

DBMS Project: Fix-It Felix

Team members:

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Problem

Potholes on Indian roads are not being filled. This poses a threat to the lives of drivers and pedestrians. Over the past 3 years it has claimed 15,000 lives ([source](#).)

Solution

This is an opportunity for the community or local construction companies to take action. The website aims to solve this issue by connecting the problem with the solution. The solution is to build a website that:

- Allows the user to submit photos of potholes from which location data is taken.
- Those who intend to fix the potholes (mender) can enter their location. The distance between them and the nearest pothole is calculated.
- After the potholes are fixed then the authority checks if the potholes are fixed and then close the request.

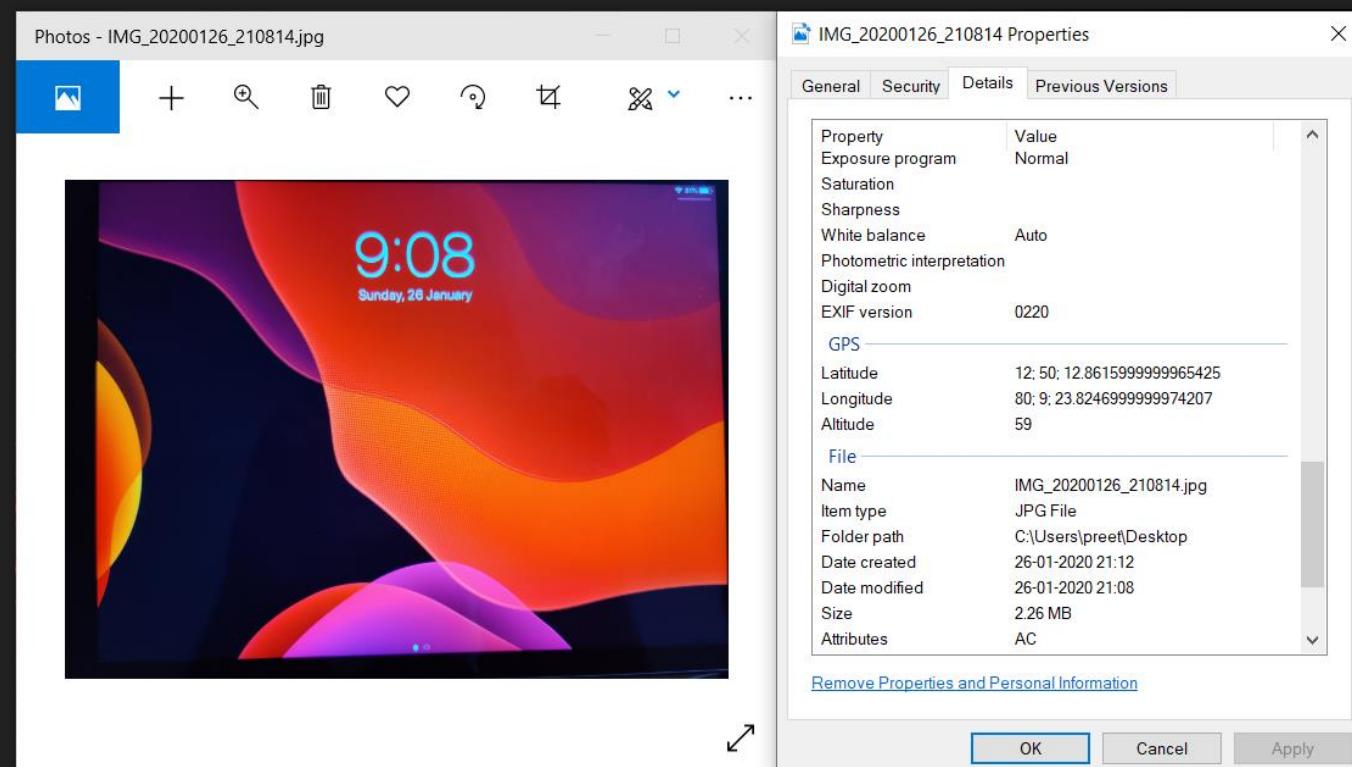
Principle

Every image taken with a smartphone can store the location in its **EXIF** file.

EXIF

- **EX**changeable **I**mage **F**ile format is a standard that describes the format of images, sound and ancillary tags used by digital cameras.
- The EXIF format has standard tags for location information. Cameras and smartphones in today's age store location data in the EXIF header.
- The process of adding geographic information to a photograph is known as geotagging.

Principle



Principle

Metadata

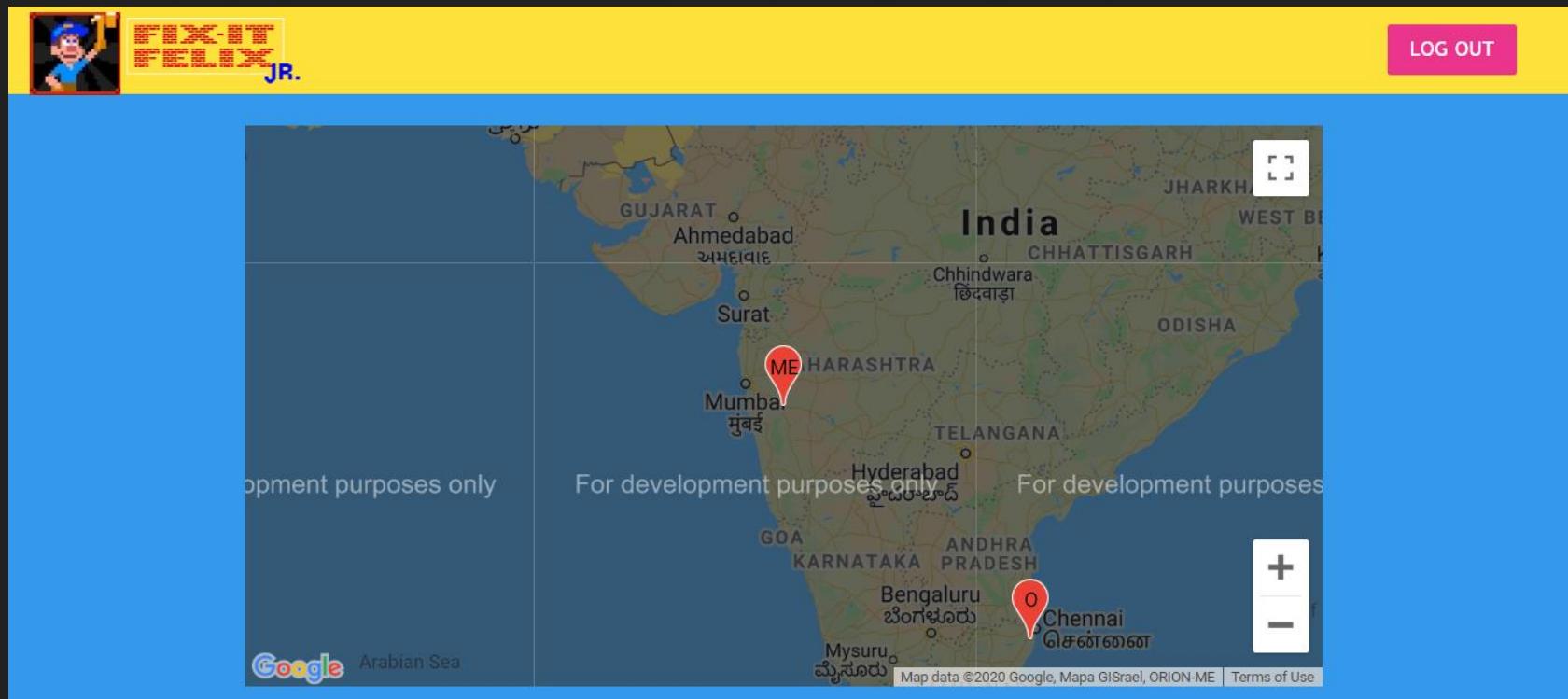
This file contains additional information such as Exif metadata which may have been added by the digital camera, scanner, or software program used to create or digitize it. If the file has been modified from its original state, some details such as the timestamp may not fully reflect those of the original file. The timestamp is only as accurate as the clock in the camera, and it may be completely wrong.

Camera manufacturer	NIKON CORPORATION
Camera model	NIKON D7100
Author	krd
Copyright holder	krd / cc-by-sa-3.0
Exposure time	1/160 sec (0.00625)
F-number	f/2.8
ISO speed rating	800
Date and time of data generation	10:04, 15 October 2014
Lens focal length	200 mm
Show extended details	

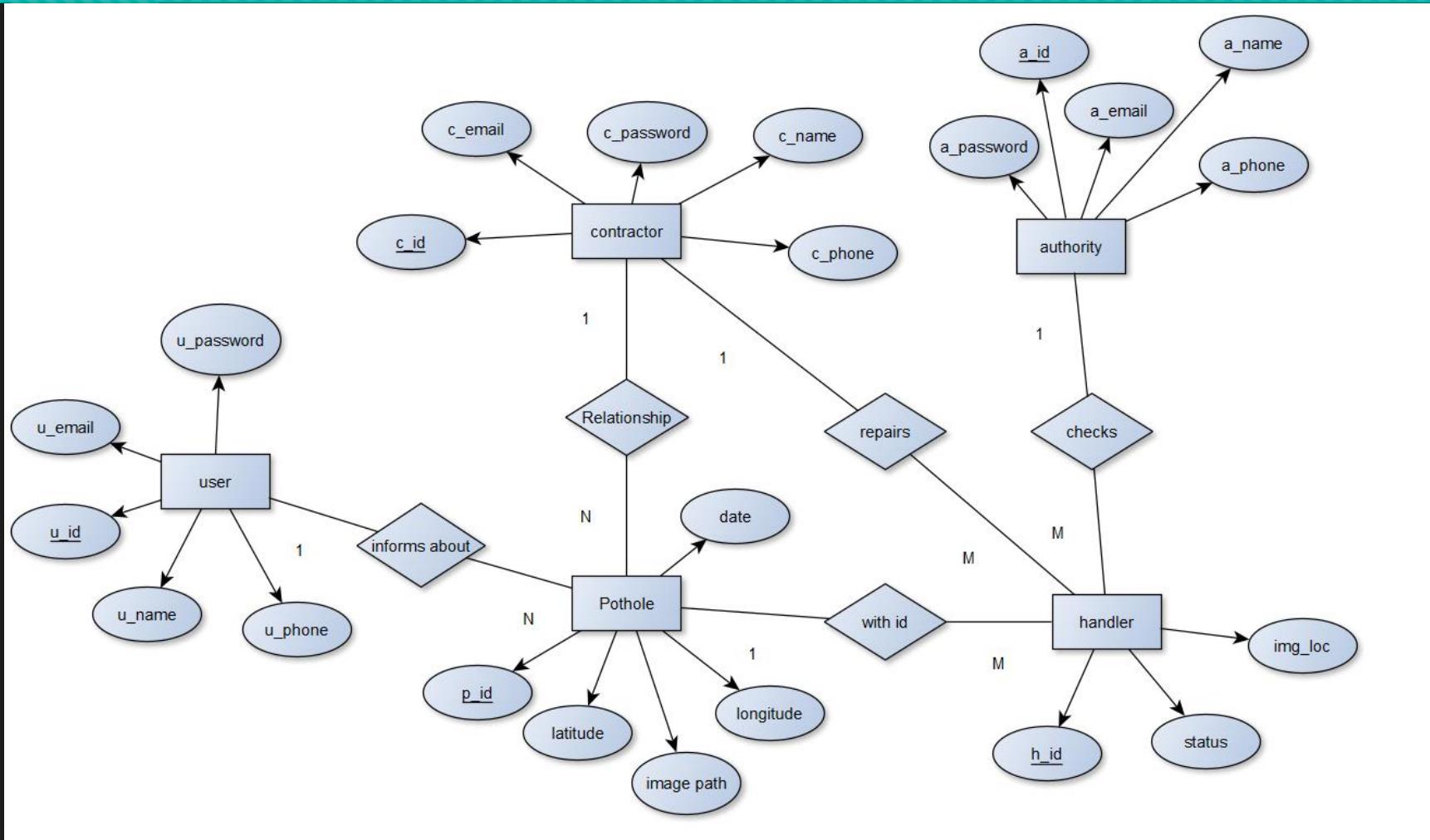
EXIF metadata of an image of Wikipedia

Principle

- The pothole location is used for:
 - Finding the distance between the contractor and the pothole using the [Haversine formula](#)
 - Displaying the location on Google Maps using Google Maps API.



Entity Relationship Model



Relational Schema

- User(**u_id**, u_email, u_password, u_name, u_phone)
- Contractor(**c_id**, c_email, c_password, c_name, c_phone)
- Authority(**a_id**, a_email, a_password, a_name, a_phone)
- Pothole(**p_id**, **u_id**, latitude, longitude, img_loc, date)
 - u_id** is foreign key from table user
- Handler(**h_id**, **p_id**, **c_id**, **a_id**, status, img_loc)
 - p_id** is foreign key form table pothole,
 - c_id** is foreign key from table contractor,
 - a_id** is foreign key from table authority

Pros of using a DBMS

- A DBMS helps maintain data integrity by the use of primary and foreign keys, not null constraints and referential constraints.
- It ensures that data like usernames is not duplicated.
- Simple queries are required to extract information.
- Insertion, updating and deletion of records is simple.
- Access to information can be controlled.

Software Used

The front-end will use HTML and CSS and the back-end will use PHP+MySQL.

PHP and MySQL are the most popular open source database and scripting in the current trend. PHP is a server-side scripting language, hence it creates significant dynamic pages with customized features. One of the main benefits of using PHP and MySQL is, it provides an interactive, user-friendly website and also facilitates visitors to openly interact while producing a genuinely dynamic and flexible content.

Advantages of using PHP with MySQL

- PHP has methods to extract EXIF data from uploaded images
- PHP and MySQL are both open source and free
- Both have wide support and have extensive documentation
- Compatible with operating system like IIS, Apache
- Platforms independent and runs on Linux, Windows, or Unix
- User friendly and offers multilingual support
- Wider support for other popular databases like Informix, Oracle, Sybase, etc.

Advantages of using PHP

- **Open Source**

PHP is open-source and free of cost, which helps developers to install it quickly and readily available for use. There are a lot of PHP frameworks to choose from.

- **Platform Independent**

PHP is mainly supported by all the operating systems like Windows, Unix, Linux etc. The PHP based developed web applications can be easily run on any platform. It can be integrated with other programming language and database easily and there is no requirement of re-development.

- **Simple and Easy**

This advantage of PHP is its simplicity and ease of learning and coding. It is mainly organized code and clean, which helps new developers. The command functions of PHP can easily learn and understood.

- **Compatibility with databases**

PHP has a built-in modules that is used to connect to databases easily which reduce the time to connect to a database management system(**mysqli PHP library**). Multiple databases can be integrated with PHP.

Advantages of PHP

- **Maintenance**

The Model View Controller (MVC) architecture in PHP framework helps the code to be easily maintained and used. It separates files for different modules.

- **Support**

This advantage of PHP has great online support and community, which helps the new developers to help in writing the code and developing the web applications. The documentation provided at the official site helps in using the different features of PHP and its framework. The latest updates are released timely by the PHP to make it better for the developer to develop the web-based applications.

- **Security**

PHP frameworks built-in feature and tools make it easier to protect web applications from the outer attacks and security threats. The security threats can be SQL injection(**with the use of prepared statements**), data tampering and forgery.

Database Connection With PHP

- PHP 5 and later can work with a MySQL database using:
 - **MySQLi extension** (the "i" stands for improved)
 - **PDO (PHP Data Objects)**
- First the connection is established with the database

```
$conn=mysqli_connect('localhost','preet','test1234','dbms');
print_r($conn);
//check connection
if(!$conn){
    echo 'Connection error: '.mysqli_connect_error();
}
```

Since [warning_count] is 0 there is no error in connection

```
mysqli Object ( [affected_rows] => 0 [client_info] => mysqlnd 7.4.1 [client_version] => 70401 [connect_errno] => 0 [connect_error] => [errno] => 0 [error] => [error_list] => Array () [field_count] => 0 [host_info] => localhost via TCP/IP [info] => [insert_id] => 0 [server_info] => 5.5.5-10.4.11-MariaDB [server_version] => 100411 [sqlstate] => 00000 [protocol_version] => 10 [thread_id] => 260 [warning_count] => 0 )
```

Database Connection With PHP

- Lets write a SQL query

```
$pathsq="SELECT `latitude`, `longitude`, `img_loc` FROM potholes WHERE `p_id`='$phid'"
```

- Then query the database

```
if(mysqli_query($link,$pathsq)){  
    $pathres=mysqli_query($link,$pathsq);  
    print_r($pathres);|
```

```
mysqli_result Object ( [current_field] => 0 [field_count] => 3 [lengths] => [num_rows] => 1 [type] => 0 )
```

Upon querying the database we use the
SQL link to pass the query for the DB to process

Database connection with PHP

○ Fetching the query

We fetch the query that has been processed for the required result.

```
$pathrow=mysqli_fetch_assoc($pathres);  
Array ( [latitude] => 12+50+12.8616+N [longitude] => 80+9+23.8247+E [img_loc] => uploads/5e92ab93b2a205.95012532.jpg )
```

Project Home Page



**FIX-IT
FELIX**
JR.

[GO TO HOME](#)

Select Type:

- User
- Contractor
- Authority

[LOGIN](#)

[REGISTER](#)

Copyright 2020

Select the user type and log in

Registration Page



LOG OUT

Email:

Password:

Name:

Phone Number: 0

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Log In Page



**FIX-IT
FELIX**
JR.

[GO TO HOME](#)

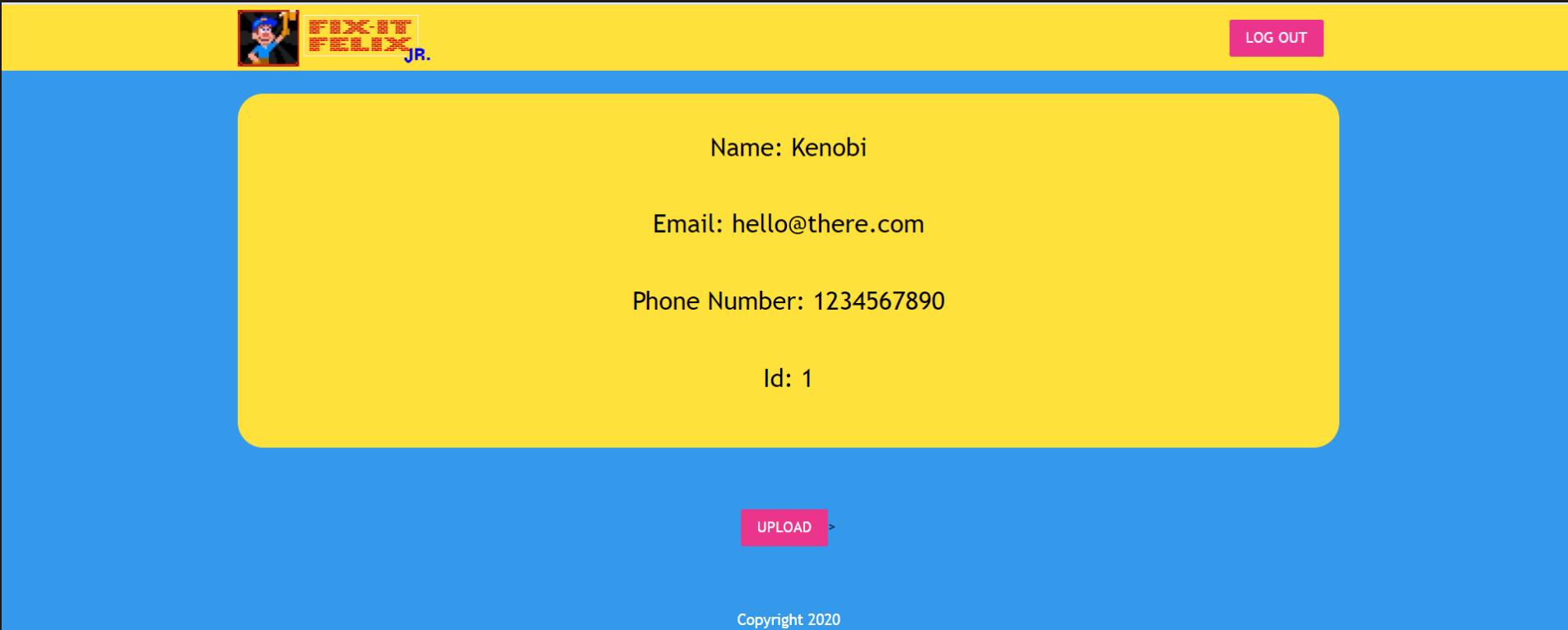
Email:

Password:

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User Home Page



The image shows a user home page interface. At the top, there is a yellow header bar with a logo for "FIX-IT FELIX JR." featuring a cartoon character holding a wrench. To the right of the logo is a "LOG OUT" button. Below the header is a large yellow rectangular area containing personal information: "Name: Kenobi", "Email: hello@there.com", "Phone Number: 1234567890", and "Id: 1". At the bottom of this yellow area is a small "UPLOAD" button with a right-pointing arrow. The background of the page is blue.

Name: Kenobi

Email: hello@there.com

Phone Number: 1234567890

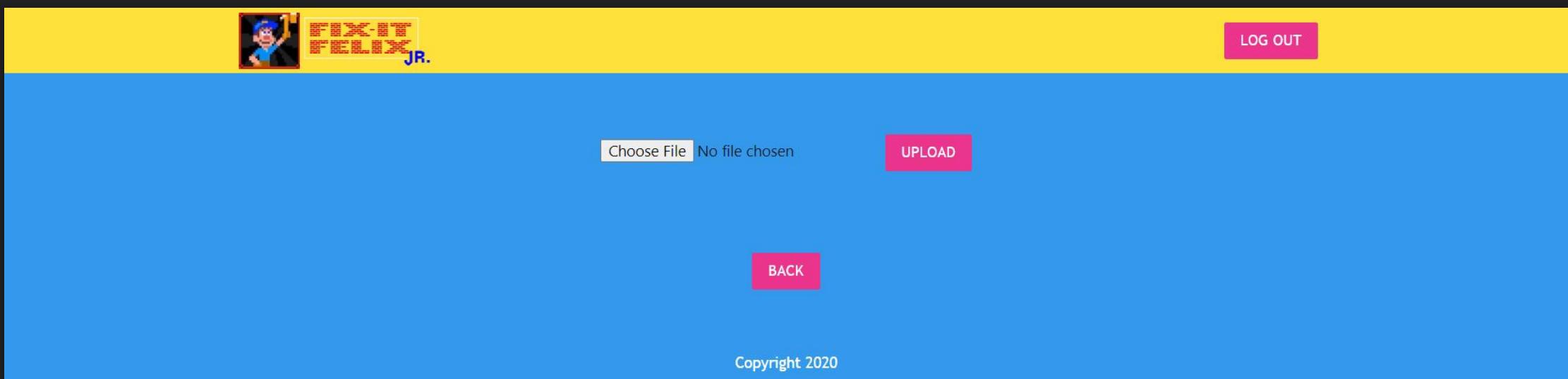
Id: 1

UPLOAD >

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The user can upload images by pressing the upload button

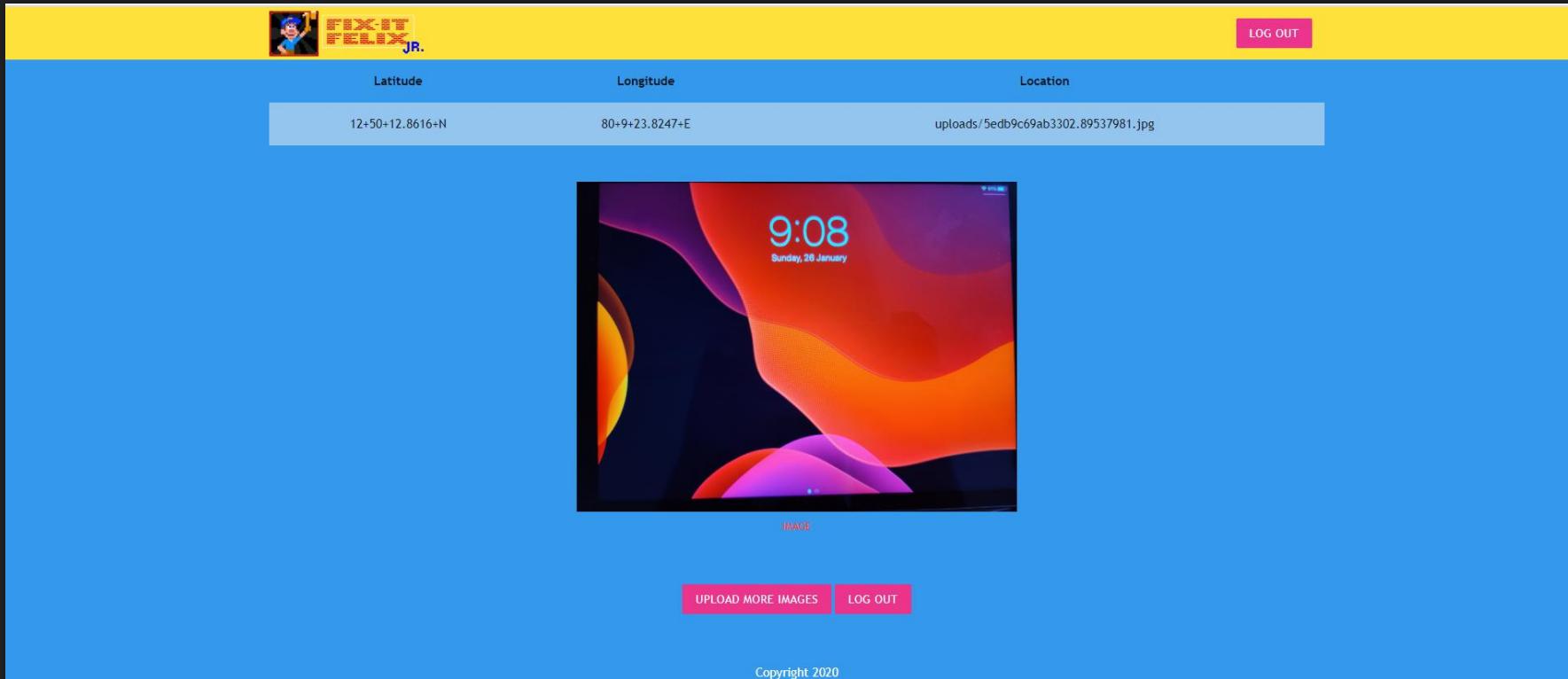
Image Upload Page



A screenshot of a web page titled "Image Upload Page". The page has a yellow header bar at the top. On the left side of the header is a logo for "FIX-IT FELIX JR." featuring a cartoon character. On the right side of the header is a "LOG OUT" button. The main body of the page is blue and contains a file input field with the placeholder "Choose File No file chosen", an "UPLOAD" button to its right, and a "BACK" button below them. At the bottom center of the page is the text "Copyright 2020".

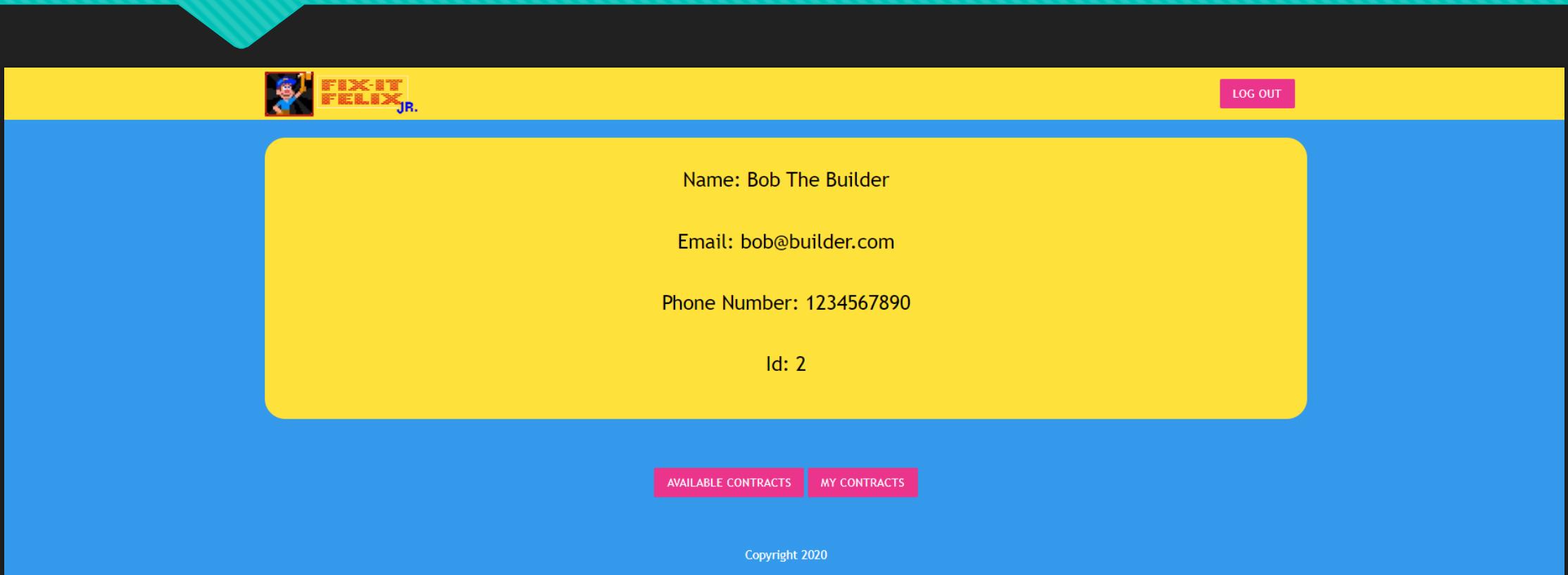
Web page for user to upload image

After Uploading Image



The window shows the image and the location of the place it was shot extracted from the EXIF metadata

Contractor Home Page



The screenshot shows a contractor's profile page. At the top left is the "FIX-IT FELIX JR." logo, featuring a cartoon character holding a wrench. At the top right is a "LOG OUT" button. The main content area displays the following information:

- Name: Bob The Builder
- Email: bob@builder.com
- Phone Number: 1234567890
- Id: 2

At the bottom of the page are two buttons: "AVAILABLE CONTRACTS" and "MY CONTRACTS". The footer contains the text "Copyright 2020".

The contractor can look at the available contracts and the contracts undertaken

Available Contracts



LOG OUT

Pothole Id	Latitude	Longitude	Distance (km)	Date
146	12°50'12.8616"N	80°9'23.8247"E	3817.2010106629	2147483647
154	12°50'12.8616"N	80°9'23.8247"E	3817.2010106629	2147483647
154	12°50'12.8616"N	80°9'23.8247"E	3817.2010106629	2147483647
154	12°50'12.8616"N	80°9'23.8247"E	3817.2010106629	2147483647
154	12°50'12.8616"N	80°9'23.8247"E	3817.2010106629	2147483647
154	12°50'12.8616"N	80°9'23.8247"E	3817.2010106629	2147483647

Enter ID for contract you want to take:

0

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The contractor can look at the location and the distance of the uploaded contracts from his current IP address

Contract Acceptance Page

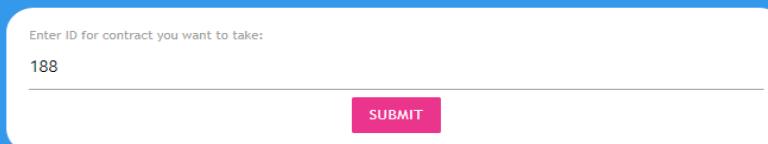
 FIX-IT
FELIX
JR.

LOG OUT

182	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
183	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
184	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
185	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
186	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
187	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
188	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
189	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647
190	12° 50'12.8616"N	80° 9'23.8247"E	3817.2010106629	2147483647

Enter ID for contract you want to take:
188

SUBMIT



9:08 Sunday 29 January

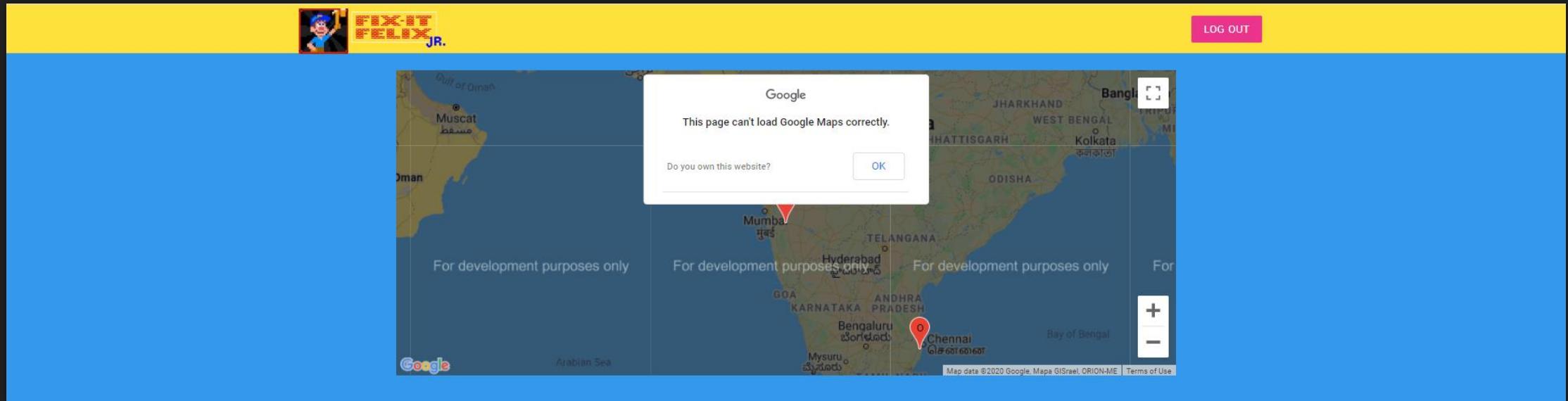
POTHOLE ID: 188

Google Map

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The output page shows the image of the pothole and a link for the location on a Google Map

Location in Google Map



The image location and the contractor location are shown on the map. To remove the popup the developer has to pay Google

Current Contracts Page

The screenshot shows a software interface titled "Fix-It Felix Jr." with a yellow header bar. On the right side of the header is a "LOG OUT" button. Below the header is a table listing 10 current contracts. The table has four columns: Contract ID, Description, Status, and Action. The contracts listed are:

ID	Description	Status	Action
141	12+50+12.8616+N	80+9+23.8247+E	2147483647
142	12+50+12.8616+N	80+9+23.8247+E	2147483647
143	12+50+12.8616+N	80+9+23.8247+E	2147483647
144	12+50+12.8616+N	80+9+23.8247+E	2147483647
145	12+50+12.8616+N	80+9+23.8247+E	2147483647
146	12+50+12.8616+N	80+9+23.8247+E	2147483647
147	12+50+12.8616+N	80+9+23.8247+E	2147483647
149	12+50+12.8616+N	80+9+23.8247+E	2147483647
150	12+50+12.8616+N	80+9+23.8247+E	2147483647
151	12+50+12.8616+N	80+9+23.8247+E	2147483647

Below the table, there are two input fields for managing contracts. The first field is labeled "Enter ID for contract you want to drop:" with a value of "0". It includes a "REMOVE" button. The second field is labeled "Enter ID for contract you completed:" with a value of "0". It includes a "COMPLETE" button.

Shows the current contracts accepted by the contractor. Contract id can be entered to drop or complete contract

Dropped Contract Page

The screenshot shows a web application interface for managing dropped contracts. At the top, there is a yellow header bar with the "FIX-IT FELIX JR." logo on the left and a "LOG OUT" button on the right. Below the header is a blue main content area.

The main content area contains a table with the following columns: Pothole Id, Latitude, Longitude, and Date. The table lists eight entries:

Pothole Id	Latitude	Longitude	Date
138	12+50+12.8616+N	80+9+23.8247+E	2147483647
141	12+50+12.8616+N	80+9+23.8247+E	2147483647
142	12+50+12.8616+N	80+9+23.8247+E	2147483647
143	12+50+12.8616+N	80+9+23.8247+E	2147483647
144	12+50+12.8616+N	80+9+23.8247+E	2147483647
145	12+50+12.8616+N	80+9+23.8247+E	2147483647
147	12+50+12.8616+N	80+9+23.8247+E	2147483647
149	12+50+12.8616+N	80+9+23.8247+E	2147483647

Below the table, there is a form field with the placeholder text "Enter ID for contract you want to drop:" followed by a text input containing "146" and a "REMOVE" button. Further down, another form field with the placeholder text "Enter ID for contract you completed:" followed by a text input containing "0" and a "COMPLETE" button.

The contractor can enter the contract id to drop it. It won't appear in the current contracts table.

Contract Complete Page

The screenshot shows a web application interface with a blue header bar. The main content area has a light blue background. At the top left, there is an email address: bob@builder.com. Below it is a table with the following data:

Pothole Id	Latitude	Longitude	Date
141	12+50+12.8616+N	80+9+23.8247+E	2147483647
142	12+50+12.8616+N	80+9+23.8247+E	2147483647
143	12+50+12.8616+N	80+9+23.8247+E	2147483647
144	12+50+12.8616+N	80+9+23.8247+E	2147483647
145	12+50+12.8616+N	80+9+23.8247+E	2147483647
147	12+50+12.8616+N	80+9+23.8247+E	2147483647
149	12+50+12.8616+N	80+9+23.8247+E	2147483647
150	12+50+12.8616+N	80+9+23.8247+E	2147483647

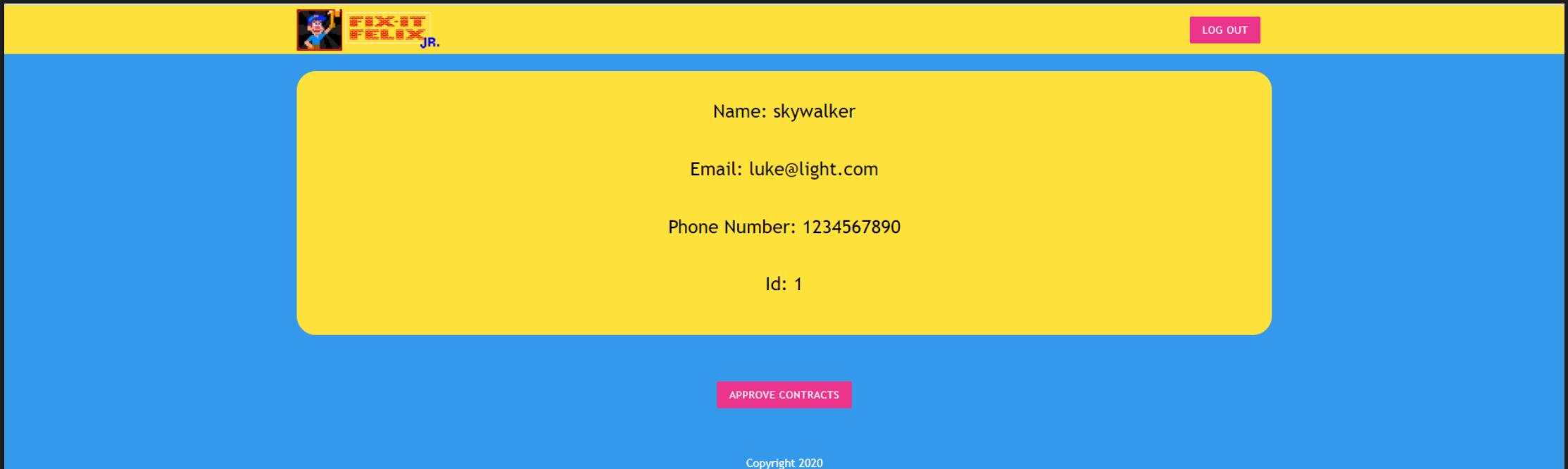
Below the table, there are two input fields:

- An input field labeled "Enter ID for contract you want to drop:" containing the value "0". It includes a "REMOVE" button.
- An input field labeled "Enter ID for contract you completed:" containing the value "138". It includes a "COMPLETE" button.

At the bottom center of the page, there is a small copyright notice: "Copyright 2020".

The contractor can enter the contract id of the completed contract.

Authority Home Page



The screenshot shows a user interface for an authority home page. At the top, there is a yellow header bar with a black background underneath. On the left side of the header is a logo for "FIX-IT FELIX JR." featuring a cartoon character holding a wrench. On the right side of the header is a "LOG OUT" button. Below the header is a large blue rectangular area containing a yellow rounded rectangle. Inside this yellow rectangle, the user's information is displayed: Name: skywalker, Email: luke@light.com, Phone Number: 1234567890, and Id: 1. At the bottom of the blue area is a pink button labeled "APPROVE CONTRACTS". At the very bottom center of the page is the text "Copyright 2020".

Name: skywalker

Email: luke@light.com

Phone Number: 1234567890

Id: 1

APPROVE CONTRACTS

Copyright 2020

The authority can look at the unapproved contracts by pressing approve contracts

Approval Pending Page

The screenshot shows a web-based application for managing contracts. At the top, there is a yellow header bar with the 'FIX-IT FELIX JR.' logo on the left and a 'LOG OUT' button on the right. Below the header is a blue content area containing a table of unapproved contracts. The table has four columns: Contract ID (e.g., 142, 143, 144, 145, 147, 149, 150, 151, 152), Description (e.g., 12+50+12.8616+N), Status (e.g., 80+9+23.8247+E), and Action (e.g., 2147483647). A scroll bar is visible on the right side of the table. At the bottom of the page, there is a search bar with the placeholder text 'Enter ID for contract you want to approve:' and a 'SUBMIT' button.

Contract ID	Description	Status	Action
142	12+50+12.8616+N	80+9+23.8247+E	2147483647
143	12+50+12.8616+N	80+9+23.8247+E	2147483647
144	12+50+12.8616+N	80+9+23.8247+E	2147483647
145	12+50+12.8616+N	80+9+23.8247+E	2147483647
147	12+50+12.8616+N	80+9+23.8247+E	2147483647
149	12+50+12.8616+N	80+9+23.8247+E	2147483647
150	12+50+12.8616+N	80+9+23.8247+E	2147483647
151	12+50+12.8616+N	80+9+23.8247+E	2147483647
152	12+50+12.8616+N	80+9+23.8247+E	2147483647
153	12+50+12.8616+N	80+9+23.8247+E	2147483647

Enter ID for contract you want to approve:

SUBMIT

The authority can look at the unapproved contracts and its location. Contracts are approved by entering its contract id.

After Approval

Pothole Id	Latitude	Longitude	Date
142	12+50+12.8616+N	80+9+23.8247+E	2147483647
144	12+50+12.8616+N	80+9+23.8247+E	2147483647
145	12+50+12.8616+N	80+9+23.8247+E	2147483647
147	12+50+12.8616+N	80+9+23.8247+E	2147483647
149	12+50+12.8616+N	80+9+23.8247+E	2147483647
150	12+50+12.8616+N	80+9+23.8247+E	2147483647
151	12+50+12.8616+N	80+9+23.8247+E	2147483647
152	12+50+12.8616+N	80+9+23.8247+E	2147483647
152	12+50+12.8616+N	80+9+23.8247+E	2147483647

Enter ID for contract you want to approve:
143



The contract is removed from the pending approval table.

Team members

- Divyansh (19BCE1610)
- Preetham Sagireddy (19BCE1627)
- Nimisha Swain (19BCE1860)



THANK YOU