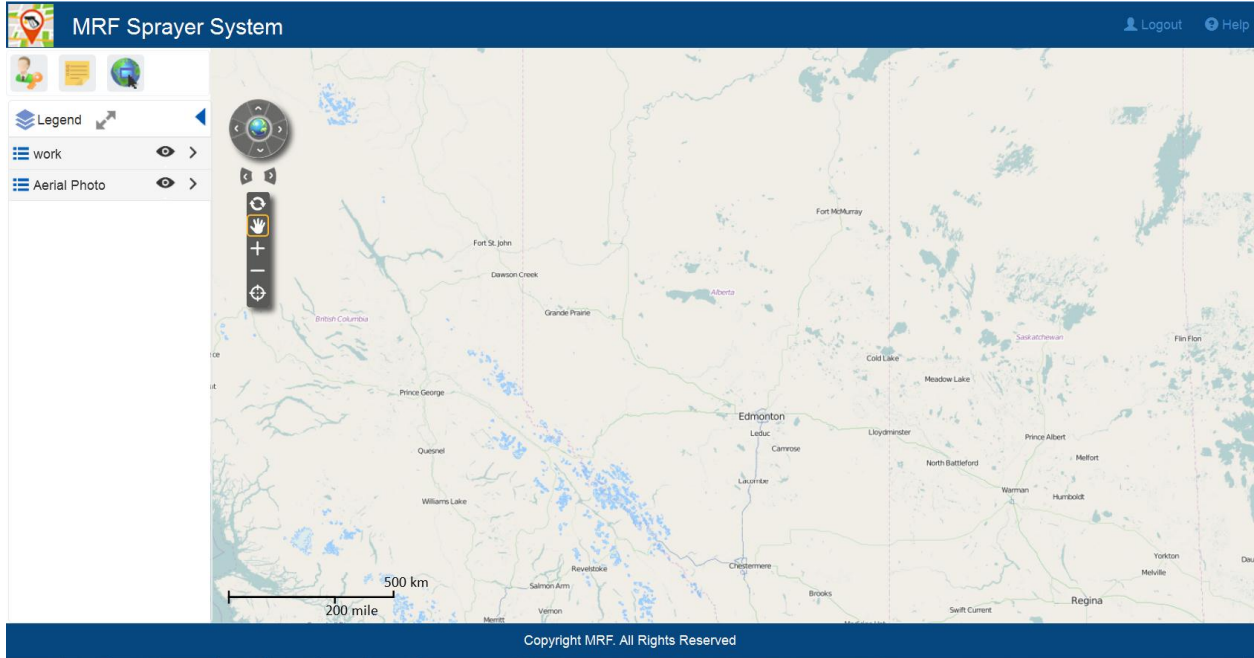


Fig.2. User interface for company user

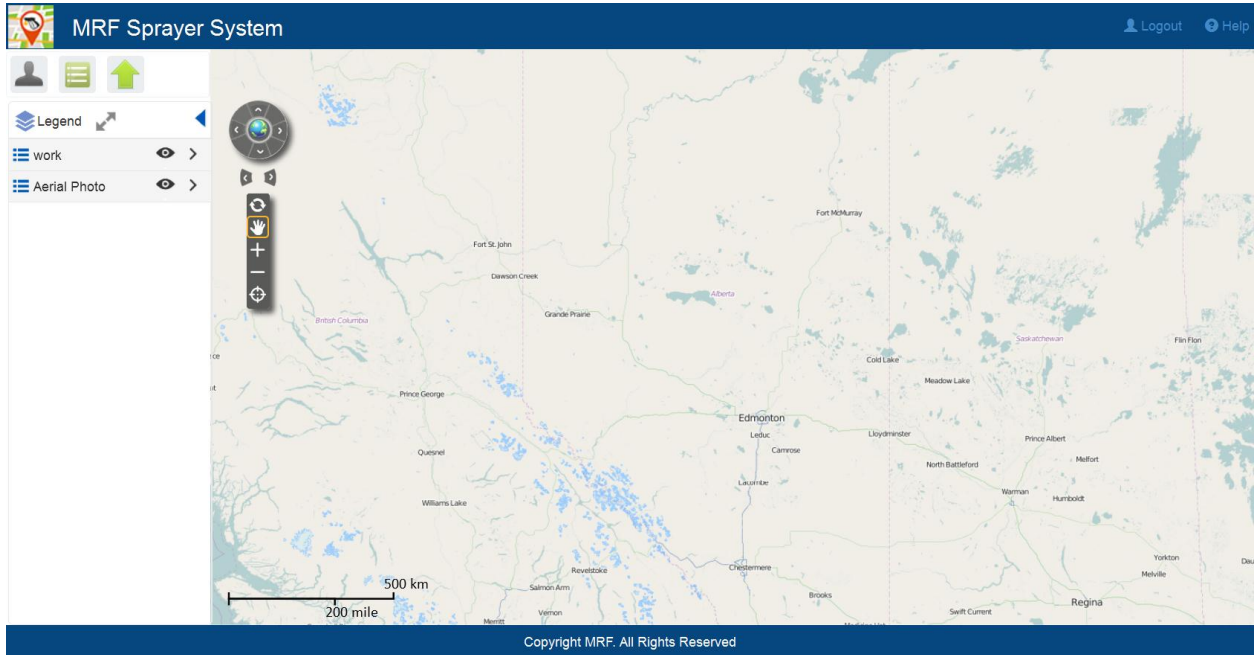

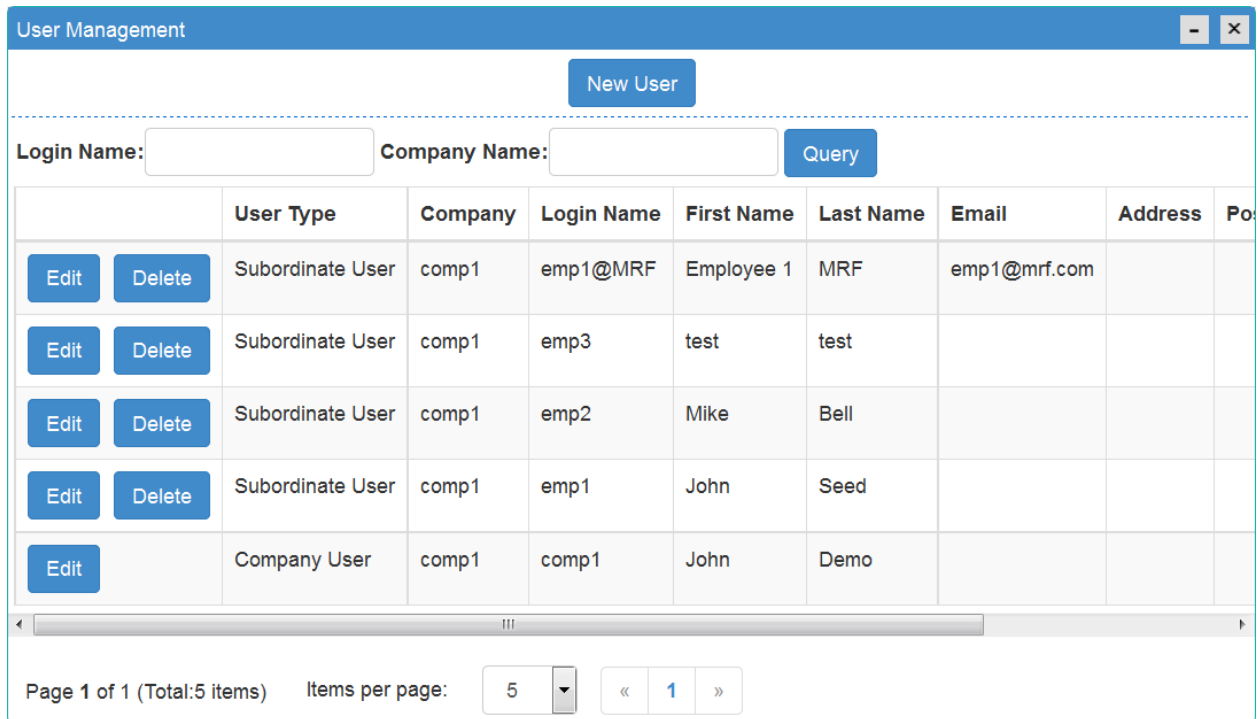


Fig.3. User interface for subordinate user

4.2 User Management (Company User)

Click on  to create/edit/delete users.




	User Type	Company	Login Name	First Name	Last Name	Email	Address	Pos
Edit Delete	Subordinate User	comp1	emp1@MRF	Employee 1	MRF	emp1@mrf.com		
Edit Delete	Subordinate User	comp1	emp3	test	test			
Edit Delete	Subordinate User	comp1	emp2	Mike	Bell			
Edit Delete	Subordinate User	comp1	emp1	John	Seed			
Edit	Company User	comp1	comp1	John	Demo			

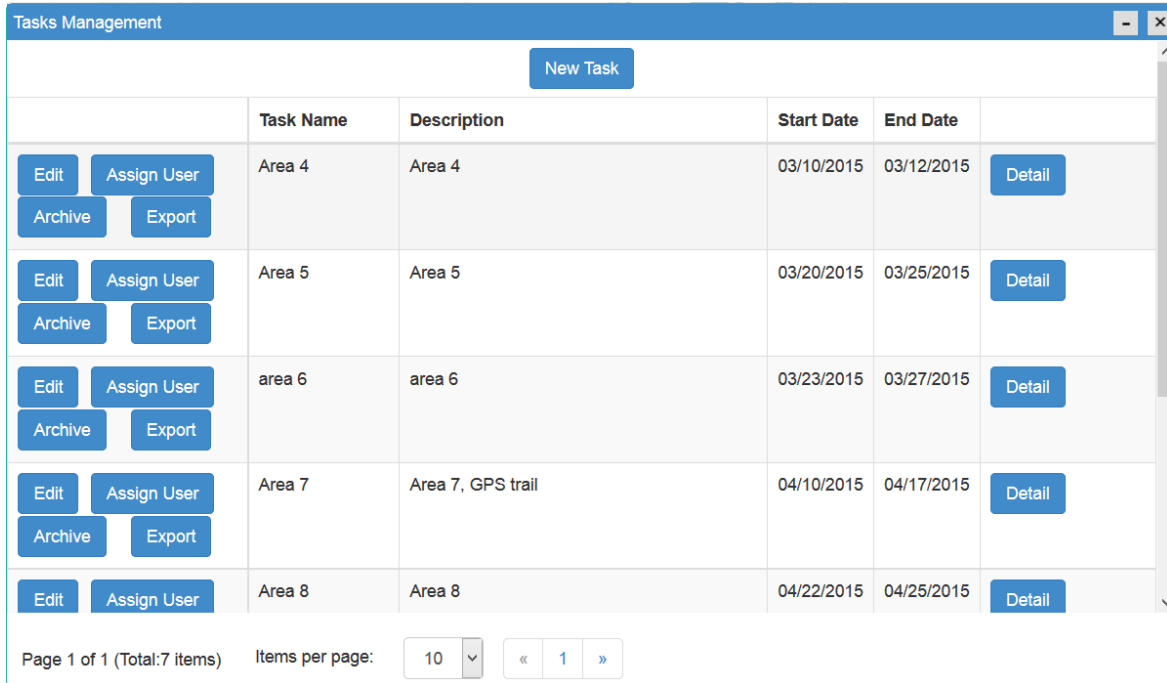
Page 1 of 1 (Total:5 items) Items per page: 5 « 1 »

Fig.4. User Management

Note: It's recommended to create the subordinate user ID in the following format: employee1@company name.

4.3 Task Management (Company User)

Click on  to create/edit/delete tasks. One task can be assigned to multiple subordinate users. The archived tasks will not be displayed on the current task list. All the tasks can be exported as shape files.

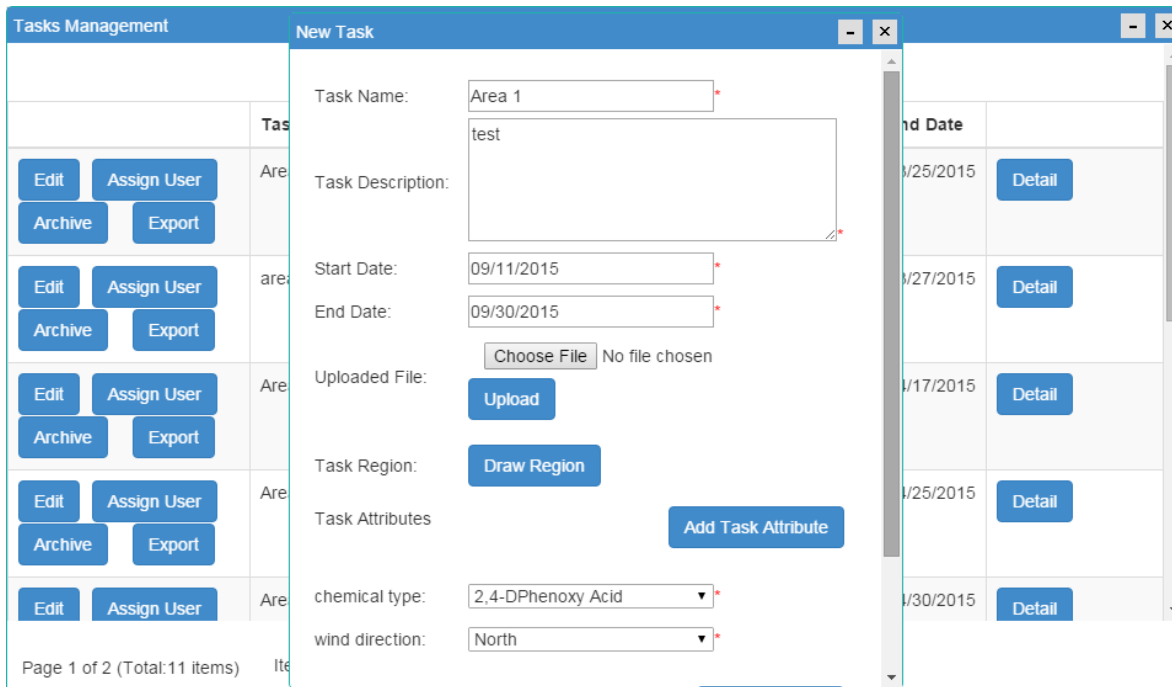


The screenshot shows a 'Tasks Management' window with a 'New Task' button at the top. Below it is a table with the following columns: Task Name, Description, Start Date, and End Date. The table contains five rows of tasks:

Task Name	Description	Start Date	End Date
Area 4	Area 4	03/10/2015	03/12/2015
Area 5	Area 5	03/20/2015	03/25/2015
area 6	area 6	03/23/2015	03/27/2015
Area 7	Area 7, GPS trail	04/10/2015	04/17/2015
Area 8	Area 8	04/22/2015	04/25/2015

Each task row has a set of buttons: 'Edit', 'Assign User', 'Archive', and 'Export'. A 'Detail' button is located to the right of each row. At the bottom of the window, it shows 'Page 1 of 1 (Total: 7 items)' and 'Items per page: 10'.

Fig.5. Task Management



The screenshot shows the 'New Task' form in the 'Tasks Management' window. The form has the following fields and controls:

- Task Name:** Text input field with value 'Area 1'.
- Task Description:** Text area with value 'test'.
- Start Date:** Date picker with value '09/11/2015'.
- End Date:** Date picker with value '09/30/2015'.
- Uploaded File:** 'Choose File' button, 'No file chosen' text, and 'Upload' button.
- Task Region:** 'Draw Region' button.
- Task Attributes:** 'Add Task Attribute' button.
- chemical type:** Dropdown menu with value '2,4-DPhenoxy Acid'.
- wind direction:** Dropdown menu with value 'North'.

The background shows a partial view of the task list from the previous screenshot, with 'Page 1 of 2 (Total: 11 items)' at the bottom.

Fig.6. Create New Task

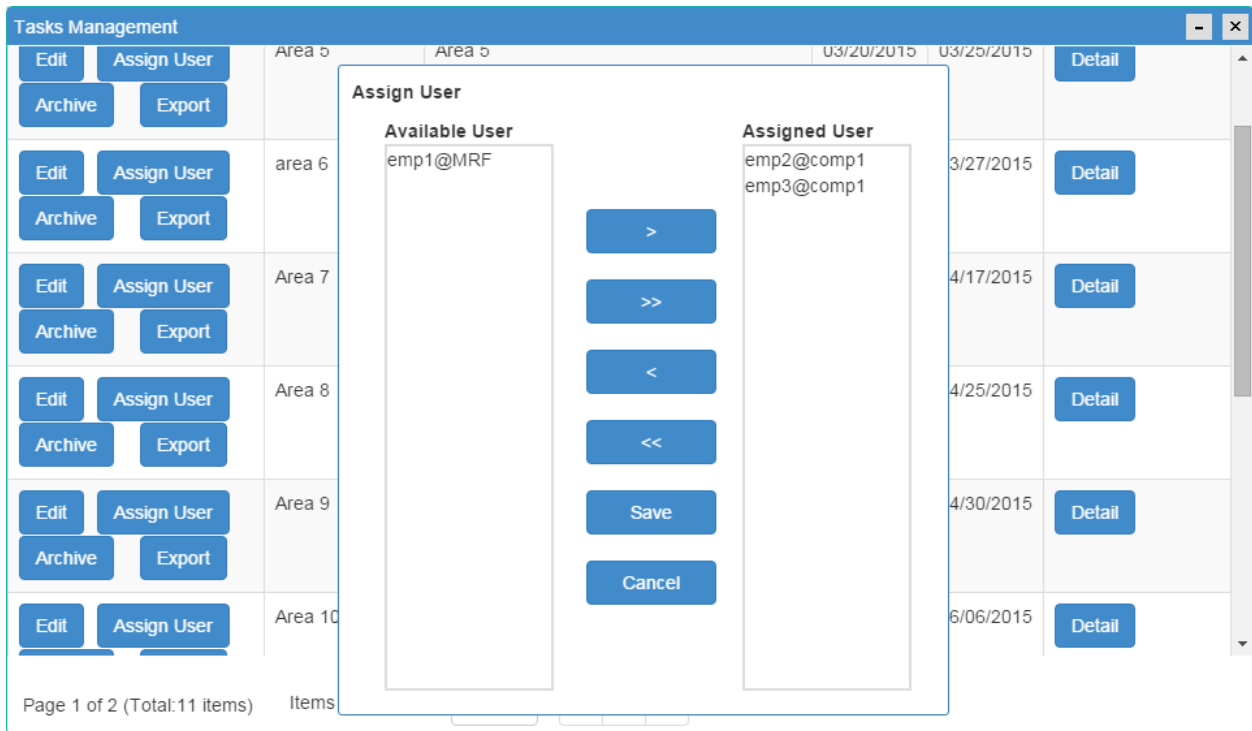



Fig.7. Tasks Assignment

After the task is created and assigned, the subordinate users will be able to see the tasks assigned to them either through the website or mobile app.

4.4 Search (Company User)

Click on  to search for archived tasks.

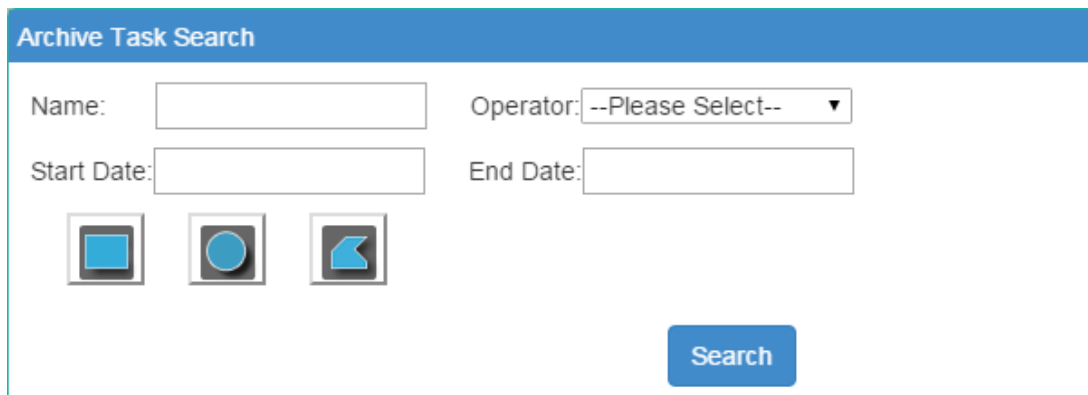

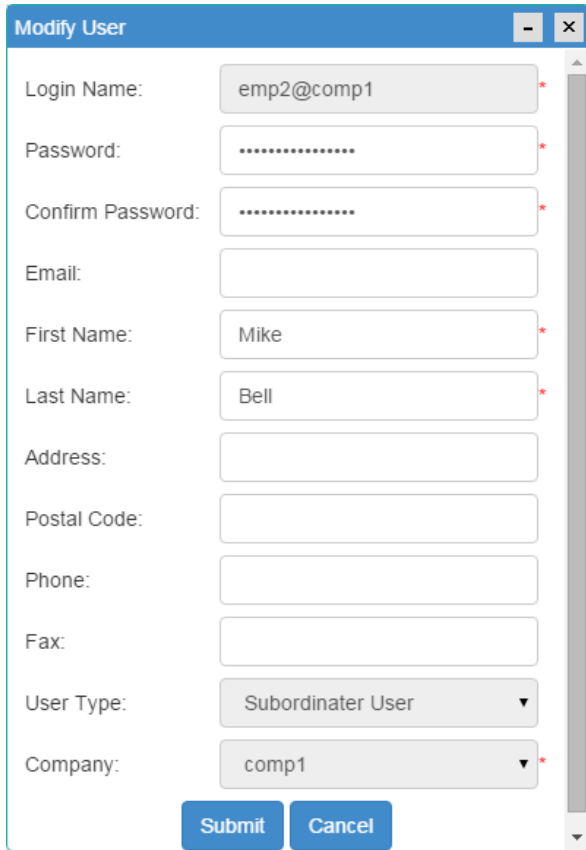


Fig.8. Search

4.5 User Information (Subordinate User)

Click on  icon to edit user information.




The 'Modify User' dialog box contains the following fields and values:

- Login Name: emp2@comp1
- Password:
- Confirm Password:
- Email: (empty)
- First Name: Mike
- Last Name: Bell
- Address: (empty)
- Postal Code: (empty)
- Phone: (empty)
- Fax: (empty)
- User Type: Subordinator User
- Company: comp1

Buttons: Submit, Cancel

Fig.9. Modify User

4.6 Task List (Subordinate User)

Click on  to view the list of assigned tasks. Click on "Detail" button for the information about the task. A highlighted area will show on the map representing the task area. The blue dots represent the sprayed locations. The yellow dots represent the GPS locations.

Task Name	Description	Start Date	End Date	
Area 5	Area 5	03/20/2015	03/25/2015	Detail
area 6	area 6	03/23/2015	03/27/2015	Detail
Area 8	Area 8	04/22/2015	04/25/2015	Detail
Area 10	area 10	06/02/2015	06/06/2015	Detail
area13	area 13	07/27/2015	07/29/2015	Detail

Fig.10. Task List

The screenshot displays a software interface with three main components:

- Tasks List (Left):** A table listing tasks with columns for Task Name, Description, Start Date, End Date, and a Detail button. The tasks listed are Area 5, area 6, Area 8, Area 10, and area13.
- Task Detail Form (Center):** A form for 'Area 10' with the following fields:
 - Task Name: Area 10
 - Description: area 10
 - Start Date: 06/02/2015
 - End Date: 06/06/2015
 - Task Attribute:
 - chemical type: Roundup/Glyphosate
 - weather temperature: 10
 - wind speed: 100
 - wind direction: North
 - gun type: AB-17G 600ml cup gravity types
- Map (Right):** A street map showing a residential area with streets labeled 1 Avenue NW through 10 Avenue NW and 14 Street NW through 16 Street NW. A cluster of yellow and blue markers is visible on the map, corresponding to the task location.

Fig.11. Task detail

5. MRF Sprayer Mobile App

The Sprayer Mobile App is to assist subordinate users in the field to record and send sprayed locations to the GIS website.

Currently the Sprayer Mobile App can be run on devices that support Bluetooth Low Energy (4.0), specifically:

- Android 4.3 and later
- iOS 5 and later

The user can search "MRF Sprayer Map" from "Play Store" on your Android device or from "App Store" on your iPhone/iPad.

Direct links,

<https://play.google.com/store/apps/details?id=com.mrf.sprayer>

<https://itunes.apple.com/ca/app/mrf-sprayer-map/id1022031550>

MRF will provide the support to install the appropriate mobile app once you have installed the sprayer sensors to the sprayer guns. The Sprayer App requires internet connection and Bluetooth to perform the task. The screenshots in this guide are based on iOS version. Android version is similar.

5.1 Login

Use Subordinate User ID and password to login to the Sprayer Mobile App.

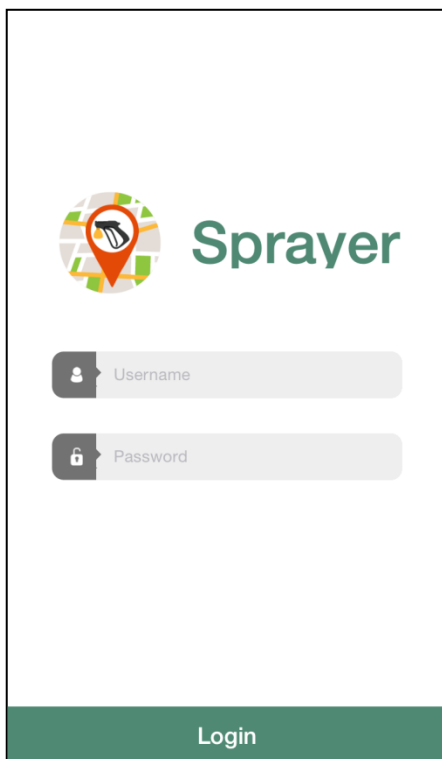
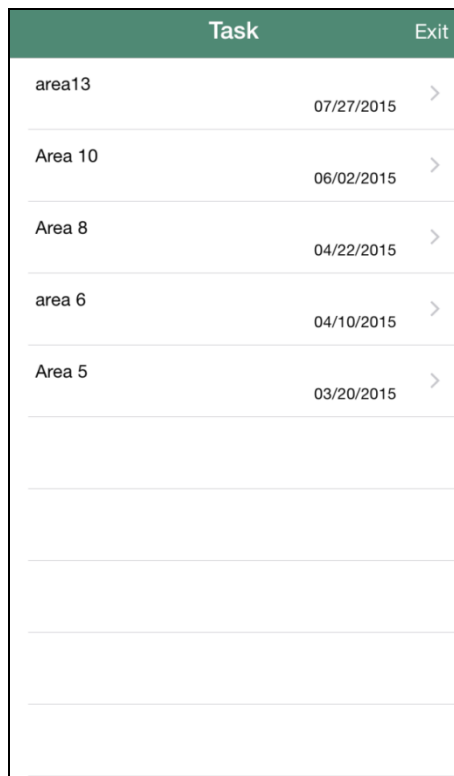


Fig.12 Sprayer Mobile App Login

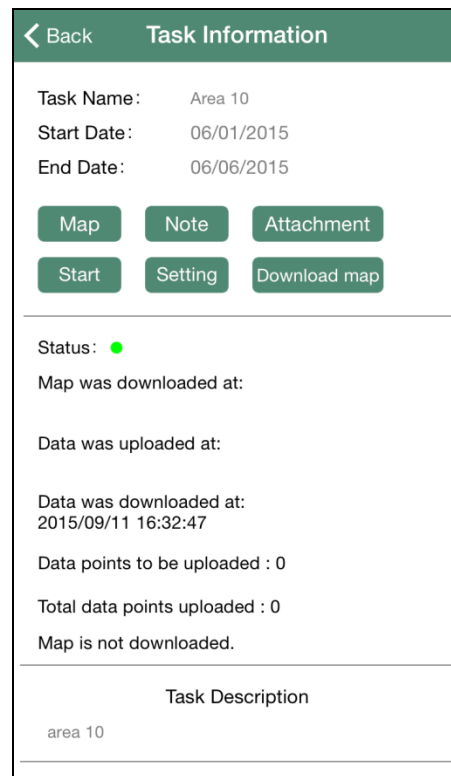
5.2 Task List

After login, a list of assigned task will be displayed. Click on a task to view the detailed Task Information.



Task	Exit
area13	07/27/2015 >
Area 10	06/02/2015 >
Area 8	04/22/2015 >
area 6	04/10/2015 >
Area 5	03/20/2015 >

Fig.14. Task list



Task Information

Task Name: Area 10
Start Date: 06/01/2015
End Date: 06/06/2015

Map Note Attachment
Start Setting Download map

Status: ●

Map was downloaded at:

Data was uploaded at:

Data was downloaded at:
2015/09/11 16:32:47

Data points to be uploaded : 0
Total data points uploaded : 0
Map is not downloaded.

Task Description
area 10

Fig.15. Task detail

5.3 Setting

Connect the Sprayer Mobile App with the sprayer sensor before start the task.

- 1) Click on “Setting” button on the Task Information page.
- 2) **Trace Frequency** - the interval for sending spraying dots.
- 3) **Radius** - the size of the spraying points on the map.
- 4) Two Tracing Modes:
 - **GPS Only** – the app sends out current location at the “Trace Frequency”.
 - **Bluetooth** – every time the trigger is pressed, the sensor will send out a signal to record a spray point on the map.

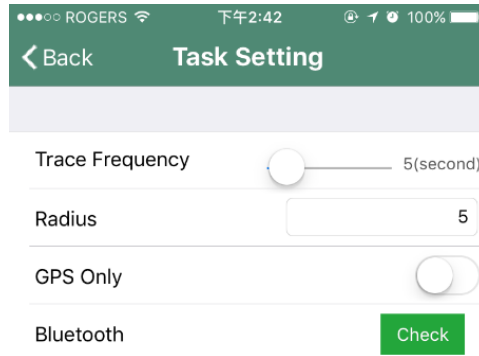


Fig.16. Task setting

To set up the Bluetooth, please click on “Check” button. It will start searching for Bluetooth sensors near you. The status bar should change to **Checking**. Then press the sprayer trigger in order to synchronize the Bluetooth between the sprayer and the app (Fig.17).



Fig.17. Pressing Sprayer Trigger

The name of the Bluetooth sensor will appear on the setting page (Fig.18) after connection.

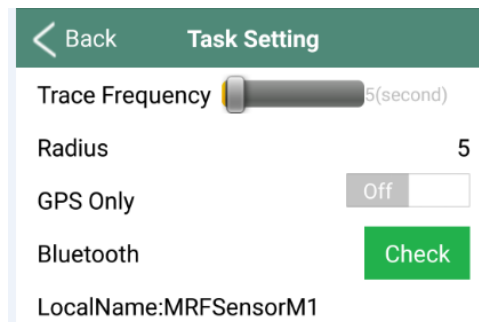


Fig.18. Bluetooth Sensor Name

5.4 Start

Click on “Start” button to begin recording spraying positions.

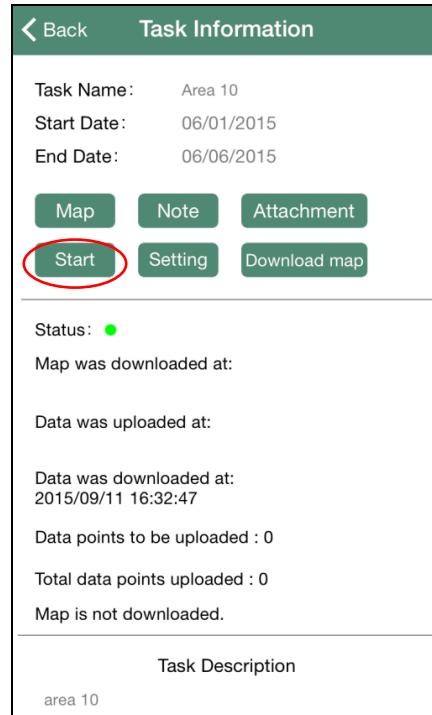


Fig.19 Start

The user can click on “Map” button to view the points locally on the map.



Fig.20. Display Spraying points on a Local Map

Click “Pause” button to pause the current task.

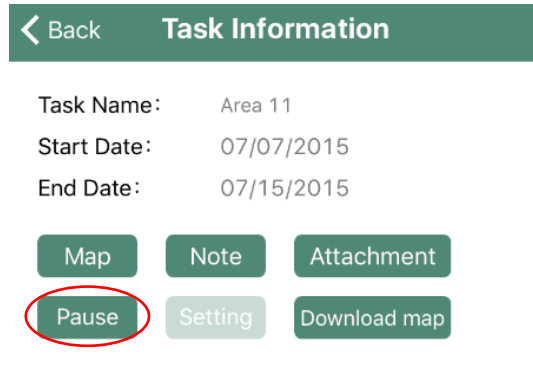


Fig.21 Stop Sending Spraying Points

The local points will be uploaded to the GIS website later automatically when there is internet connection.

5.5 Uploading Notes

The user can also view and upload some notes about the spraying task such as chemical type, weather condition etc.

- Click on the “Note” button in the setting page to view a list of notes (Fig.22).
- View the note details by clicking on each note from the list.
- Create a note by clicking on the “+” sign on the upper right corner.

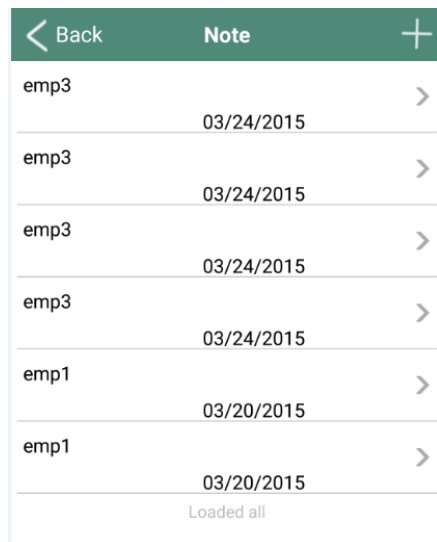


Fig.22. Note List

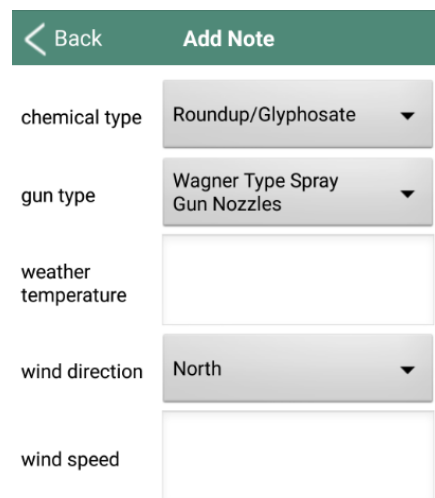


Fig.23. Create Note

Appendix A – MRF Bluetooth Sensor Installation Guide

Tools

- Pliers
- Philips #1 screwdriver
- Drill
- 1/8" drill bit
- Zip ties
- Rubber strap
- 1/8" Pin Punch
- Hammer
- Metal to Metal Epoxy
- Coarse Grit Sand Paper
- Neodymium Magnet
- MRF Bluetooth Sensor
- Tape

STEP 1: Verify Sensor

Put the sensor box with flat side down on a table. Bring the magnet close to the cylindrical sensor. As the magnet gets close to the sensor, a faint red light will light up in the sensor box. It will stay lit up for a second before turning off.



If the light does not light up, try to replace the lithium battery inside the sensor box with a new one. To replace the lithium battery, use a Philips screwdriver to remove the 4 screws that hold the main sensor box.



Open the box, replace the lithium battery inside with a new one, then close the box and tighten the screws. The model of the lithium battery should be CR2032.



If the light still does not come on, do not install this sensor. Please contact MRF for support.

STEP 2: Separate Sprayer

Use a hammer, pin punch, and pliers to remove the two pins holding the finger guard and the lever. Do not lose any of the parts that come out.



STEP 3: Attach the magnet

Using sandpaper, roughen the inside of the lever about half an inch from the end. This will allow epoxy to effectively adhere to the lever. Next, put some epoxy on the roughened part, and drop a magnet into it. Make sure the magnet doesn't stick out too much. Put the lever to the side and let the epoxy set.

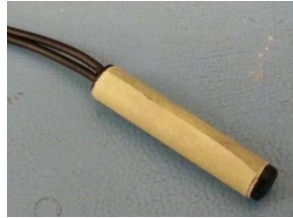


STEP 4: Modify Sensor (Optional)

Use a Philips screwdriver to remove the 4 screws holding the cylindrical sensor.



Cut a 1" long piece of tape and wrap it around the sensor. The tape should go all the way around the sensor once, and have a small overlap.



Put the sensor back into its holder and tighten the screws. The cylindrical sensor should no longer slide in the housing.



STEP 5: Attach Sensor Box

Put the rubber strap on back of the sensor box.



Attach the sensor box to the bottom of the finger-guard with the rubber strap.

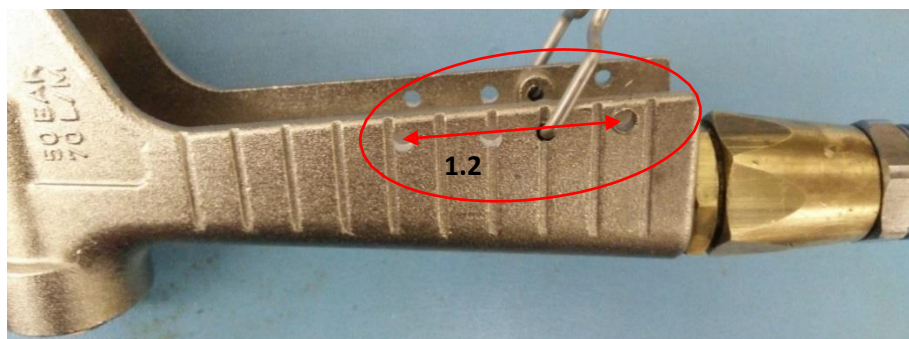


Secure the sensor box in place with a zip tie. Wrap the sensor wire in the gap between the sensor box and the finger guard. The sensor should have 2" of wire left coming out of the wrap close to the pin hole. Use another zip tie to secure the top of the sensor board to the finger guard, locking the wires in between the two in the process.



STEP 6: Secure Sensor to Sprayer

Using a 1/8" drill bit, drill a hole about 1 1/4" away from the existing pin hole. The hole should be about the same distance away from the inside of the handle as the existing pin hole, and the hole should be through both sides of the handle.



Then feed a zip-tie through both of these holes.



Feed the sensor under the lever lock and put it underneath the zip-tie with the flat part of the sensor casing against the handle. Tighten the zip-tie and make sure there is no extra slack around the handle, as it will be uncomfortable to hold.



STEP 7: Final Assembly

Put the spring on the engaging pin.



Align the holes on the lever with the holes on the handle, compressing the spring slightly.



Align the finger guard holes with the holes on the handle. Make sure the locking lever is not jammed between the finger guard and the handle when installing the guard.



Put the thick pin in first. It should go through the holes closer to the front of the sprayer. The pin should go through the finger guard, handle, and the lever.

Push the sensor cable to one side of the handle to ensure that it is not getting crushed between the finger guard and handle. Put the thin pin through the handle and the finger guard.



After installation, a faint red light should light up on the sensor box when you pull the trigger.

Appendix B – FCC and Industry Canada Notice

FCC Notice to Users

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Orpyx Medical Technologies Inc. has not approved any changes or modification to this device by the user. Any changes or modification could void the user's authority to operate the equipment.

Industry Canada Notice to Users

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the devices.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage;
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.