1. In **350 words or less**, please describe the type of company and internship work assignment you would prefer and why?

11 years ago, I stared at the television screen and saw rocket boosters light off for the first time, as my eyes widened it ignited a love that would dictate the next decade of my life. This dedication has led me to pursue my vocation such that I never fail to reach the imagination and goals that I set for myself so long ago. Since that initial spark, my devotion to space can be seen in my academic and professional experience. Starting in the Nuclear Particle Group, as an undergraduate researcher I gained experience in scientific research and team-oriented operations. Transitioning to an internship at TURBOCAM International where I acquired knowledge relating to the inner workings of a private aerospace engineering company. All the while I’ve devoted my enthusiasm for spaceflight through the University of New Hampshire’s Students for the exploration and Development of Space. Where I’ve served as Vice President for the past three years alongside previous Matthew Isakowitz Fellow, Charlie Nitschelm. When reflecting upon my work, I have concluded that commercial space is the cumulation of the greatest engineering challenges facing mankind, and I see no alternative for where to apply my efforts. The challenges facing this industry are as interdisciplinary as the host companies themselves, therefore I see my experience oriented most with those in rocket propulsion, vehicle integration, and spacecraft design. An internship within these areas is where I would prosper and develop into the greatest asset, helping both mine and the host companies’ journey to the stars.

I have had the pleasure of knowing exactly what I want to do with my life since I was young. If I am granted a spot in the Matthew Isakowitz Fellowship Program, I will bring the love for space I have carried for the past 10 years and will carry for the rest of my life. The work done by NASA in the Space Race encouraged me to take my first steps, I can only hope to encourage others to take their first steps with what the commercial space industry and I will accomplish in the upcoming years.

Other areas of interest have come and gone but engineering and STEM has always been a central driving force.

that I work towards the mission of the company and the final frontier.

\*Talk a little more heart into it\*

\*Experience seems forced\*

10 years ago, I stared at the television screen and saw rocket boosters light off for the first time, as my eyes widened it ignited a love that would dictate the next decade of my life. I live my life as if I have the shadow of my 11 year old self by my side, I want to pursue my vocation such that I never fail to reach the imagination and goals that I set for myself so long ago. The company that I would prefer to work for would be one that allows me to fulfil every aspect of that love for space, exploration, and discovery. As I have followed along my path, areas such as vehicle integration, propulsion, and spacecraft design have become highlighted and dictated my focus. This focus has not wavered and can be seen in my experience though my collegiate career. Starting in the Nuclear Particle Group as an undergraduate researcher I gained experience in scientific research and team-oriented operations. Transitioning to an internship at TURBOCAM International where I acquired knowledge relating to the inner workings of a private aerospace engineering company. All the while I’ve devoted my enthusiasm for spaceflight through the University of New Hampshire Students for the exploration and Development of Space. Where I’ve served as Vice President for the past three years alongside previous Matthew Isakowitz Fellow, Charlie Nitschelm. When reflecting upon my work, nothing would be greater than saying I was able to help a team progress human development, in space, on earth, and along our joined journey to the stars.

I have had the pleasure of knowing exactly where and what I want to spend my efforts on throughout my life. Other areas of interest have come and gone but my drive for engineering and STEM has been unwavering. If I am granted a spot in the Matthew Isakowitz Fellowship Program, I will bring that focus and commitment to spaceflight and to my host company. Ensuring day in and day out, that I work towards the mission of the company and the final frontier.

If accepted into the MIFP, I would be looking to be paired with a company that is looking for a student to rise to the challenge. I went into the commercial spaceflight field because I knew it would be challenging and thus, equally rewarding. I want to invest in a company that see’s the value of everyone's work and allows their interns to prove their worth.

As for the internship work, there are areas of spaceflight that fascinate me the most, rocket integration, propulsion engineering, and systems operations and optimization. Nevertheless, this is not to distract myself from the fact that my passion lays in aerospace and spaceflight, no matter what specific task I preform, if it can be seen to progress human development towards space, it will be fulfilling.

I am looking to work for a company that will have a real impact on the world, encouraging and inspiring people through allowing human spaceflight to be accessible to more than just the select few.

I chose to go into the commercial spaceflight field because I knew it would be challenging and thus, equally rewarding. My determination to work towards these goals and their alignment with this internship make me an ideal candidate.

Over my collegiate career, I have worked towards personal and academic success, not only for myself, but also those around me. A good friend of mine and I have built an engineering organization within my university that has grown to over 40 members with the focus on the development of aerospace and commercial spaceflight. As the Vice President of UNH Students for the Exploration and Development of Space, I have gained valuable experience developing and designing our hybrid rocket engine and managing the design of the vehicle architecture. In depth FEA and SOLIDWORKS has been a required to create a beautifully designed rocket. Outside of UNH SEDS, I am an Engineering Intern at TURBOCAM International where I develop data analysis software and work with 5 axis machining.

My devotion and passion for space has not wavered over the course of my life, and I can only hope that my next steps are with Matthew Isakowitz fellowship

1. Please answer **ONE** of the following essay questions in **350 words or less**:
   * What will be the next giant leap in space technology from the private sector and why?
   * You are testifying before Congress for a hearing focused on the biggest barriers for the commercial space industry. What would be your opening remarks?
   * Elon Musk, in a discussion with our 2019 Fellows, stated that starting a company is like “eating glass and staring into the abyss.” Thankfully, you have the stomach for this kind of business. What start-up idea would drive you into starting a business and why?

Thank you chairwomen Kendra Horn and ranking member Brian Babin, thank you for the opportunity to testify today. As we sit here today, there are more than 21,000 objects larger than 10cm orbiting the Earth, not to mention the 500,000 bits of space debre that fall between 1 and 10 cm. On the bright side, small debre burns up once it re-enters through the atmosphere, and larger objects can be tracked, simulated and ground impacts predicted. Now, predicted, not controlled, not modified, simply predicted. As you can see, space debris poses a threat for the space industry on both fronts, in the sky and on land. When launching costs on SpaceX rockets are to the tone of $2,720 per kilo, its vital to all those involved to protect their assets.

In a recent industry study, I asked 35 professionals what the biggest challenges and barriers in the industry were currently, and in the foreseeable future. Of the responses, 65% + mentioned space debris and orbital debris disposal as one of their top issues. These professionals are ingrained in our industry, from a Manager of Business Development at one of the largest Defense contractors, to a CEO & System Engineer at a Korean based small orbital launch company. Their input is invaluable and as one professional commented on space debris, “It’s like driving across a vast desert with your eyes closed, maximum car speed, with a lot of other cars driving there too, and being told to turn right, or turn left, and the person giving the direction only seeing a very small fraction of things you can run into.  Never stopping or slowing down.” These dangers exist in every facet of space, from life support systems on the ISS, to precision equipment on revolutionary space satellites. Space debris poses as one of the most formidable dangers, and barriers to the commercial space industry and due to their contributions, it is crucial that we recognize their responsibility for the items launched. Thank you, and I look forward to answering your questions.

Thank you chairwomen, Kendra Horn and ranking member, Brian Babin, thank you for the opportunity to testify today. As we sit here today, there are more than 21,000 objects larger than 10cm orbiting the Earth, not to mention the 500,000 bits of space debre that fall between 1 and 10 cm. These objects are traveling at bewildering speeds turning fore say, a BB, into an undetectable projectile with a kinetic energy far greater than modern bullets. On the bright side, small debre burns up once it re-enters through the atmosphere, and larger objects can be tracked, simulated and ground impacts predicted. Now, predicted, not controlled, not modified, simply predicted. As you can see, space debre poses a threat for the space industry on both fronts, in the sky and on land. When launching costs rise to the tone of $23,000 per kilo, its vital to consumers, companies, and all those involved to protect their assets.

In a recent industry study, I asked 35 professionals what the biggest challenges and barriers in the industry were currently, and in the foreseeable future. Of the responses, 60% + mentioned space debris and orbital debris disposal as one of their top issues. These professionals are ingrained in our industry, from a Manager of Business Development at one of the largest Defense contractors, to a CEO & System Engineer at a Korean based small orbital launch company. Their input is invaluable and as one professional commented on space debris, “It’s like driving across a vast desert with your eyes closed, maximum car speed, with a lot of other cars driving there too, and being told to turn right, or turn left, and the person giving the direction only seeing a very small fraction of things you can run into. Never stopping or slowing down.” These dangers exist in every facet of space, from life support systems on the ISS, to precision equipment on revolutionary space startups satellites. Space debris poses as one of the most formidable dangers, and barriers to the commercial space industry. Thank you, and I look forward to answering your questions.

\*Add statistic about commercial cost\*

\*Add comment about how its commercial space’s responsibility\*

Ref.

[1]. <https://www.universetoday.com/42198/how-many-satellites-in-space/>

[2]. <https://en.wikipedia.org/wiki/List_of_United_States_House_of_Representatives_committees>

[3]. <https://www.bloomberg.com/graphics/2018-rocket-cost/>

1. In **800 words or less,** please answer the following: Why are you excited and passionate about commercial space and your current or future role in it, and why are you a strong candidate for this Fellowship?

When I was 11 years old, I watched *When We Left Earth (2008)* with my father, I was completely engrossed by the sheer size, technicality, and power those beautiful machines produced. I marveled at the challenges they overcame, the milestones they stood on and how the astronauts were living legends. It was everything you could ever ask for in a science fiction fantasy, except it wasn’t. I could travel to Pad 39A, walk under rockets at the Kennedy Space Center and meet Buzz Aldrin at the 2019 International Astronautical Congress. Nothing fascinated me more than the fact that I could be a part of this universal journey, and it still does till this day.

In August 2015 I started my undergraduate’s degree in Engineering Physics from the University of Maine. The University (UMaine) had advertised itself as specializing in engineering while the University of New Hampshire (UNH) emphasized business. After three semesters, that was distinctly not true. UMaine’s facilities were aging and I had failed to get actively engaged within the academic community. I saw this trend continuing for the remained of my time there and realized I needed to change the course of my life, transferring to the University of New Hampshire was my solution. Once at UNH, I spent no time lost, pursuing professional development through my time with the co-ed business fraternity and academic development with numerous organizations. I found my home with UNH Students for the Exploration and Development of Space (SEDS) just a few weeks after its foundation.

UNH SEDS stems from SEDS, a nationwide organization whose mission is to that empowers young people to participate and make an impact in space exploration. UNH SEDS created a connection between my university studies and my dream. It allowed me to pursue the commercial space industry all while reinforcing the concepts covered in my engineering courses. These connections have tremendously ramped up throughout the past three years, with our eyes and hearts looking higher and higher, setting even more ambitious goals for ourselves. I have acted as the Vice President for the past three years, working with freshmen to seniors, and it has been the most rewarding work I have ever done.

UNH SEDS has functioned off a three-year plan, mastery of the fundamentals of rocketry, development of our hybrid engine, and finally, fabrication of New Hampshire’s first undergraduate hybrid rocket. During the 2017-2018 school year, mastery of rocketry was a far-fetched reality, from lawn darts to lake landings, we failed in the most glorious fashion. Time and time again, we marched out to our home-made launch pad and completed 9 flights. Lessons learned and modifications made we felt strong in our understanding and looked forward. 2018-2019 brought in the development of Runaway, our hybrid engine utilizing HTPB Rubber and Nitrous Oxide. Through four hot-fire tests, we gained insight on our engine’s performance and the capabilities it would be able to achieve the following year. 2019-2020 started with less than 10 months till the Spaceport America Competition, with a group of 14 seniors and 25+ underclassmen, I can’t wait to watch USURPER soar and see the fruition of three years and over 1000 hours of work come together.

My time with UNH SEDS has been the best memories of my life. I’ll always remember when Charlie and I stayed in the workshop (shop) until 3 AM, finalizing our second rocket, only for it to undergo a rapid unscheduled assembly during flight. It never felt like work. I grew as the organization grew, I loved and cared for our mission and the work we put in each day. In 6 months from now I’ll have to say goodbye to this family, but the accomplishments of this team are my proudest moments. I can only hope that I have opened Space for one of the undergraduates filling in my footsteps.

Commercial space capitalizes on man’s innate desire to explore. It captures the minds of the youngest generation and the greatest engineering minds alike, inspiring entrepreneurs to drive the market faster and further than the government's reach. When considering its sphere of influence, it’s nearly impossible to determine, much like the universe itself, it is ever expanding. Personally, nothing could generate a more fulfilling life’s work than to looking over the horizon with a team of people who are driven by the challenges before them.

In conclusion, I believe I am a strong candidate for this program because I share the same drive for exploration that Matthew Isakowitz exhibited before leaving us far too soon. Matthew was an inspirational figure within the commercial space industry and his curiosity was only matched by his kindness. It would be an honor to be part of his living legacy.

[In Progress]

I manage the student body of the organization and work with every engineering team to design the best rocket frame possible. SEDS and Space are my passion, so having the ability to integrate every engineering team while simultaneously work with undergraduates and new members is a huge honor and pleasure.

A good friend of mine and I have built an engineering organization within my university that has grown to over 40 members with the focus on the development of aerospace and commercial spaceflight. As the Vice President of UNH Students for the Exploration and Development of Space, I have gained valuable experience developing and designing our hybrid rocket engine and managing the design of the vehicle architecture. In depth FEA and SOLIDWORKS has been a required to create a beautifully designed rocket. Outside of UNH SEDS, I am an Engineering Intern at TURBOCAM International where I develop data analysis software and work with 5 axis machining.

**In a brief statement, in your own words, please describe why you are an ideal candidate for this position.**

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My devotion and passion for space has not wavered and I can only hope that my next steps are with The Spaceship Company.

When I started at the University of New Hampshire as a mechanical engineering major, I wasn’t sure what I wanted to apply my studies to. I then witnessed the live event of SpaceX’s booster engine land on a drone ship from a sub-orbital flight. I instantly had the realization that I wanted to be a

part of a team that is pushing the bounds of space exploration. There are very few topics that funnel my thoughts into only the current moment. I was told growing up that there would be a time in my life that my passion would find me. Some must wait more than half a lifetime, but I only had to wait 18 years. Space exploration, and specifically rocket technology, is one of those topics that expose my passion. Commercial space opens up the opportunity for more people to be innovative and creative. Government and political organizations cannot compete with entrepreneurial models and commercial drive. Private companies seek real, sustainable business models that will allow the industryto lower costs and grow over time. With any scientific development, no matter the topic, all areas of human knowledge expand. Jumping higher into rocket and space technology will have unimaginable benefits to society on Earth, and beyond. There is nothing more exciting than letting our natural curiosity of the unknown unfold secrets to what else is out there in the universe. I cannot say it better than Elon Musk, who said “You want to be inspired by things? You want to wake up in the morning and think the future is going to be great. That's what being a spacefaring civilization is all about. It's about believing in the future and believing the future will be better than the past.”After I knew I wanted to contribute to the commercial space industry, I needed to become a part of it during my university studies. I came across Students for the Exploration and Development of Space (SEDS), a nationwideorganization that empowers young students to participate and make an impact in space exploration near the end of my freshman year. I am proud tohave founded UNH SEDS, a local chapter at my university, during the Spring of 2017 with the goal of pushing its members to explore the inner workings of rocket. During the 2017-2018 school year, we developed simulation and optimization functions using MATLAB to design, manufacture and assemble the most optimized rocket given its constrains. After countless rocket flights, including burning a hole through our first launch pad, a G engine coming out of the engine tube, 2 tree landings, countless rocket lawn darts and one very unfortunate lake landing, I think I can finally say to the entire UNH SEDS team that we now know how to build a rocket. After the end of our school year, we were able to optimize a multi-stage carbon fiber rocket and fly it to 2,200 meters, crushing previous record from other universities. When the 2018-2019 school year began, we decided to pursue the design and manufacturing of a hybrid engine using HTPB and nitrous oxide to propel a rocket to compete in the Spaceport America Cup Competition in May 2019. We are currently finalizing our first design and moving to manufacturing overthe next week. We have also recently returned from San Diego, California

where our group attended SpaceVision, a SEDS-sponsored conference, enabling us to network and connect with other space-enthusiastic students across the country. Developing this team has been the hardest, most rewarding thing I have done. I owe everything to SEDS. Rocketry is a noble pursuit. It is the truest profession in which failure directly leads to success. It can become discouraging that failure has been experienced over and over again, but it has only pushed us more to prove that we are capable of achieving greatness. SEDS USA has guided us to finally become rocketeers. Matthew Isakowitz was a passionate young man who was motivated bythe opening of the commercial space frontier. He was also known for his kindness, respect and generosity to anyone he encountered. I believe I am an excellent fit for this program because my drive everyday stems from the same principles that Matthew had. The future is all around us, directly above every single person on Earth.