

# Nebula Net Interactive Feed

## 3 Page Design Proposal

Design Team: Jacob Burke, Isabella Cortez, Freddy Lopez, Daniel Willard, Simon Zhao

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### Summary:

This document is a three-page proposal to layout the framework for Nebula Net. Nebula Net is a system that will allow a user an easy-to-use website to gather and consolidate the feed from the James Webb space telescope (JWST) all in one place. What follows is the rough idea of how this will be accomplished and why it is necessary.

### Document Contents:

1. Project Timeline
2. Software Requirements Specification (SRS): Concept of Operation
  - 2.1. Current situation
  - 2.2. Justification for a New System
  - 2.3. Operational Features of New System
  - 2.4. User Classification
  - 2.5. Operational Scenarios (Use cases)
3. Software Design Specification (SDS): Concept of Design
  - 3.1. System Overview
  - 3.2. System Proposed Architecture
  - 3.3. Propose Technology Stack for Framework
4. References
5. Acknowledgements

1. Project TimeLine
  - 1.1. Week\_0 (11 – 17 FEB2024):
    - Research system requirements for the project and resources available form National Aeronautics and Space Administration (NASA) and how to use them. Plan out the general framework and investigate it or any shortcomings. Explore existing frameworks and systems to see if anything can be used in this project. Plan out interviews and set up times with recipients. Create a rough draft project plan.
  - 1.2. Week\_1 (18 - 24 FEB2024):
    - (23FEB) Prototype website and host to see if hosting method ae working correctly. Create a connection to database and pull data and sat formatting data for data calls.
  - 1.3. Week\_2 (25 – 2 MAR2024):
    - Integration of website request to James Web Photo database so that when a request is sent form the website the requested information form the James web database is sent in the correct format.
  - 1.4. Week\_3 (3 – 9 MAR2024):
    - System Testing to ensure the website works and connects reliably and uses automated tests to test possible failing point on the website structure and function. Finalize documentation for the stake holders.
  - 1.5. Week\_4 ((10 -16 MAR2024):
    - (12MAR) Project Presentation for the review board and final deliverable turn-in and system turn in for grading by the end user.

## 2. Software Requirements Specification (SRS): Concept of Operation

**Description:** This document outlines the software requirements for the Nebula Net Interactive feed system, detailing its concept of operations, user classes, operational scenarios, specific requirements, and references.

### 2.1. Current situation:

- Currently, users of the James Webb space telescope (JWST) have a hard time finding the mission of the day/photo of the day. The sources to find this data are scattered through various sources. There is no singular, interactive platform that consolidates these images and provides detailed information and user engagement through a centralized and interactive feed.

### 2.2. Justification for a New System:

- A single unified platform is necessary to enhance accessibility and the educational value of the JWST images. There is a clear need for a system that not only displays these images but also allows users to interact with the photo and information about the photo, customize their viewing experience, and receive updates on new discoveries. This would increase the usefulness of the photos if the users could use this unified platform as a start of their space exploration and studies.

### 2.3. Operational Features of New System:

- Real time connection to feed from JWST (Updated with the most current mission of the day)
- Historical log for each day of since launch (12JUL2024)
- Detailed annotations and celestial object information.
- Historical Gallery organized by date that is filterable by celestial object, mission type.
- Interact features with the photo, such as zooming and downloading.

### 2.4. User Classification:

- Educational Users: teachers, students and researchers using the images and information for learning and teaching.
- Astronomy Enthusiasts: people looking for detailed celestial information for personal use.
- Casual browsers: people looking for beautiful images and/or interested in space imagery.

### 2.5. Operational Scenarios (Use cases)

- Use case 1: A user explores high-resolution images of a galaxy, zooming in on areas of interest, and saving favorite images to a personal gallery.
- Use case 2: User uses image and data for educational purposes to learn about astronomical bodies.

### 3. Software Design Specification (SDS): Concept of Design

**Description:** This document outlines the software Design for the Nebula Net Interactive Feed system, detailing its concept of operations, user classes, operational scenarios, specific requirements, and references.

#### 3.1. System Overview

-Nebula Net interactive Feed system aims to collect data from the James Webb Space Telescope (JWST) into a cohesive platform accessible to diverse user classes. It furnishes real-time access to JWST images, annotations, and interactive features to engage users effectively.

#### 3.2. System Proposed Architecture:

3.2.1. Frontend Module (the website and user interface): This Module will allow the user to only click around on the webpage to prevent user input error. The webpage will have two landing pages. First will be the home page that will have the mission of the current day and information about the photo. This page will be the navigation page and have site information and accreditation as well. The second page will be the gallery page that has a calendar from the present day to the first mission the JWST has ran date 12 JUL 2024. This page will allow the user to pick a day and see that photo also it will allow the user to filter by astrological bodies and mission type.

3.2.2. Integration (the connection to the JWST database) Module: This module will handle all requests form the webpage and send all requested data to the website. This will also, if needed, will call and package the web scraping module if the database is lacking information about the photo we require.

3.2.3. Web Scrap module (if needed): this module will handle collecting data if the database of the JWST is lacking the data we require.

3.2.4. Hosting and testing module: This module will automate our testing process and host our website on the University of Oregon computer science server (ix-dev).

#### 3.3. Propose Technology Stack for Framework:

3.3.1. Frontend: HTML (Hypertext Markup Language), CSS (Cascading Style Sheets), React and JavaScript for cross-platform compatibility and responsiveness.

3.3.2. Integration: Python serves as the primary backend language, interfacing with the MAST database to retrieve image feeds and manage user requests to JWST. We will need to use MAST API (Application Programming Interface) to make the connection to JWST form the information provided by NASA.

3.3.3. Web Scrap module (if needed): Python will be the langue used with the fallowing web information gathering libraries: BeautifulSoup, requests, and urllib3. These will be used to ensure connection to a website and pull data for the hosted files.

3.3.4. Hosting and Testing: this will use python for unit test to test our code for edge cases and possible errors in an automated way. The hosting service will require bash knowledge and scripts.

### 4. References

- IEEE Std 1362-1998 (R2007). IEEE Guide for Information Technology–System Definition–Concept of Operations (ConOps) Document.

- JWST Official Website. (n.d.). James Webb Space Telescope. Retrieved from <https://www.jwst.nasa.gov/>

- Hornoff, Anthoney. 2024 Winter. Class Documents for CS422 Software methodologies. University of Oregon, <https://classes.cs.uoregon.edu/24W/cs422/P2/>, <https://classes.cs.uoregon.edu/24W/cs422/>

### 5. Acknowledgements

- JWST mission teams and engineers for providing the data that will be used in this project.