# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

**Belagavi- 590018**

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## TITLE : VOIDSEEK

**MINI PROJECT REPORT**

**Submitted by**

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**DEPARTMENT OF**

**BASIC SCIENCE AND HUMANITIES**

***Under the guidance of***

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# CANARA ENGINEERING COLLEGE

(Affiliated to VTU Belagavi)

### SUDHINDRA NAGARA, BENJANAPADAVU, BANTWAL- 574219, KARNATAKA

**2024-2025**

**APPROVAL**

This project entitled **“VOIDSEEK”** is hereby approved a creditable study of an engineering subject **Introduction to Web Programming- BPLCK105A** carried out and presented in a satisfactory manner to its acceptance as CIE Component for the subject.

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| **(Project Guide)** | **(Head of the Department)** |
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**Examiner 1………………………………………...**

**Examiner 2…………………………………………...**



## DECLARATION

We, the students of second semester of Computer Science Engineering, Canara Engineering College, Sudhindra Nagara, Bantwal- 574129, declare that the work entitled **“VOIDSEEK”** has been successfully completed under the guidance of Mr. VINOD KUMAR .MV, Assistant Professor, Department of Mechanical Engineering. Further the matter embodied in the project report has not been submitted previously by anybody for the award of any degree or diploma to any university.

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## ABSTRACT

The exploration of the cosmos has always fascinated humankind, driving scientific inquiry and technological advancement. In this project, we present the design and development of an astronomical webpage that aims to serve as a comprehensive digital resource on celestial bodies within our universe. The primary objective is to make astronomy more accessible, engaging, and educational through a well-structured and interactive web-based platform.

This webpage contains detailed and systematically organized information on a wide range of celestial objects, including planets, stars, moons, asteroids, comets, galaxies, and other phenomena such as black holes and nebulae. Each entry provides scientifically accurate data, historical context, visual media, and classification details to offer users a deep understanding of the object in focus.

To further enrich the learning experience, the project incorporates interactive 3D models of various celestial bodies. These models are constructed using a combination of HTML, CSS, and JavaScript, integrated with modern web graphics technologies such as WebGL and the Three.js library. Users can rotate, zoom, and explore these 3D objects in real time, simulating a spatial perspective that mirrors real astronomical observations.

The frontend design emphasizes responsiveness and intuitive navigation, ensuring compatibility across devices including desktops, tablets, and smartphones. The user interface is visually immersive, with animations and transitions that mimic the dynamic nature of space. Content is structured to allow both casual browsing and deep exploration, making it suitable for students, educators, researchers, and astronomy enthusiasts alike.

This project demonstrates the effective fusion of scientific content with modern web development techniques to create a virtual space environment that is both informative and visually captivating. It highlights the potential of web technologies in promoting science education and fostering curiosity about the universe. Future improvements may include the addition of real-time data integration from space observatories, voice-guided tours, and multilingual support to broaden accessibility and educational impact.

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**CHAPTER 1**

# INTRODUCTION

The universe, with its vast and mysterious expanse, has intrigued humanity since the dawn of civilization. From the early days of stargazing and mythological interpretations of the night sky to the scientific revolution that led to telescopic observations and space exploration, our fascination with celestial bodies has remained constant. In recent decades, advances in both astronomy and digital technology have made it possible to explore the cosmos not only through physical observation but also through immersive virtual experiences. This project, titled **"Interactive Astronomical Webpage Featuring Celestial Bodies and 3D Models"**, is a step in that direction—merging scientific knowledge with modern web development tools to create a digital platform that brings the universe closer to users in an engaging and educational manner.

The core objective of this project is to design and develop an interactive webpage that serves as a rich repository of information about various celestial bodies. These include the planets of our solar system, their moons, distant stars, galaxies, comets, asteroids, black holes, and more. Each celestial body featured on the website is accompanied by detailed scientific data, such as composition, size, orbital characteristics, discovery history, and notable features. The content has been curated to ensure accuracy and relevance, making it valuable for students, educators, amateur astronomers, and general users interested in space science.

What distinguishes this webpage from a standard informational site is the incorporation of **interactive 3D models** that allow users to visualize celestial objects in a spatial, hands-on manner. Built using HTML, CSS, and JavaScript—along with libraries like **Three.js** and **WebGL**—these models can be rotated, zoomed, and explored in real time. This adds a dynamic, immersive element to the learning process, offering users a more intuitive understanding of astronomical concepts, such as planetary rotation, relative size, and orbital paths. The use of 3D visualization bridges the gap between textual learning and experiential understanding, especially for visual learners.

The design philosophy behind the webpage emphasizes simplicity, accessibility, and user engagement. The interface is clean and responsive, ensuring compatibility across multiple devices and screen sizes. Animations and effects are used to reflect the aesthetics of outer space—dark themes, glowing visuals, and smooth transitions contribute to an immersive experience. Content is categorized intuitively, allowing users to search, filter, and browse through celestial objects with ease interface design, 3D model integration, coding strategies, and challenges encountered along the way. It will also highlight future scope for improvement and expansion, such as the integration of real-time astronomical data, virtual reality support, and multilingual options. Ultimately, this project stands as a testament to the power of combining science with technology to make learning a more immersive and enjoyable experience.

**CHAPTER 2**

# LITERATURE REVIEW

The integration of astronomy education with digital platforms has gained substantial attention in recent years, with numerous studies highlighting the effectiveness of interactive tools in enhancing learning outcomes. Researchers like Slater et al. (2001) and Zeilik et al. (2002) have emphasized the role of visual aids and simulations in helping learners grasp complex astronomical concepts such as planetary motion, star formation, and the scale of the universe. Traditional resources, while informative, often lack the dynamic and interactive features needed to engage modern learners. As a result, web-based astronomy tools like NASA’s “Eyes on the Solar System,” Stellarium, and Celestia have emerged, offering users the ability to explore the cosmos virtually. However, many of these tools require software installation and are not optimized for universal accessibility across devices, particularly mobile platforms. This limitation presents a significant gap that browser-based solutions can effectively address.

Simultaneously, the development of web technologies such as WebGL and JavaScript libraries like Three.js has made it possible to create interactive 3D models directly within the browser. These technologies allow for real-time rendering of complex graphics without the need for additional plugins, making them ideal for educational applications. According to Evans et al. (2014), WebGL has proven to be a powerful tool for scientific visualization, and its use in web-based learning environments continues to grow. Several astronomy-focused projects have already utilized these technologies to simulate planetary systems and visualize space phenomena in three dimensions. However, while platforms such as Solar System Scope and Space Engine Web are technologically advanced, they often prioritize high-fidelity simulation over simplicity, which can make them less approachable for beginners.

Equally important in the development of educational platforms is user experience. Studies by Nielsen (1994) and Kim and Reeves (2007) stress that usability and interactivity are critical for effective learning. Features such as smooth navigation, responsive design, drag-and-rotate interfaces, and interactive information cues help sustain user interest and promote deeper exploration. Despite this, many existing astronomy sites focus more on static content or visual realism, neglecting aspects of user interface and accessibility.

In conclusion, the current landscape of astronomical web platforms highlights both innovation and gaps. While several tools have made great strides in integrating 3D visualization and astronomical data, issues such as limited accessibility, lack of mobile responsiveness, and steep learning curves remain. This project seeks to address these gaps by offering an all-in-one, browser-based webpage that combines informative content, interactive 3D models, and user-friendly design to create a more inclusive and engaging astronomical learning experience.

## CHAPTER 3

**MATERIALS**

The development of the astronomical webpage required a combination of software tools, programming languages, libraries, and resources to effectively design and implement both the content and interactive features. The core technologies used in this project include HTML, CSS, and JavaScript, which form the foundation for structuring, styling, and enabling interactivity on the webpage. HTML was used to create the structural layout of the webpage, organizing content into sections such as celestial body descriptions, navigation menus, and interactive elements. CSS was employed to design a responsive and visually appealing user interface, using styles, themes, animations, and transitions that reflect the aesthetic of outer space. JavaScript served as the primary language for adding interactivity, enabling dynamic behaviors such as content switching, user-triggered animations, and the rendering of 3D models.

To create and render the 3D models of celestial bodies, the Three.js JavaScript library was utilized. Three.js is built on top of WebGL, allowing for hardware-accelerated 3D graphics directly in the browser without the need for plugins. This library provided tools for creating spheres to represent planets and stars, applying textures, adding lighting effects, and enabling user interactions like rotation, zoom, and camera movement.

For visual assets, including textures of planets and star fields, NASA’s public domain image database and other open-source space image repositories were used. These high-resolution textures added realism to the 3D models and enhanced the visual quality of the simulation. In some cases, additional image editing was done using tools like Adobe Photoshop or GIMP to optimize the textures for web use and ensure smooth loading performance.

The project was developed and tested using Visual Studio Code as the main code editor due to its extensive support for web development, integrated terminal, and useful extensions for HTML, CSS, and JavaScript. Browser-based debugging and live preview were conducted primarily in Google Chrome, which offers robust developer tools for testing responsiveness and performance.

To ensure that the webpage would function effectively across different screen sizes and devices, responsive design techniques were implemented using CSS Flexbox and Media Queries. The design was tested on various devices including laptops, tablets, and smartphones to validate accessibility and usability.

In summary, the project made use of a modern and accessible web development stack, along with publicly available astronomical resources, to build an educational platform that is both scientifically accurate and visually engaging. The careful selection and integration of these materials were essential in achieving the project’s objectives of interactivity, usability, and educational value.

**CHAPTER 4**

**CHAPTER 6**

# RESULTS AND DISCUSSIONS

## CONCLUSION

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