



# ExploreSpace - Documentation

Application Frameworks – SE3040

Assignment 2

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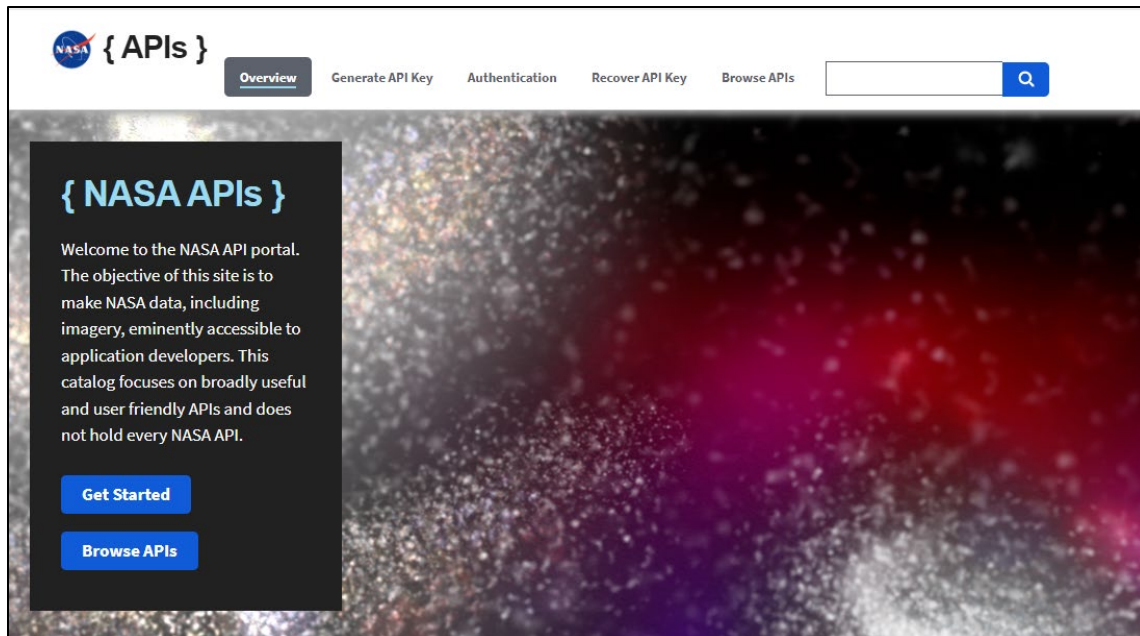
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# 1. NASA API's

## How to use the NASA Open API's

The National Aeronautics and Space Administration which is abbreviated to NASA has made a number of API's available to the public use. They're known as NASA Open API's. They can be found at the website of the NASA API website which is <https://api.nasa.gov>.



***Landing Page of the NASA Open API Website***

After arriving at the landing page of the website, people can give their personal information such as the name and the email. Afterwards, an email containing the 'API KEY' for that specific user will be sent to the email provided. That API KEY should be used while fetching information from the specific API listed on the website.

## Generate API Key

Required fields are marked with an asterisk (\*).

First Name \*

Last Name \*

Email \*

How will you use the APIs? (optional)

Signup

***Form to enter details to generate the API KEY***

## NASA Open API's used in Explore Space

### APOD – Astronomy Picture Of the Day

This API is one of the most popular used by developers. Once a request is sent through this API, it returns a picture related to astronomy and it provides a brief explanation regarding the picture in the response. The request needs to be sent with the API KEY that was generated for yourself accordingly.

```
const fetchApodData = async () => {
  try {
    const response = await axios.get('https://api.nasa.gov/planetary/apod?api_key=wC8n5rUiWbcaaJhXJR03GNz14zEGkXWqXfH8E7E0');
    setApodData(response.data);
  } catch (error) {
    console.error("Error fetching APOD data:", error);
  }
}
```

***Fetch Request to get the APOD Response***

The API implementation done on my project was to load the image in a separate component called APOD, it had details regarding the APOD picture below. For the designing purposes bootstrap components were used and media queries were implemented for the responsive user interface of the APOD component.

ExploreSpace™
APOD
Mars Rover Photos
User Profile
Log Out

Astronomy Picture Of the Day - 3/5/2024
@teejay7, your daily astronomy pic is ready. Check it out and explore the black matter 🚀.

Temperatures on Exoplanet WASP-43b

Diagram illustrating the temperature distribution on the exoplanet WASP-43b, showing the permanent day side and night side, with a color-coded temperature scale ranging from 1,000°F to 2,500°F.

Information regarding "Temperatures on Exoplanet WASP-43b" :

A mere 280 light-years from Earth, tidally locked, Jupiter-sized exoplanet WASP-43b orbits its parent star once every 0.8 Earth days. That puts it about 2 million kilometers (less than 1/25th the orbital distance of Mercury) from a small, cool sun. Still, on a dayside always facing its parent star, temperatures approach a torrid 2,500 degrees F as measured at infrared wavelengths by the MIRI instrument on board the James Webb Space Telescope. In this illustration of the hot exoplanet's orbit, Webb measurements also show nightside temperatures remain above 1,000 degrees F. That suggests that strong equatorial winds circulate the dayside atmospheric gases to the nightside before they can completely cool off. Exoplanet WASP-43b is now formally known as Astrolábo, and its K-type parent star has been christened Guonon. Webb's infrared spectra indicate water vapor is present on the nightside as well as the dayside of the planet, providing information about cloud cover on Astrolábo.

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## User Interface of the APOD Component

### Mars Rover Photos

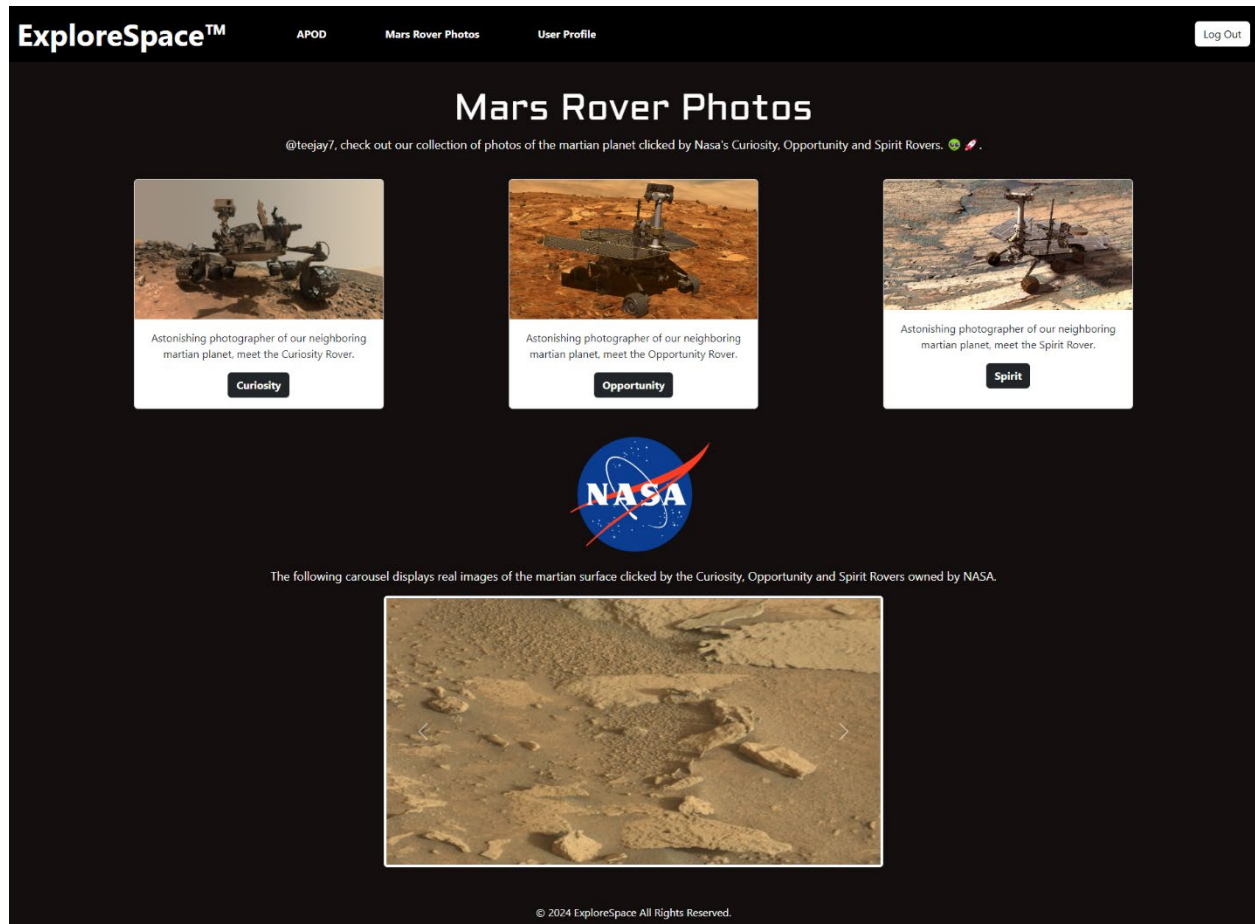
The Mars Rover Photos API was designed to collect image data gathered by the Rovers on the Martian planet. They are the NASA's Curiosity, Opportunity, and Spirit rovers. This API responds with a collection of images of the surface of the planet Mars when a request is made, and these images are made available to use to the public by the NASA. The request needs to be sent with the API KEY that was generated for yourself accordingly.

```
const fetchRoverPhotos = async () => {
  try {
    const response = await axios.get(
      'https://api.nasa.gov/mars-photos/api/v1/rovers/curiosity/photos?sol=1000&api_key=wC8n5rUiwbcaaJhXJRO3GNz14zEGkXWqXfH8E7E0'
    );
    setPhotos(response.data.photos);
    setLoading(false);
  } catch (error) {
    console.error('Error fetching Mars Rover photos:', error);
    setLoading(false);
  }
};

setUserName(user.userName);
fetchRoverPhotos();
}, []);
```

## Fetch Request to get the Mars Rover Response

The API implementation done on my project was to load the image in a separate component called MarsRover, it had 3 separate cards that redirects you to information regarding the 3 separate rovers that was on Mars for NASA. For the designing purposes bootstrap components were used and media queries were implemented for the responsive user interface of the Mars Rover component. The carousel bootstrap component to use the images that provided in the response in a slideshow, where the user can go back and forth with the images.

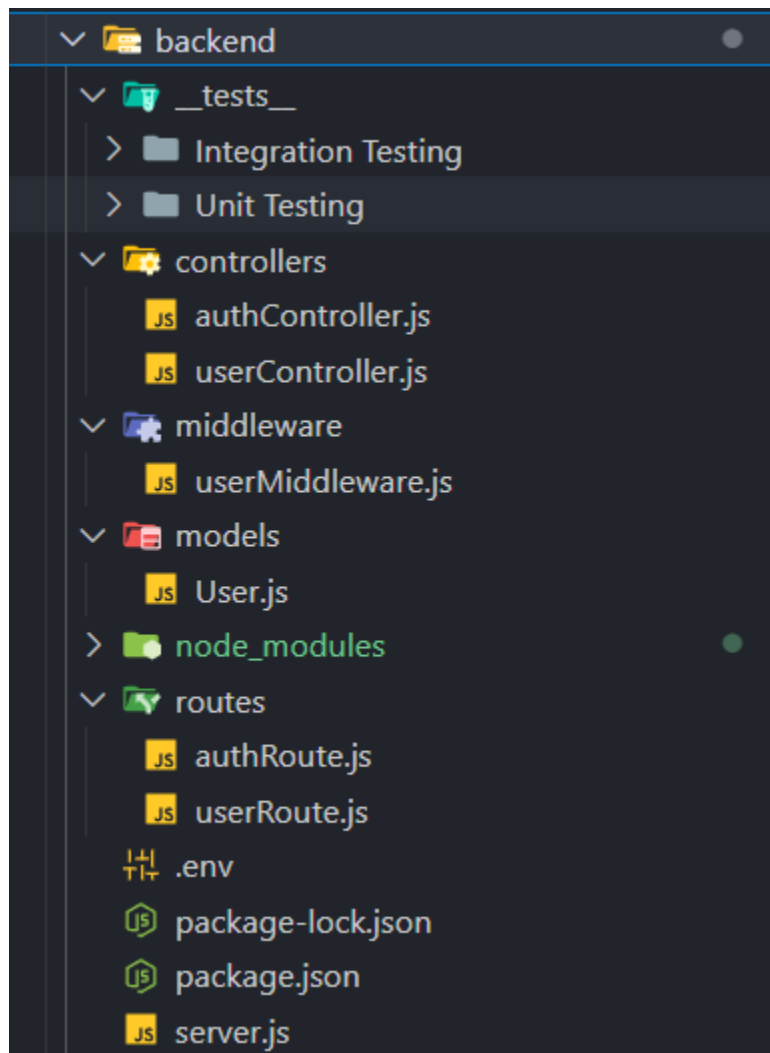


***User Interface of the MarsRover Component***

## 2. Implementation of the system

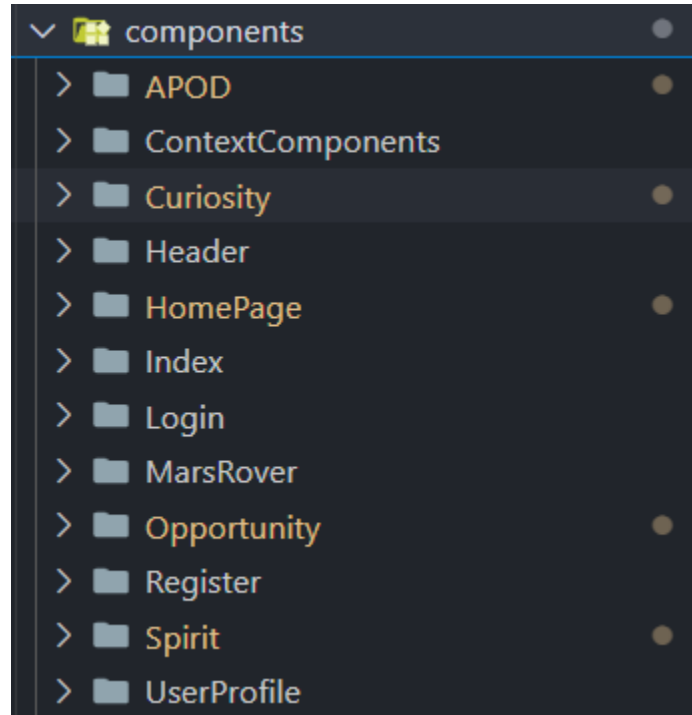
For development of this system various frameworks were used in both frontend and the backend of this system, ExploreSpace. For the frontend development the javascript based framework React was used and for the backend development Node which is also a javascript based framework. The backend development was not a big development for this system as most of the API's were taken from the NASA's Open API portal.

The backend development was done for the user management system of ExploreSpace. I developed a collection of APIs that allowed the users to register themselves and login to the system. Authentication is also needed to login to the system and access the other components for the user. This was done by using jsonwebtoken node package, which gives a random JSON web token everytime the user is logged in, so the user must be logged in to access the components with a valid JSON web token for authentication. The testing of the APIs were done using the Postman API Testing tool and also used Jest node package to see if the controllers are working properly.



*File Structure of the backend system*

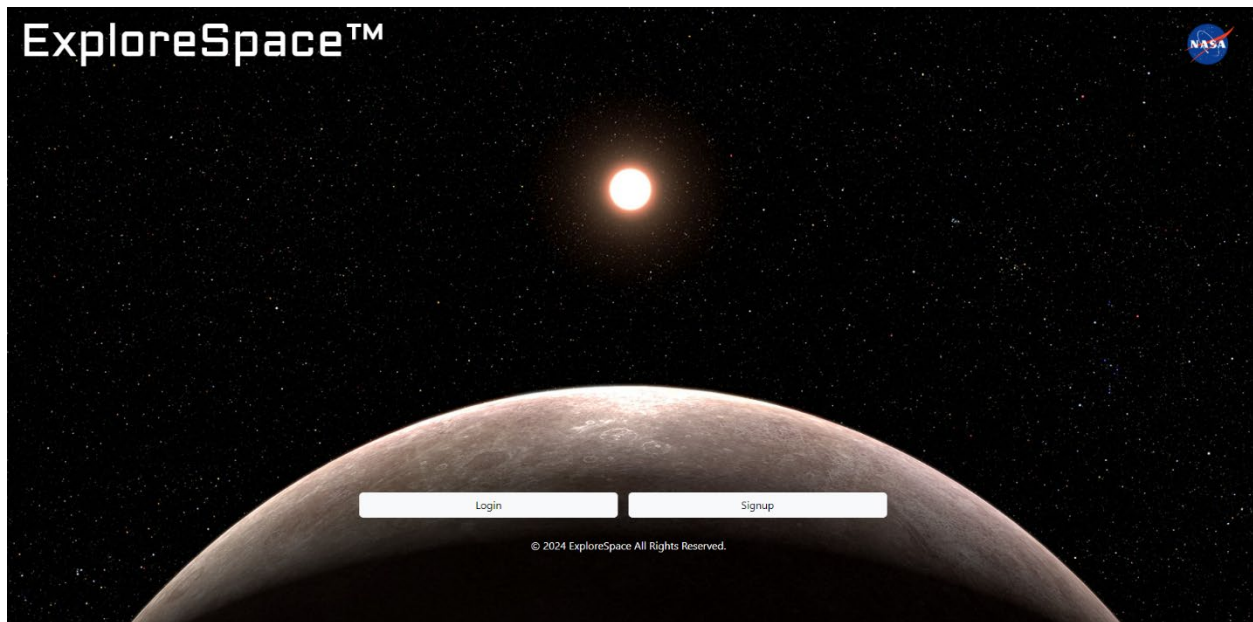
The frontend development of ExploreSpace was done using the React framework. It is a component-based framework which is used for frontend development. I used the function-based components for the development of the components over class-based components. I also used Bootstrap as a CSS framework which was used to get components such as Cards, Forms, and Carousels.



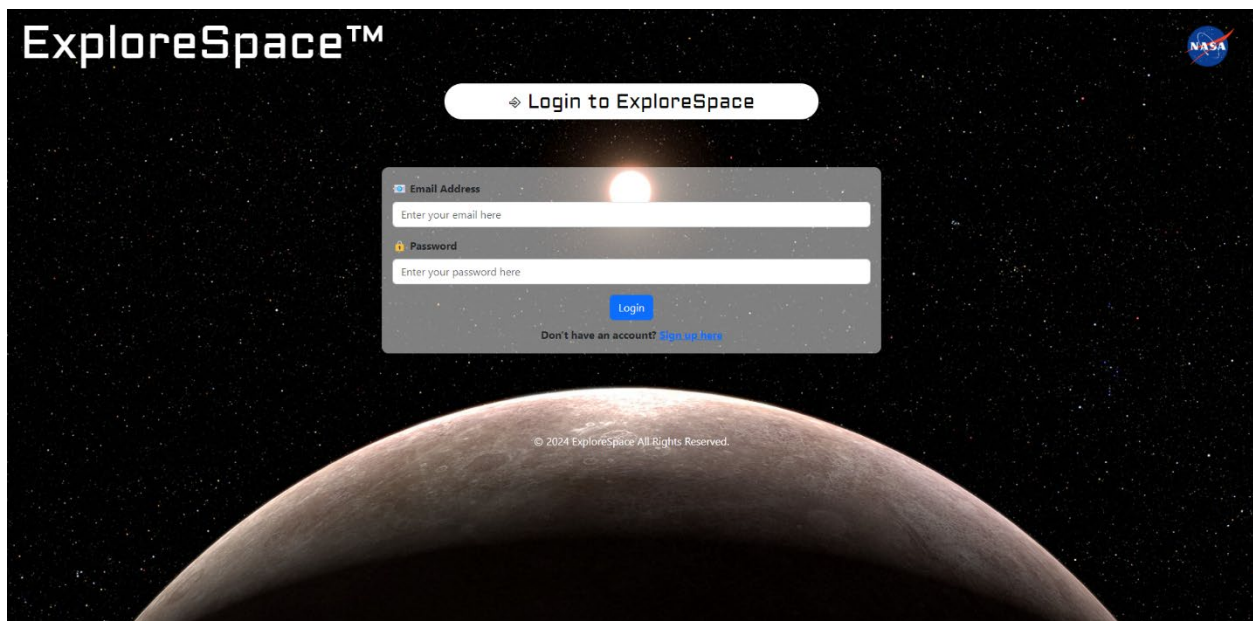
***Set of Components that were developed for the FE***



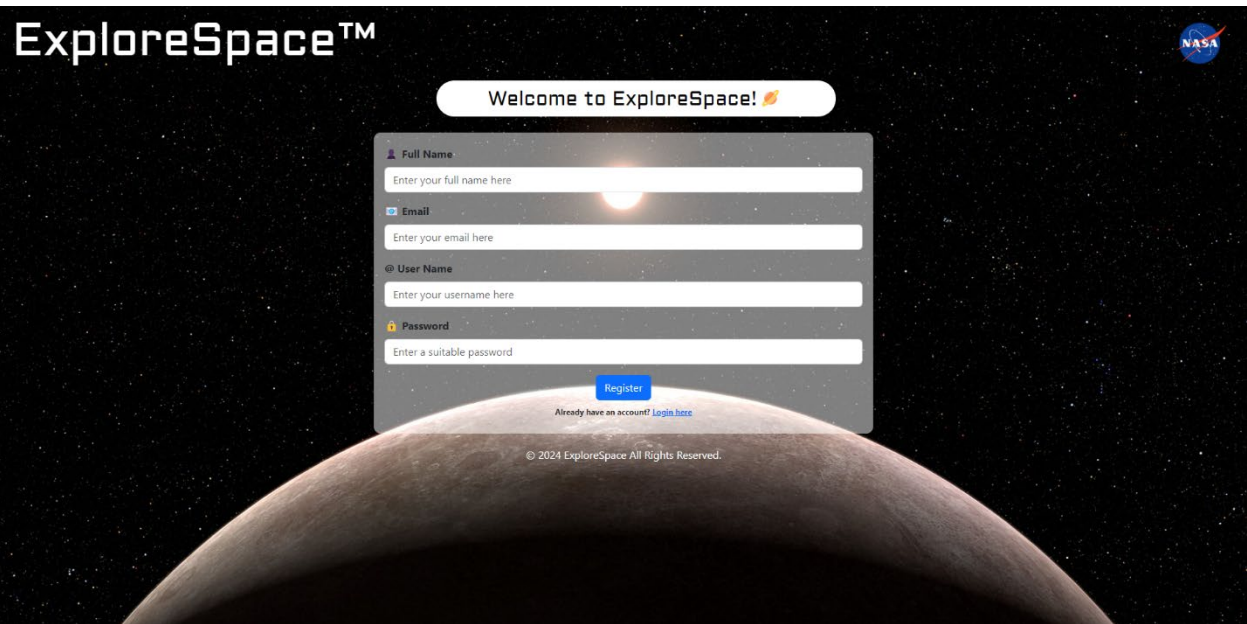
### 3. User Interfaces



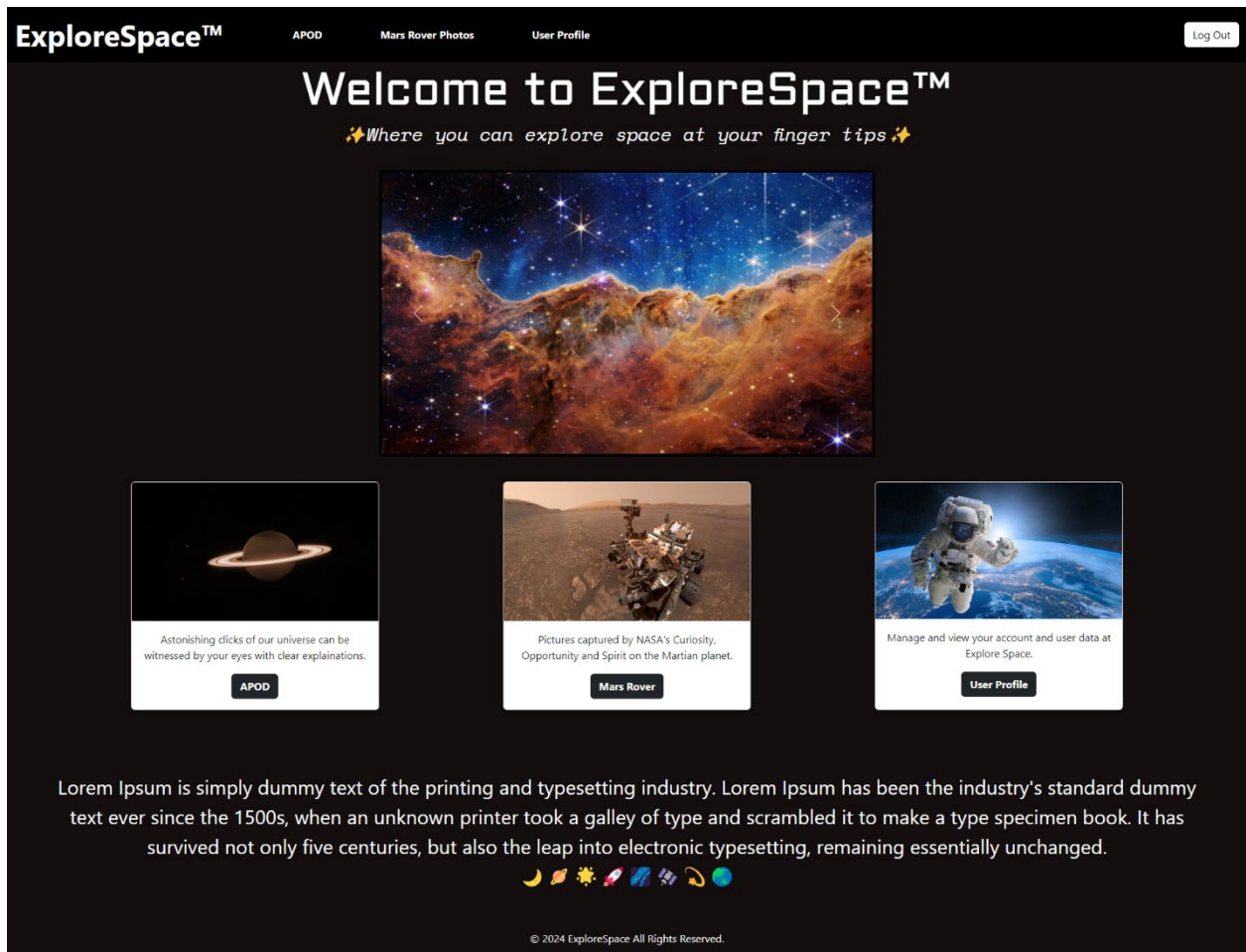
***Index Page***



***Login Page***



*Sign up / Register Page*



*Main Page / Home Page*

ExploreSpace™

APOD

Mars Rover Photos

User Profile

Log Out

# Astronomy Picture Of the Day - 3/5/2024

@teejay7, your daily astronomy pic is ready. Check it out and explore the black matter 🚀.

## Temperatures on Exoplanet WASP-43b

The figure is titled "HOT GAS GIANT EXOPLANET WASP-43b TEMPERATURE MAPS". It shows an elliptical orbit around a central star. The top of the orbit is labeled "Permanent Dayside" and the bottom is labeled "Permanent Nightside". Two temperature maps of the planet are shown, one for each side. A color scale at the bottom indicates temperatures from 1,000°F to 2,500°F and 1,000 K to 1,500 K. The Webb Space Telescope logo is in the bottom right corner.

Information regarding "Temperatures on Exoplanet WASP-43b" :

A mere 280 light-years from Earth, tidally locked, Jupiter-sized exoplanet WASP-43b orbits its parent star once every 0.8 Earth days. That puts it about 2 million kilometers (less than 1/25th the orbital distance of Mercury!) from a small, cool sun. Still, on a dayside always facing its parent star, temperatures approach a torrid 3,500 degrees F as measured at infrared wavelengths by the MIRI instrument on board the James Webb Space Telescope. In this illustration of the hot exoplanet's orbit, Webb measurements also show nighttime temperatures remain above 1,000 degrees F That suggests that strong equatorial winds circulate the dayside atmospheric gases to the nightside before they can completely cool off. Exoplanet WASP-43b is now formally known as Astrolabos, and its K-type parent star has been christened Gnomon. Webb's infrared spectra indicate water vapor is present on the nightside as well as the dayside of the planet, providing information about cloud cover on Astrolabos.

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### APOD Component Page

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APOD

Mars Rover Photos

User Profile

Log Out

# Mars Rover Photos

@teejay7, check out our collection of photos of the martian planet clicked by Nasa's Curiosity, Opportunity and Spirit Rovers. 🌍 🚀.

Astonishing photographer of our neighboring martian planet, meet the Curiosity Rover.

Curiosity

Astonishing photographer of our neighboring martian planet, meet the Opportunity Rover.

Opportunity

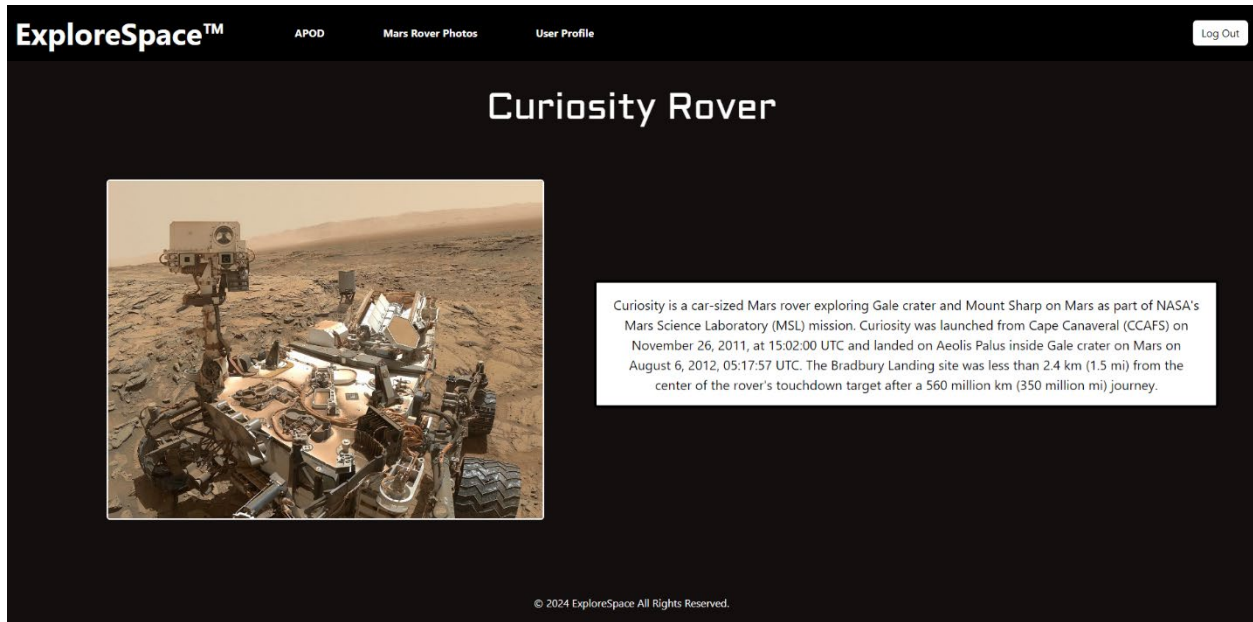
Astonishing photographer of our neighboring martian planet, meet the Spirit Rover.

Spirit

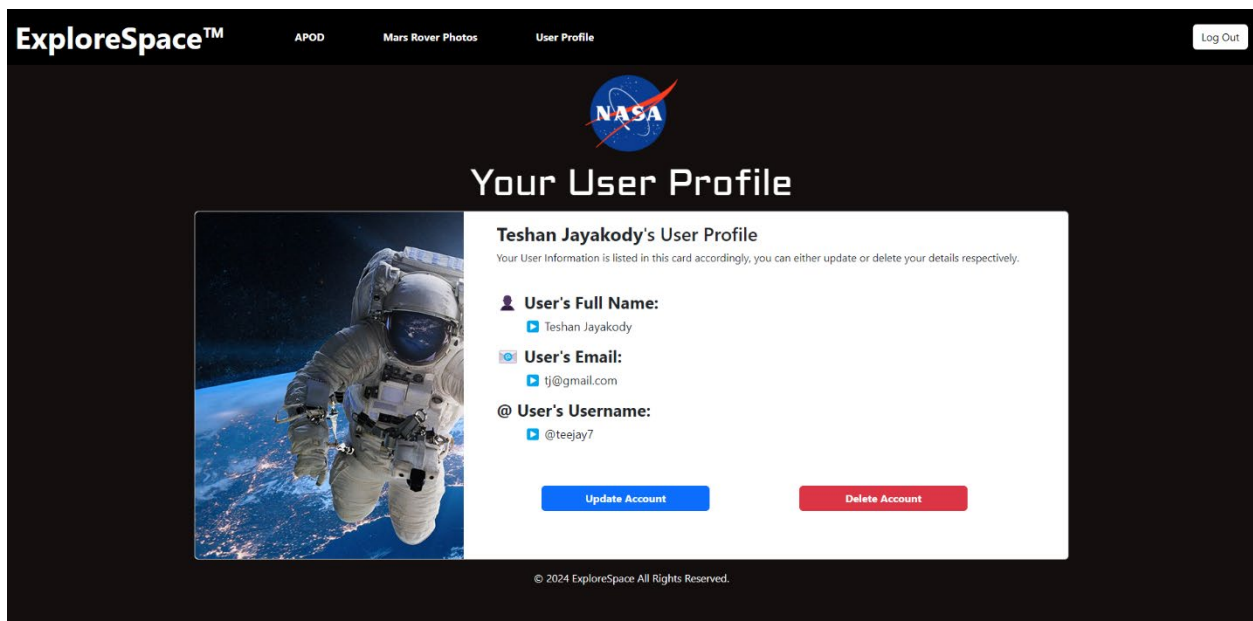
The following carousel displays real images of the martian surface clicked by the Curiosity, Opportunity and Spirit Rovers owned by NASA.

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### Mars Rover API Component



*Rover Information Page*



*User Profile Page*



## 4. Challenges Faced

### Usage of NASA Open APIs

The main challenge that was faced by me was to get to know how to use the APIs that are available in the NASA Open API Library. I went through the documentation provided by NASA regarding the APIs. Initially I did not get a full understanding regarding these APIs. I followed a YouTube tutorial that was uploaded by the YouTuber “Smoljames”, which gave me a proper understanding for the first time.



*Tutorial that was followed for the understanding of the API*

After following this tutorial, I was able to know how to use the APIs and how to generate the API KEY for myself. Afterwards I was able to use the APOD, Mars Rover NASA Open APIs in my project accordingly.

### Responsive User Interface Creation

```
@media (max-width: 800px) {  
  .ApodHeading{  
    color: ■white;  
    font-family: "Aldrich", sans-serif;  
    margin-top: 3%;  
    font-size: 25px;  
    text-align: center;  
  }  
  
  .ApodParaOne{  
    color: ■white;  
    font-size: 18px;  
    text-align: center;  
  }  
  
  .APodInfoTitle{  
    color: ■white;  
    text-align: center;  
    font-size: 16px;  
  }  
}
```

The next challenge I faced was creating the Responsive User Interfaces. Previously, in most of the project I did not care about the responsiveness of the user interfaces. I finally learnt how to make the screens responsive according to the screen size. I was able to master the use of Media queries in CSS which allowed me to make CSS changes depending on the size of the screen.

#### *Usage of Media Queries*

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AP02Mark Rover PhotosUser Profile

Log Out

Astronomy Picture Of the Day - 4/5/2024

@teejay7, your daily astronomy pic is ready. Check it out and explore the black matter 🚀

Temperatures on Exoplanet WASP-43b

WASP-43b: Giant Exoplanet WASP-43b

TEMPERATURE MAPS

MIRI | Low Resolution Spectrographs

Permanent Dayside

Permanent Nightside

1,500°F 1,500°F 2,000°F 2,500°F

1,000 K 1,000 K

WEBB

JAMES WEBB SPACE TELESCOPE

Information regarding "Temperatures on Exoplanet WASP-43b" :

A mere 280 light-years from Earth, tidally locked, Jupiter-sized exoplanet WASP-43b orbits its parent star once every 0.8 Earth days. That puts it about 2 million kilometers less than 1/25th the orbital distance of Mercury) from a small, cool sun. Still, on a dayside always facing its parent star, temperatures approach a torrid 2,500 degrees F as measured at infrared wavelengths by the MIRI instrument on board the James Webb Space Telescope. In this illustration of the hot exoplanet's orbit, Webb measurements also show nightside temperatures remain above 1,000 degrees F. That suggests that strong equatorial winds circulate the dayside atmospheric gases to the nightside before they can completely cool off. Exoplanet WASP-43b is now formally known as Astrolábos, and its K-type parent star has been christened Gnomon. Webb's infrared spectra indicate water vapor is present on the nightside as well as the dayside of the planet, providing information about cloud cover on Astrolábos.

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Normal User Interface in a Laptop Screen

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Astronomy Picture Of the Day - 4/5/2024

@teejay7, your daily astronomy pic is ready. Check it out and explore the black matter 🚀

Temperatures on Exoplanet WASP-43b

WASP-43b: Giant Exoplanet WASP-43b

TEMPERATURE MAPS

MIRI | Low Resolution Spectrographs

Permanent Dayside

Permanent Nightside

1,500°F 1,500°F 2,000°F 2,500°F

1,000 K 1,000 K

WEBB

JAMES WEBB SPACE TELESCOPE

Information regarding "Temperatures on Exoplanet WASP-43b" :

A mere 280 light-years from Earth, tidally locked, Jupiter-sized exoplanet WASP-43b orbits its parent star once every 0.8 Earth days. That puts it about 2 million kilometers less than 1/25th the orbital distance of Mercury) from a small, cool sun. Still, on a dayside always facing its parent star, temperatures approach a torrid 2,500 degrees F as measured at infrared wavelengths by the MIRI instrument on board the James Webb Space Telescope. In this illustration of the hot exoplanet's orbit, Webb measurements also show nightside temperatures remain above 1,000 degrees F. That suggests that strong equatorial winds circulate the dayside atmospheric gases to the nightside before they can completely cool off. Exoplanet WASP-43b is now formally known as Astrolábos, and its K-type parent star has been christened Gnomon. Webb's infrared spectra indicate water vapor is present on the nightside as well as the dayside of the planet, providing information about cloud cover on Astrolábos.

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Normal User Interface in a Smaller (Mobile) Screen