Why Should we Fund NASA

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction:

There is so much that is unknown about deep outer space. It is the last frontier for exploration. The final unknown. There are countless scientists and engineers who devote their lives to uncovering the mysteries that space holds. There is so much to learn. What happened during the big bang? What is dark matter? What causes gamma-ray bursts? Discovering more about outer space will help to enable us to learn more about the mysteries of our universe and learn more about fundamental science. In particular there is a whole area of study devoted to learning more about cosmic gamma-rays. Gamma-rays are high energy photons that are emitted from a variety of different sources in outer space (NASA Sept). If we are able to detect and measure both the energy levels and the direction of the gamma-rays it can tell us a lot of information about what is happening in the universe.

In order to learn more about space and the universe the National Aeronautics and Space Administration (NASA) frequency funds missions proposed by different groups to observe different phenomena. One category that NASA offers funding for is the small explorers mission class (SMEX) (NASA Nov). These missions are not as large scale and don't cost billions as some of the more re-known missions such as Curiosity or Perseverance do (Drier), but they serve an important role in learning more about Astro and Helio physics. It allows for many different scientists to compete to get funding in order to verify their ideas and predictions. The breakthroughs that NASA makes are very important to different branches of space science, but they are equally as important to us, tax payers, American citizens, and people of the world. Throughout its lifetime many NASAs technical achievements have been able to positively impact regular people, who aren't scientists and who new discoveries in the cosmos don't affect. Much of the technology that NASA develops in its pursuit of science has direct consumer impact, in addition to the economic benefits that NASA has as well as the medicinal research that has been conducted aboard this International Space Station (ISS).

STS Topic:

Why should we invest into space sciences? Some might say that it is a waste of time money and effort when there are many different problems on earth that we could reappropriate the money to. This view point completely neglects the positive impact that space research, particularly the work that NASA does, and how that research and products have changed society. Even excluding NASAs monetary contribution to the economy and society in the form supporting over 300,000 jobs and the 71 billion dollars of economic output (Dodson), the technological advances that NASA has provided to society have been revolutionary.

Money spent on space travel and space research doesn't get burned up. It produces results that benefit us and our society. One of the biggest impacts that NASA has had was the creation of a highly accurate Global Positioning System (GPS). The Jet Propulsion Lab (JPL) had a lot of experience tracking the direction of radio waves in the 1960s. They were originally used for tracking radio signals from quasars. These radio signals were captured by different satellites at different times. From this information they were able to get a highly accurate model of Earth's shape and size (Hall). JPL was then able to use the knowledge and experience they earned in tracking radio waves and apply it to the civilian market in the form of GPS. They helped to create base stations to calibrate the satellites used for GPS transmission as well as developed critical algorithms to determine location from the GPS transmissions as well as to correct any errors that might occur (NASA May). These innovations helped to increase the accuracy of GPS from 30 feet down to a mere 3 inches (NASA May). With this increase in GPS accuracy, it was able to lead to the wide spread adoption of GPS. The crucial investment in NASA has helped change how society operates. GPS is so ubiquitous that almost everyone is carrying one with them wherever they go in the form of their smart phone. Gone are the days of asking strangers for directions or staring at maps from the glove box trying to decipher where you are. Long distance road trips have never easier. It has helped us as a society stay more personally connected to one another my allowing us to more easily travel and congregate. According to technological determinism, changes in

technology is one of the key factors in social change. Investment into NASA and the quest for more knowledge about space can bring about that change due to inventions and products that are able to spawn from it.

Last year in October of 2022 NASA launched the Surface Water and Ocean Topography (SWOT) Satellite. The purse of SWOT is to monitor the Earths oceans and water from outer space. SWOT is going to be able to measure verify river boundaries as well as monitor water basins and river flow allowing different states to more equitably share water resources. Due to its capabilities to monitor water levels it will help scientist be able to improve our capabilities to model floods which could save people from disaster and losing their home and livelihood. Finally, SWOT is going to improve public policy by giving lawmakers more information about water resources and natural disasters such as flood and hurricane warnings. This will allow them to make better, more informed decisions and lead to better results (Sylvian). This mission has the potential to positively impact thousands of Americans and people from all around the world. It can help guide them to avert potential disasters as well as guide society on how it should properly allocate its resources. This 20-year project cost tax payers 1.1 billion dollars. Which might sound like a lot but spread out over 20 years it's only 55 million a year. Compared to the impact that it can have the price isn't that steep.

Additionally, NASA has a massive economic impact as well as a technological impact. Money spent on funding government agencies, particularly NASA, isn't simply wasted and burned. That money gets spent and helps fuel the economy, creating more jobs for Americans. NASA helps create over 300,000 jobs as well as provides an additional 71 billion is total economic output as well as generates an estimated 7.7 billion in additional state and local taxes (Dodson). Money spent on space exploration and space sciences is able to come directly back to the economy to fuel development, science and people.

Even if you did not know it, innovations brought on by NASA funding have helped millions of Americans sleep better for years. The origin of memory traces it routes back for the late 1960s when NASA came up with a new shock absorbent material. Its initial purpose was to provide comfort to NASA airplane seats but it eventually found a niche in many different areas such as football helmet protection, shoe cushioning, and the most notorious, mattresses (NASA). Memory foam has been shown to help reduce neck and back pain in sleeper, leading to a higher quality of life and greater satisfaction (The Pros). These are some of the technologies that NASA has created that has helped to influence modern, every day life. The effect that scientific investment and technological progress has isn't always evident from the primary objective. Many times, investment into science can lead to positive new discoveries that can directly influence everyday folk. NASA has made countless innovations that are able to effect normal people, not just astrophysicists who are exploring the universe. Funding NASA has helped brought about these innovations and yielded positive side effects.

Space exploration has not just had a major technological influence, it also had a major cultural impact in the United States in the 50s and 60s, in particular due to the massive space race between America and the Union of Soviet Socialist Republics (USSR). Space travel and funding was at the forefront of America due to our need to be better than the Soviets and beat them in all aspects of technological advancement. Back during the 1960s, over 4% of the U.S' annual budget went to funding NASA (Rodgers). This was due to wipe spread approval and enthusiasm for novel space technology. Because of this influence, NASA played a larger part into pop culture, in particular science fiction. The effect it had on sci-fi is incredibly notable and has helped inspire some of the most ground breaking pieces of cinema. For instance, 2001: A Space Odyssey, by Stanley Kubrick was heavily influenced by the development of NASA. The aesthetics of one of the most influential moves of all time came directly from NASA missions and the desire to depict an accurate movie about space travel. This has helped to influence generations of film makers that have been enormously popular with the general public. 2001:

a Space Odyssey has had a massive impact on film making. Many popular films were directly inspired from it such as Interstellar, Arrival, and perhaps the largest and most influential movie franchise of all time, Star Wars (Reeves 2021). These franchises and movies have touched millions of people and have been massively influential in shaping the populaces minds towards space travel and exploration.

The influence of the space race and NASA can be found not just in movies and TV, but also in that of amusement parks. One of, if not the most iconic roller coaster are the two Space Mountain roller coasters located in Disney world and Disney Land. Space Mountain is almost synonymous with the word roller coaster. It is the most popular attraction in the most famous amusement parks on the earth (Levine 2020). Countless people ride them and derive joy from space mountain every year. It is hard to imagine a world where Space Mountain is as popular as it is without the influence of the space race and the public acknowledgement on NASA and advances in space exploration.

In conclusion, funding NASA has had extraordinary benefits not just for American citizens, but people of the world. Despite its limited budget, it has been able to have a tremendous impact. Permeating peoples lives and affecting how we interact with society. NASA has helped to completely revolutionize travel and how connected we are. It enabled us to easily get to places we've never been before without the concern of getting lost. NASA's innovations have helped us to understand more about our planet, climate and water cycle. With the new satellite SWOT, they are able to observe water levels across the entire planet, allowing us to more efficiently allocate resources as well as learn when and where new natural disasters might strike. There are countless technological innovations and improvements that funding science and engineering has allowed us to produce. Spin-offs from NASA endeavors have directly been applicable to mass market consumers and have had a wide appeal. Countless people across not just the United States, but the entire world use products developed with NASA funded technology. In addition to scientific benefits, NASA has had a deep and long-lasting cultural

impact from the world encompassing space race against the Soviet Union. The affects of which still dominate pop-culture as well as our memories and perceptions of space science.

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