
THE
VENETIANS

Meet the Team

1. Shaurya Sinha

My name is Shaurya Sinha, and I am 11 years old, and am currently studying at Gems Wellington International School, Dubai, in year 7. My hobbies include reading books (both fiction and fact based), playing video games, roller skating and playing with my little poodle -Whiskey. I like science and engineering related things. I have always been fascinated by robotics and computers. From a young age, I've loved making robots (especially out of LEGO) and learned how to code when I was 7. Since then, my eagerness to learn more has grown, from EV3 and block-based to C++. Recently, I've also finished an Arduino course at Unique World Robotics center. I wanted to enter the NASA SpaceApp challenge to see how much I could challenge myself and to see how good I am when working with a team instead of by myself. I thought that Exploring Venus would be the perfect challenge for us because I love astronomy and I want to be an Aerospace Engineer, so I would be able to give good ideas about the batteries. I think overall our team is well sculpted and I think that we might be able to win.

2. Parrthav Karthik

My name is Parrthav Karthik, a regular year 9 student you see around. I am no different except for my passion to do something different and learn something new. My passion for robotics had just sparked and not knowing what to do I had started a couple of home projects. I later went on to present these ideas to one of my teachers and they gave me the idea of participating in robotics competitions. I started with the First Lego League competition and won the best presentation award. I went on to participate in Fll once more and we won the champions award and champions runner up in regionals and nationals. Then me and my team went for the internationals and won the best innovation project award as well. I also participated in WRO and I secured 7th place and here I am. I am here not for winning or losing but for the experience. The experience of working with different people and combining our ideas.
As a team we are here to gain experience and represent our ideas and values. To improve our community, our world using technology and do something different.

3. Arush Nagpal

Just like everything has its ups and downs, the world of programming is no less. From the euphoria when a flawless program successfully runs, to the vexation when a semi-colon is forgotten at the end of a line. After watching my mom, a software developer, go through some of these moments, my young mind, slowly but surely, got enraptured by the dramatic change in emotions. My name is Arush Nagpal, a 15 year old student in the Dubai International Academy. I adore reading books on military strategy, and have also had an interest in programming ever since I was five years old, when I used to write basic code in Java. When I was ten, I launched my first app, TimesTable, to help my fellow students who were having difficulty in memorizing their times tables. Fast forward to 2020, when a series of natural disasters rocked the world. I took the initiative to incentivize society to combat climate change through developing an online marketplace for used books, ReuseKitab. I have participated in the FLL and the Space apps challenge last year

4. Brent Adrial D'souza

I'm Brent, an IB1 student at Deira International School Dubai. I'm 15 years old and I'm really passionate about aerospace and robotics. Some of my hobbies include playing the keyboard and basketball. I have learnt python programming and extensively worked with Lego Mindstorms in the past in regional and international competitions. I love to collaborate and share my ideas with others and working in a team certainly achieves this. I feel this

competition will provide me with a unique platform to explore more about the past and future NASA missions as well as expand my knowledge about space in general.

5. Abhay Praseeth

My name is Abhay Praseeth, I am 18 years old and I currently study at Cambridge International School Dubai. My love for technology and robotics started when I was 9 years old when I took apart devices around my house. I love tinkering with devices trying to learn how they work with first hand experience. Coding is a skill I picked up as a by-product of this interest to tinker, it helps me further understand the world of technology and how projects are built from scratch.

6. Mohamed Mifzal Maharoof

My name is Mohamed Mifzal Maharoof and I'm 15 years old and studying at Gems New Millennium School, Dubai year 10i IGCSE. I'm an active student in robotics and I'm passionate about doing Humanoid Robotics Engineering. My hobbies are doing many projects including robotics and doing many animated drawings. Apart from robotics, I like to do many activities such as football, basketball, swimming and other outdoor activities. I even made an app that I used as a controller for a unique car that I made. I'm planning to do my higher education in the field of robotics engineering. I also finished my App development course in MIT app inventor 2 at Swiss international scientific school. When I was in 4th grade I did many projects in science field technology and submitted to the science club that took place in my school. I was also part of the Hemaya Dubai police Training 2017 at the general headquarters when I was in 5th grade. I also took part in FTC 2019 (UI Force) competition and secured a price of the Best Robot Controller. I also took part in INOFEST where I did a project on UPCam which helps people from tracking the virus that occurs in our CCTV cameras. Now I'm enhancing my python coding and raspberry from Unique World Robotics center where I have finished levels 1 and 2 in Robotics course. I'm very lucky to be part of the NASA Space App Challenge where I'm gonna team up in groups and learn more about the NASA missions and teamworks that will be taking place in future.

Our Team Values-

We as a team fully embrace each others' thoughts and ideas. We respect our fellow team members and treat them equally. We follow our core values of inclusion, teamwork, respect, fun and innovation without fail as that's what makes us a team. We have a willingness to learn and a never-dying passion for work. We like to be efficient with our work, while maintaining our highest standard. We believe in outcomes and results, as well as good leadership skills. We take responsibility for our actions and for our team. We make sure our team members can understand the task and the solution and we also ensure that every member contributes to the solution and to any relevant discussion and of course we all make sure we have a ton of fun.

The task we chose and our process

We decided to choose the “Explore venus together” challenge. We had a group discussion where we decided that we should go ahead with this topic mainly because we all loved a challenge but also because this suited all of our skill sets and interests .

When we first started we were a bit confused and all over the place but slowly we started making progress. It wasn't easy, we had to do a lot of research and a lot of work but we were getting there. We ran into so many dead ends mainly because the internet is not really an accurate source all the time.

We created prototypes and thought about its flaws and benefits. We have three versions each with major changes in them but finally we achieved our goal with version 3.0 .

Solutions

Version 1-

Our First solution was to create a small battery box using titanium as an outer layer. We decided to use lithium sulfur batteries to power the rover. Each lithium sulfur battery can last 8 hours of full use without charge. Since the battery degrades everytime you charge, The capacity of the battery and the amount of energy it can produce will decrease. **Ignoring this**, one battery (in terms of just the jelly roll) is a measly 6.6 grams and because this is meant to stay for 60 days, i.e. 1440 hours, we would need 180 batteries (1440/8 hours). Since the weight of each of them is 6.6 grams, this would add up to north of a kg, which is light enough seeing as you’re packing 60 days of battery life. Because these batteries only slowly degrade in charging capabilities, it would be fine if we took only one third or even a quarter, but it’s good to have spares. Half of 1 kg is 500 grams, which means the batteries themselves would weigh half a kg This way, even if some of them ruptured unexpectedly, there will still be easily enough battery to stay for 60 days. Another thing is the g-forces and vibrations during launch, which can be easily fixed because these batteries aren’t affected by either one.

To save power initially, we can use the strong electromagnetic field of Venus’s to start charging the batteries before even landing (we would use rectennas to harness the electromagnetic field.) This would increase the ways we can charge our batteries.

Problems With Version 1.0-

One of the key issues identified was the discharge rate of lithium sulfur batteries in harsh environments which gives us an inconsistent variable. Another point of concern was with the melting point of titanium and that it could generate heat. Not only that but the rectannas which would harness the electromagnetic energy would need to be exposed needing it to have a material capable of handling harsh conditions. This makes it difficult to create a rectenna as they would require their outer layer to be an metal insulator.

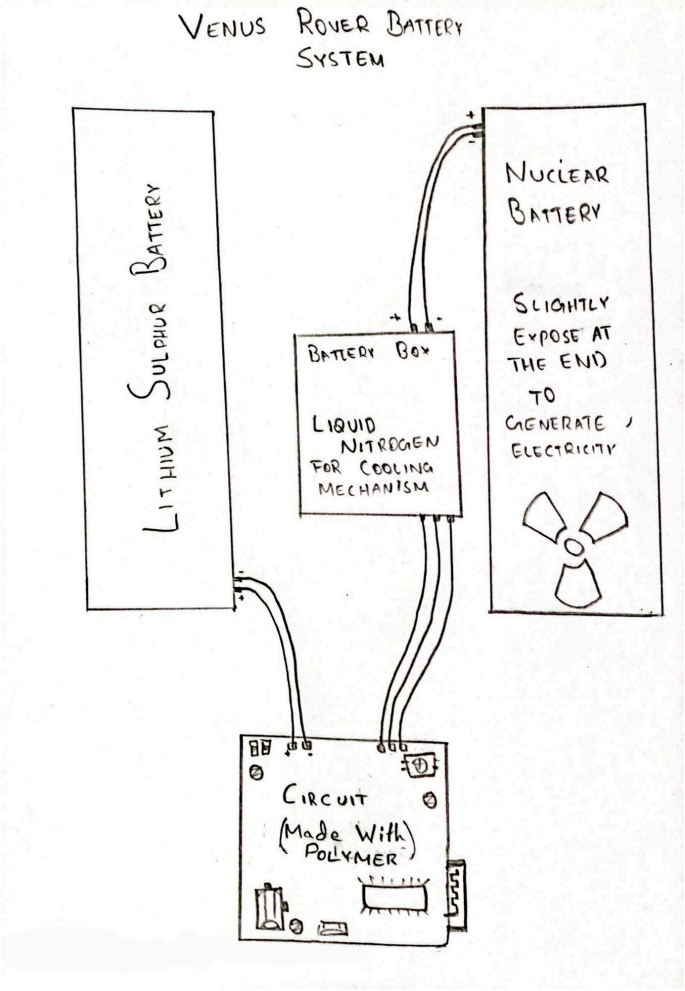
Version 2-

We had decided to change the outer layer to silicon and use titanium as an inner second layer. Then we thought about cooling and decided to use nitrogen. We decided to change the lithium sulfur batteries to a backup and decided to use plutonium batteries as the main source. The reason we have decided to have a backup is because plutonium is a nuclear form of energy making it unstable. To recharge the batteries we have decided to leave the end of the plutonium battery box exposed as it will charge if the temperature of the surrounding area is higher than the temperature of the battery itself and we would use polymer for the circuit system of the rover.

Issues with Version 2.0-

There were multiple flaws we noticed with this version. The cooling system would be limited as there would not be a way to acquire liquid nitrogen when the rover reaches venus. Leaving parts of the plutonium battery exposed could be fatal as there are chances it could overheat and melt.

A diagram of version 2.0-

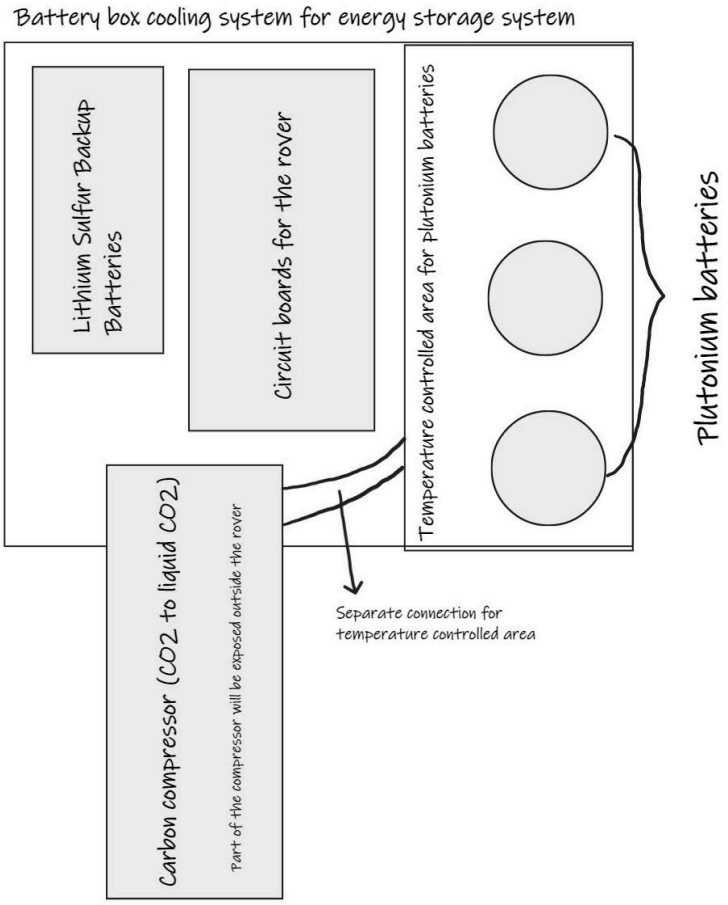


Version 3-

Our version three consists of the positives of versions. For cooling we decided to use a custom made carbon compressor which would be made of titanium as an inner layer and carbon fiber as an outer layer. The carbon compressor would be there to turn Co2 an element available in abundance on the surface of venus and turn it into liquid Co2 which would be used as a coolant. We decided to continue using the lithium sulfur batteries as a backup and we decided to use the plutonium batteries as the main. To charge the plutonium batteries we will design a temperature controlled area with a separate connection with the compressor. The connection can be blocked to increase the temperature which in turn charges the battery and the liquid carbon can be released to cool down the compartment as well. The compartment would be built up of three layers containing it as if the batteries were to explode it won't damage the entire unit. The compartment would have an outer layer of carbon fiber, an inner insulation of silicon and the innermost layer would be titanium.

This solution is the most failproof of all three versions. So far we have not discovered any issues with our current solution.

A diagram of Version 3.0-



Brief Description of our Project-

Our solution consists of the positives of all of our versions. For cooling, we decided to use a custom-made carbon compressor made of titanium and carbon fibre. The carbon compressor would turn CO2 (a gas abundantly available on Venus) into liquid CO2, our coolant. We used plutonium batteries as our primary power source and lithium sulphur batteries as our backup. To charge the plutonium batteries we will design a temperature-controlled area as plutonium batteries charge when the temperature of the surrounding environment is higher than the battery. We plan to use polymer insulation for the circuit boards that control the rover.

Hackathon Experience-

So far it's safe to say all of us as a team have enjoyed and have had so much fun. It was very strange at first since we didn't know each other and the only thing we had in common was that we all lived in the same city. We found it difficult to collaborate at first but then we slowly learned about each other and learned to work together as a team. We used our different talents and expertise in each field of the project and we pulled through as a team and we are proud to be here.

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