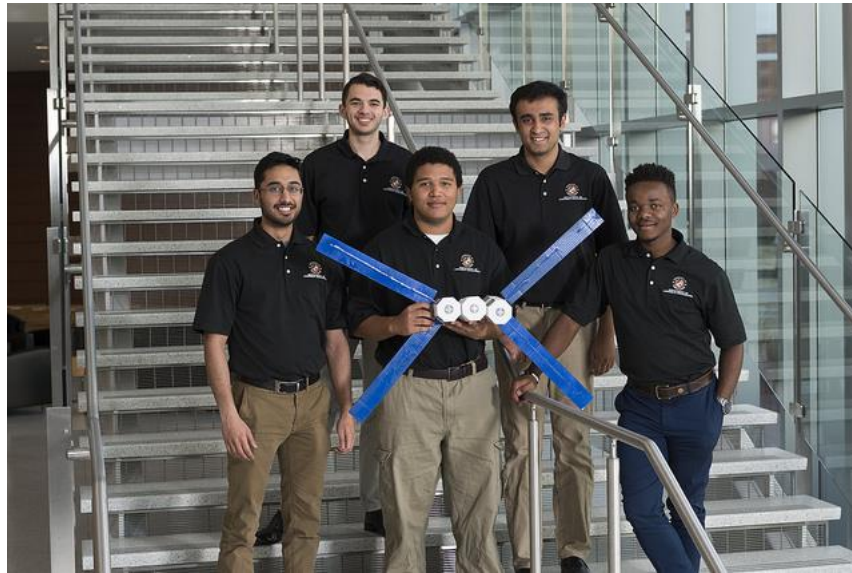


My name is Rounak Mukhopadhyay and I have been working at NASA Langley for the past six months; if I had to put it simply I would say it has been the best six months that have ever happened to me. It all started through the Big Idea competition that I entered with 4 of my classmates my senior year of college. We were all taking the same senior capstone class at the University of Maryland and were working on this project since the fall of 2016. Over winter break of 2016 into 2017 we found out that our submission had been chosen as a finalist and we were being asked to extend our paper and create a presentation that we would give at NASA Langley Research Center only about a month and a half later. The emotions I felt were overwhelming: excitement, anxiety, happiness, and a little bit of fear, after all we would be presenting our ideas to real life NASA engineers. After a couple late nights and what felt like a million rehearsals we were finally ready to present our idea at NASA in February of 2017.



*Our team at the Big Idea Competition forum (NASA)*

The whole competition was surreal; being surrounded by so many intelligent and accomplished individuals as well as touring the different test facilities was like the ultimate space nerd dream come true. By the time we were all sitting at the award ceremony I felt fulfilled from the experiences and memories I had acquired, but our NASA journey was far from over. At the award ceremony we had a couple laughs, were given some additional insight into what it meant to be a NASA engineer, and finally we got to the competition results. We were told that the judges had decided to create a second place award since they could not decide between two of the finalists, and after some suspense building our team was called out as the first runner up. That memory will always be the defining moment of my career, because there I was, suddenly changed from a confused college student questioning my path after graduation to a future NASA intern.

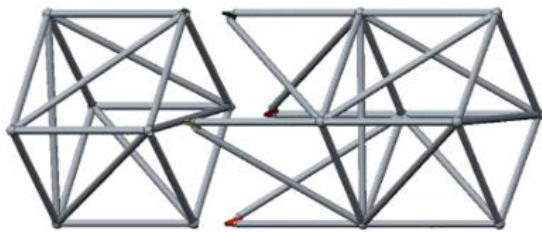


*Our team after winning Second Place (NASA)*

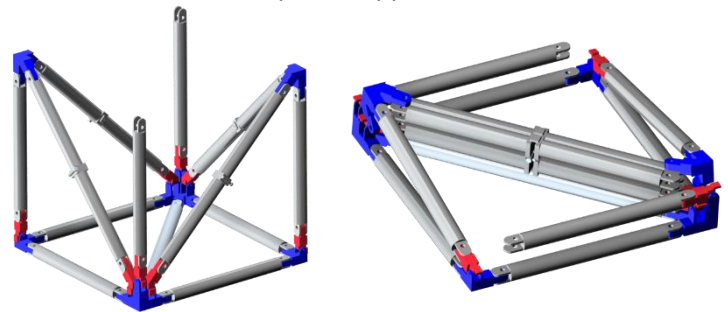


*Me accepting my finalist award (NASA)*

The next couple months was like walking in a haze: I finished my classes, graduated, and before I knew it I was here in Virginia getting ready for my first day on the job. We were assigned to the Structural Mechanics and Concepts Branch where we were introduced to RAMSES (Robotic Assembly of Modular Space Exploration Systems), the specific project we would be working on. In-space assembly is important for the future of space structures, because it replaces point designs for each individual operation to a system of modules that can be replaced and reused for multiple applications. Using a modular architecture reduces the complexity of the design, the time it takes to produce, and the cost of each successive module. Similar to the spacecraft we had designed for the Big Idea competition, which was modular and could be expanded to whatever size was needed for the mission, these space structures could be expanded in any direction to meet the needs of the specific application.



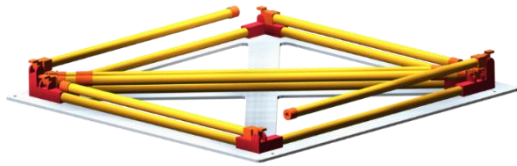
*Three cubic truss modules during assembly*



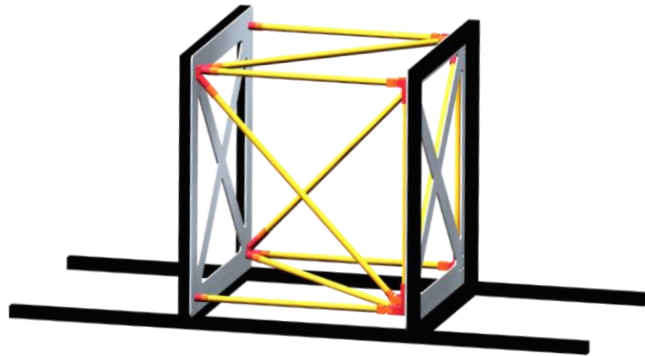
*My first design of the connector struts deployed and packaged*

Over the course of the summer we designed methods of deploying and packaging sections of trusses that would be used as modular bays for proposed space structures. I personally worked on the connection of the cubic trusses. As is visible in the picture of the three cubic truss modules, the second module is not complete and the struts are mainly for connection between two sections; this is so that when assembled with other modules there are no redundant members. I looked at the folding at the

nodes in order to make the connector struts fold into the plane above the base of the truss rather than protruding into empty space. I went through many iterations of my design before I settled on a final design that allowed me to achieve a 90% compression ratio.



*My final design of the connector struts packaged*

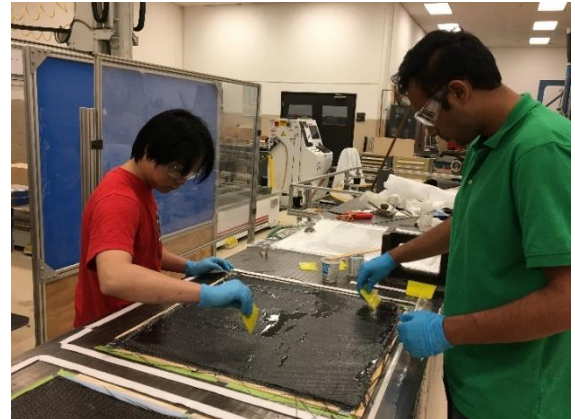


*My final design of the connector struts deployed and mounted*

Towards the end of the summer our mentors sat down with us and asked us if we were interested in staying at NASA Langley as contractors through the fall of 2017. It had not dawned upon me until that moment that realizing my dream of working at NASA long term could be achieved, and by the end of the summer our contract had been extended to the end of the year. I am currently in the middle of the fall, and am mainly working on designing a testing apparatuses for the connection and indexing of multiple cubic truss bays in order to create a one dimensional truss structure. I have also been making modifications to my summer design in order to increase the reliability of the nodes and struts by replacing plastic 3D printed nodes and plastic struts to aluminum 3D printed nodes and carbon fiber struts.



*My final design built and mounted*



*Preparing carbon fiber sheets*

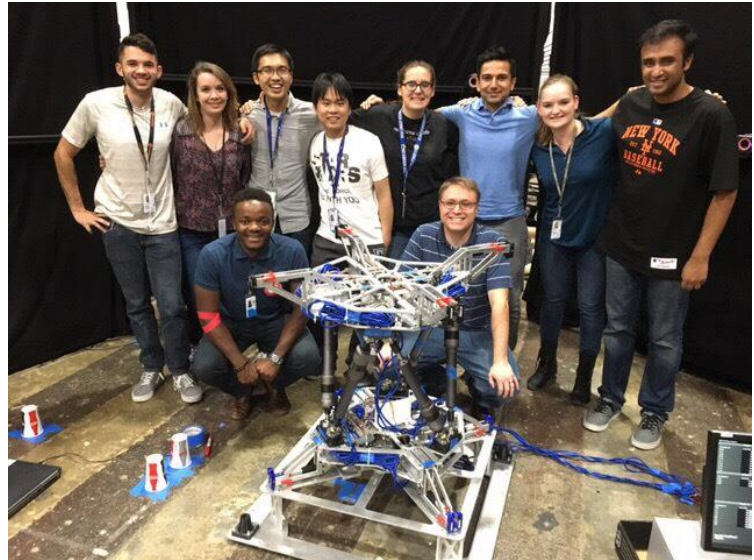
There have been many skills that I have acquired during my time here at NASA. I have become much more familiar with Computer Aided Design and working with 3D printing software and machines. I learned how to use many different machine shop tools and the basics of hardware preparation and assembly. One of the most interesting projects I participated in this summer was creating carbon fiber plates. We began with cutting carbon fiber sheets, applying resin, piling the sheets so that the thread of



each successive sheet was at a 90-degree angle, and finally vacuum sealing them until they had solidified into a plate. I am constantly surrounded by intriguing hardware and the ability to help with multiple projects has given me a broad perspective of the work that is done at NASA.



*Volunteering at the Centennial Open House*

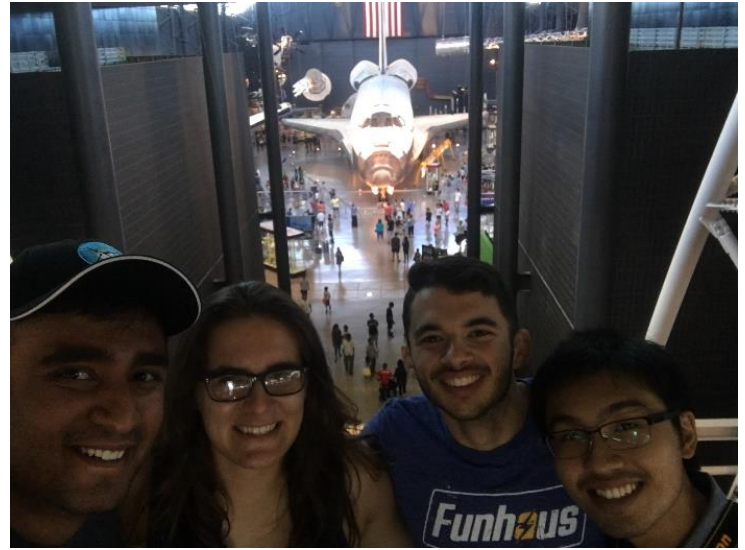


*Dr. Komendera (bottom right) and the summer '17 interns*

One of the best parts about being here this year is that it is NASA Langley's Centennial and that meant there were a myriad of Centennial events that I was able to participate in. The most memorable experience was the NASA Open House, which I helped prepare for and volunteered at. Everyone on center seemed ecstatic to show their work off to the public, and the reception was beyond my expectations. While volunteering and explaining my project to all the visitors I spoke to enthusiastic people from all over the country. I was asked many intelligent questions from individuals ranging anywhere between 8 years old to 80 years old; this showed me how curious the general public really was in the work we do here. I am glad that I could help bring our technology closer to the public as well as hopefully inspiring the next generation to be invested in space technologies.



*At Busch Gardens with the interns and a couple of mentors*



*At the Steven F. Udvar-Hazy Center*

I have been incredibly lucky to work at NASA for the past 6 months and have come across some amazing coworkers, mentors, and overall resources. Anything that I can think of and design using Computer Aided Design can be created in a couple of hours using our multiple 3D printers. I have incredible mentors with years of experience to guide me in the right direction and my coworkers have been nothing but helpful and together we have created a great work environment. I am currently waiting to hear confirmation on my contract being extended through the spring and summer of 2018, and am pursuing a graduate program to augment my engineering knowledge. All of this was possible thanks to the National Institute of Aerospace and NASA setting up the Big Idea competition and introducing me to a whole new world of possibilities.



*At the NASA LaRC main gate*