

NASA Grant Proposal: National Space Telescope Network (NSTN)

Proposed Budget: \$20,000,000

Duration: 5 Years

Executive Summary

The National Space Telescope Network (NSTN) proposes to establish a collaborative, nationwide network of 100 amateur astronomers equipped with high-resolution telescopes to capture and submit detailed images of the night sky. These observations will be compiled into a centralized database, processed into a master image file updated monthly, and analyzed using novel software to detect and track moving objects such as planets, asteroids, and comets. The NSTN will focus on identifying near-Earth objects (NEOs) that may pose a threat to Earth, enhancing planetary defense capabilities, and advancing scientific understanding of solar system dynamics. This project aligns with NASA's mission to protect Earth from potential impacts and to engage the public in space science.

Objectives

1. Establish a Network of Amateur Astronomers:

- Recruit and equip 100 amateur astronomers across the United States with high-resolution telescopes and standardized imaging equipment.
- Provide training and resources to ensure consistent, high-quality data collection.

2. Develop a Centralized Database and Processing System:

- Create a secure, cloud-based database to store and process submitted images.
- Generate a monthly master image file of the night sky, combining observations from all participants.

3. Design and Deploy Novel Software for Object Detection and Tracking:

- Develop advanced algorithms to detect and track moving objects, including asteroids, comets, and other NEOs.
- Model and predict potential collision trajectories within the solar system.

4. Enhance Planetary Defense Capabilities:

- Identify and catalog objects that may pose a threat to Earth.

- Provide data to support NASA's Planetary Defense Coordination Office (PDCO) and other international efforts.

5. Engage the Public in Space Science:

- Foster collaboration between professional and amateur astronomers.
- Educate the public on planetary defense and the importance of tracking NEOs.

Project Description

1. Network Establishment and Equipment Distribution

The NSTN will recruit 100 amateur astronomers through partnerships with astronomy clubs, universities, and citizen science organizations. Each participant will receive a high-resolution telescope, a standardized imaging camera, and a computer for data processing. Training sessions will be conducted to ensure consistent data collection and submission.

2. Centralized Database and Image Processing

A cloud-based database will be developed to store and process the submitted images. Advanced image stacking and processing techniques will be used to create a monthly master image file of the night sky. This file will serve as a resource for both scientific research and public outreach.

3. Software Development for Object Detection and Tracking

Novel software will be developed to analyze the master image files and detect moving objects. The software will use machine learning algorithms to identify and track asteroids, comets, and other NEOs. Trajectory modeling will be used to predict potential collisions with Earth.

4. Planetary Defense and Scientific Contributions

The NSTN will provide critical data to NASA's PDCO, contributing to early warning systems and mitigation strategies for potential impacts. The project will also advance scientific understanding of solar system dynamics and the distribution of NEOs.

5. Public Engagement and Education

The NSTN will engage the public through workshops, webinars, and an interactive online platform. Participants will have access to the master image files and software tools, fostering a sense of ownership and contribution to planetary defense efforts.

Budget Breakdown

1. Equipment and Supplies:

- Telescopes and imaging cameras: \$5,000,000
- Computers and software licenses: \$2,000,000

2. Database Development and Maintenance:

- Cloud storage and processing infrastructure: \$3,000,000
- Software development and updates: \$2,500,000

3. Training and Outreach:

- Workshops, webinars, and educational materials: \$1,500,000
- Public engagement platform development: \$1,000,000

4. Personnel:

- Project management and coordination: \$2,000,000
- Data analysts and software developers: \$2,000,000
- Outreach and education specialists: \$1,000,000

5. Contingency Funds:

- Unforeseen expenses and adjustments: \$1,000,000

Total Budget: \$20,000,000

Expected Outcomes

- A fully operational network of 100 amateur astronomers contributing high-resolution images of the night sky.
- A centralized database and monthly master image file updated with new observations.
- Advanced software capable of detecting and tracking moving objects, with a focus on NEOs.
- Enhanced planetary defense capabilities through early detection and trajectory modeling.
- Increased public engagement and awareness of space science and planetary defense.

Alignment with NASA's Goals

The NSTN aligns with NASA's strategic goals of advancing space science, protecting Earth from potential impacts, and engaging the public in scientific discovery. By leveraging the power of citizen science, the NSTN will complement existing efforts such as the Near-Earth Object Observations Program and contribute to NASA's mission to explore, discover, and protect.

Conclusion

The National Space Telescope Network represents a groundbreaking initiative to harness the power of amateur astronomers, advanced technology, and public engagement to enhance planetary defense and advance space science. With a proposed budget of \$20,000,000, the NSTN will create a sustainable, collaborative system that benefits both NASA and the broader scientific community. We respectfully request NASA's support to bring this visionary project to life.

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