**In Our Time**

On space travel and the evolution of our technology.

**Introduction**

It has always been a dream of humanity to fly. And when we finally got off of the ground, we turned our thoughts to something bigger. Something extraordinary. Something we'd never even dreamed of before. To escape the binds of our planet and go to *space*. At the time, this seemed impossible! Nevertheless, due to the hard work, genius, perseverance and bravery of many people, we are entering a new golden era of space travel. However, where did it all begin?

**The beginning of space travel**

The first thing ever launched into space was the Russian Sputnik. A satellite that launched on the 4th of October 1957, It was in contact for three weeks before the batteries ran out. Now it would not seem like much, but back then, it was a huge revelation, and it triggered the space race. The space race was mainly between Russia and the USA. Both wanted to get the honours for space travel, and both won some and lost some. Sputnik 2 followed Sputnik only 32 days after it launched. However, this time there was a passenger. Laika, a Russian stray dog, found on the streets of Moscow. She was the first living being ever to venture beyond our planet.

In 1958 the USA hit back. They launched the Explorer 1 on the 31st of January, and the Vanguard 1 on March 17th. Vanguard 1 was also the first satellite to have solar electric power. The Russians did not launch anything in 1958. 1959 saw four spacecraft released, but the most important is Luna 1 which did the first-ever lunar flyby, and Luna 2 which made the first lunar impact. Then came 1960, and America finally got a first with the first deep space probe. The Pioneer 5 launched on the 11th of March.

However, when the Russian Vostok 1 launched on the 12th April 1961; Yuri Gagarin became the first person in space. In the following years

There have been lots of launches and firsts, but maybe the most important, and the most famous was Neil Armstrong, Buzz Aldrin and Micheal Collins' lunar landing. It made people realise, again, how incredible space travel was, and it was a huge step forward in space travel. However, there were other firsts too, and they were just as important. For example, there was the American Mariner 1 that did the first Mars flyby. Furthermore, there was the Russian Voskhod 1, which held the first three-person crew. Both happened in 1964 before the celebrated moon landing. Then there was the, again Russian, Voskhod 2 which did the first-ever space-walk, but this time in 1965. Tons of space missions launched in the 1900s, but getting closer to the present, there are still some firsts that people have completed and some that we have yet to complete. For example, in 2005, on January 12th, the USA's Deep Impact completed the first comet impact. Though we still have not sent a human to mars or any other planet; I believe that with our new technology this will happen very soon.

**The Future**

The future of space travel and technology is quite exhilarating. We are on the brink of a golden age of interstellar travel and fascinating new creations. However, these creations demand too much energy we need a new, virtually inexhaustible source. A source, just like the sun. However, barely any of the suns rays reach earth, and solar panels are not enough.

This is where Dyson spheres come in. Dyson spheres are a hypothetical structure used to harness the power of a star. There are a few ideas as to what they would look like. A solid ball encircling the star probably would not work. It would be too vulnerable to space debris and would probably crash straight into the sun. A more viable option would be a Dyson swarm. A set of solar panels encircling the sun and beaming its energy elsewhere.

However, the sun is vast, and the number of panels needed would be enormous. If the panels were as thin as possible, they would still use over 100 quintillion tons of material. We also have to look at the design of the panels, and standard solar panels are far too brittle. What we need is something that can go without maintenance for astronomically long periods of time without falling apart. What we will most likely use are giant mirrors. And then they would still need to be sent into space. To grab hold of the materials required, we would need to largely disassemble a planet. Of all the planets, mercury seems like the most viable option. It is close to the sun and very metal-rich. There are four significant pieces of technology needed for a Dyson swarm, and those are solar collectors, miners, refiners and launch equipment.

To start, maybe deploy about one square kilometre of them either as mirrors or as traditional solar panels. They will provide the energy to run the miners, wich strip mine the surface of the planet, and the refiners, which extract valuable materials and fabricate them into the swarm satellites. Then we will need to get them into space. Rockets are too expensive and challenging to de-orbit and re-use. Instead, we could use a sort of railgun, an electromagnetic track to launch the satellites into space at high speeds. We will pack the swarm satellites tight for launch, unfurling like an enormous piece of origami once in orbit. From that point onwards, we could take advantage of exponential growth; using the existing satellites to build and launch new ones faster and faster. At this point, each panel produces the energy to create another; those two work together to make the next two, four become eight, eight become sixteen and so on. Within just about 16 doubling times, we will have surrounded the sun with solar panels and the Dyson swarm will be complete.

This will give us the energy to do virtually whatever we want in the range of space travel and keep developing new and exciting things back on earth to aid us, amuse us, and help preserve the beauty of our wonderful planet.

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