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ROBOTS ON MARS! IT LOOKS LIKE MARS IS GOING TO BE THE FIRST… "ANDRO-ROBOTIC" SOCIETY.

Even just 5 years ago, the idea that robots would play a truly leading role in Mars colonisation seemed more sci-fi than science. But now everything has changed with some huge leaps in robotics. Essentially robots are now self-learning and independent of response-programming. FULL STORY from Victor Samuels on **Page 2** in **"Humans and their Helpers".**

You'll be amazed at what the emergent andro-robotic will be capable of achieving.

A Multi-Planetary Species.

You may have heard the phrase – "Multi-Planetary Species". But what are its implications and why is Mars so important to achieving the goal? Owen Louis David explains.

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IFT 4 – When exactly?

Are you a hopeless launch addict? Then you'll be desperate for your next Starship fix. When will The Big One launch for IFT 4 flight test? We're all on tenterhooks. The editorial team has some answers.

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The Aresian makes Mars accessible.

HUMANS AND THEIR HELPERS

By Victor Samuels

As a species we first stood alone – it was tough evolving on the Serengeti but we made it through. But then, once we'd survived all that competition and predation, humans started to bring in helpers to improve our evoluitionary chances: dogs, horses, cattle, sheep and so on. In other words we domesticated a whole series of animals. These helpers enabled us to be better protected, to be more mobile, to hunt more effectively, to use energy for numerous different tasks (but most importantly for things like grinding down grains), and to provide us with an all-year round food source and sources of warm clothing (sorry domesticated animals!).

After animals came machines. First there was wind and water, helping us irrigate land and process grains. By harnessing steam power we were able to use these helper-machines to vastly increase our productivity as humans when it came to manufacture.

Now we are at the beginning of a new chapter in our "helper history". Our latest helpers are robots. We first became aware of robots (as part of reality rather than fiction) when car manufacturers started using industrial robots to replace human workers. However, we are now at a threshold where robot development is now capable of replacing humans across a very broad range of activities. Increasingly we are seeing a marriage of AI and extremely dexterous robots.

I'd like to examine the relevance of robotics to Mars colonisation in a number of discrete areas.

Androids

Android robots are human-like robots with heads, torsos and limbs. The

Tesla robot is being developed at an incredibly fast rate. It has an integral machine learning capability which means it can "learn on the job" through trial and error but also through templates like training videos.

These AI android robots could be a huge help in just finding and shifting stuff around in warehouses and other facilities.

Androids might very likely also be the toilet staff that keep hygiene facilities clean.

Robot vehicles

Martian cities will be designed to accommodate the needs of robot vehicles. Whereas self-driving cars on Earth find busy urban centres confusing environments, on Mars we will ensure things are clear and simple. That is because we will building up from nothing. So it will be easy to provide roads within urban centres with transponders or visual cues that make it easy for robot vehicles to navigate. We know that already robot taxis are working pretty well in places like Phoenix, Arizona in the USA (relatively simple traffic environments). The traffic environment will be even simpler for self-drive vehicles on Mars.

Robot vehicles will mean huge increases in productivity for the Mars economy, reducing the labour input to transport. Buses and trains will also run automatically.

Deliveries

What we might call "interactive vehicles" will be a common presence on Mars, similar in appearance to the white-tyred vehicles you see in airport terminals. What will they be doing? Well here are some of the duties they will perform automatically. Firstly, home delivery of shopping and cooked food. Secondly, collection of waste (a daily or "persol" collection service that will be activated when your bin contents reach a certain level). Thirdly, delivery of stock from warehouses to retail stores and other locations.

Cleaning

Other wheeled robots will be automated cleaners, many working

during the night when there is less pedestrian traffic.

There will also be robots that climb walls and along ceilings to clean the surfaces periodically, robots that change defective light bulbs or lighting units.

Retail and Restaurant Robots

Shops and restaurants on Mars will operated almost exclusively by robot staff. Mars's low crime environment and robot-friendly design will mean that Mars can and will surpass Earth in the use of such interactive robots. It may take a little getting used to going into a clothes or shoe shop and addressing a robot with a request. Human management will be there but will not be an obvious part of the set up. Perhaps just a couple of people will manage several units.

Industry

Robots will be used extensively in industry, not just as robot arms and 3D printing machines but also as androids moving and delivering items and materials around a workshop, and packing finished products.

Farming

Robots will be used in all sorts of farming activity: planting, crop monitoring and management and harvesting – plus packaging of produce. We may even see tiny drones used as substitutes for bees in the pollination process within CEA (Controlled Environment Agriculture) facilities.

The implications

Mars will be the first human society in the solar system to really banish boring repetitive work and indeed most hard manual work. People's jobs will be much more satisfying and personally rewarding.

The first andro-robotic society will find humans adapting to this new presence in their lives by interacting in ways somewhat similar to the way we interact with our cars and perhaps our pets. Most people don't see the cars they own as just lumps of metal and plastic, any more than they see the houses and flats they live in as just bricks and steel. There is an emotional connection. For most of us our hearts are in our homes. For

many, cars are a kind of an extension of the home principle. People do get upset when their cars get stolen or damaged, and it's not just because of the practical nuisance or potential financial loss, it's because of the emotional connection.

Humans will now be interacting on a daily basis with many robots. With workmate robots, I suspect we will develop quite close ties. Some people might even share some "banter" with robots. After your car radio is often having a kind of conversation with you in the car – it's just we don't vocalise our thoughts.

A MULTI-PLANETARY SPECIES.

By Owen Louis David

Why Mars, why now?

According to the way Elon Musk sees things, we have two choices. Firstly, we could as a species simply stay on Earth, meaning that, eventually (almost inevitably, one might add), humanity will be subjected to an *extinction event* – something on the scale of the dinosaur extinction. What that might be is anyone's guess and Musk does not specify it but self-annihilation through deployment and use of weapons of mass destruction (nuclear, biological and chemical) in a horrific global war is certainly one possible fateful termination episode. A huge asteroid impact could be another. We have seen from the geological record how one (relatively small, Mount-Everest-sized) asteroid impact led to the destruction of the dinosaurs, or at least the flightless kind.

In 2017 we had the detection of an interstellar object *Oumuamua* travelling at a phenomenal relative speed of 95,000 mph. An object like that, but on a much bigger scale, going undetected until a few days away, could quite possibly destroy the whole of life on Earth if there was a high-speed collision.

There are other possibilities for nemesis. For instance, we might *accidentally* stumble upon the means of self-extinction. People have previously hypothesised about the dangers of scientists inadvertently creating a very small Black Hole in a lab. It sounds faintly absurd but some scientists saw and see real dangers in such experimentation – that the Black Hole might get out of control and continue expanding until it swallowed up the whole of Planet Earth and us with it.

Recent speculation about deadly viruses being created in labs and then leaking from them could also be the basis for a mass extinction event. Some diseases have 90% plus lethality. In a lab you might be able to make that 99.9%. It might sound unlikely but then again we also have to consider this could be a *deliberate* act. Just as there have

been cases of pilots deliberately slamming their aircraft into a mountainside with hundreds of people on board in suicide/mass murder incidents, why not a similar attempt on a much grander scale? Misanthropy knows no bounds really. Perhaps a depressed biolab researcher who feels the world has treated them badly might take their revenge out on *the whole of humanity* by killing nearly all the world's population. Unfortunately, though it seems outlandish, such an event cannot be ruled out.

More recently, people have finally begun to see the real dangers of AI (Artificial Intelligence), something that can outsmart us and might even outlive us (having first disposed of us one way of another). Elon Musk has gone so far as to say (at the MIT Aeronautics and Astronautics Department's Centennial Symposium in 2014): *"With artificial intelligence we are summoning the demon."* A dramatic statement meant to catch our attention! Musk was certainly one of the first and one of the most credible to raise the alarm. That concern has now gone mainstream with the US and UK governments discussing steps they might take to control AI development.

Then, finally, there is the worst of all disasters approaching towards our planet: the one we *can't see*! Most likely we will *fail* to see the coming disaster. That's how it goes with most disasters, after all. They thought the Titanic was unsinkable. It's a bit like that old Paul Simon song *Fifty Ways to Leave Your Lover* – there are probably 50 ways humanity on Earth could be wiped out…the problem is we only know about five of them.

A Multi-Planetary Species

If we want to avoid a species-scale domesday scenario the other option – the one backed by Musk - is to make ourselves a "multi-planetary species". This means, of course, finding another planet apart from Earth on which we can live. You might still see humanity wiped out on Earth but at least you will have Mars! OK, it might not be the greatest slogan ever invented as justification for spending billions of dollars on a planetary colonisation project but it is true nonetheless. In a recent speech (4 April, 2024 at Starbase, Boca Chica in Texas) Musk made the point that human civilisation - which he reasonably argued began with the invention of writing - has only been around for about 5,000 years. In terms of the cosmological scale of time, that's a mere blink of an eye. Only extreme ignorance or arrogance could lead you to believe our future on this planet as a complex civilisation is totally assured.

Of course, Earth, for obvious reasons, is our ideal planet. Billions of years of evolution have seen to that. We are pretty much perfectly suited to its atmosphere, temperature range, available food, gravitational pull, radiation levels and so on. There are some small exceptions of course within population groups: humans unadapted to high altitude for instance can't

survive well or even reproduce in the thin atmosphere found in our highest mountain ranges. Also, when it comes to temperature, well we have, you might say, "cheated" as a species, as we have developed the ability to make and wear clothes that keep us warm and equally we have cheated by developing the ability to create artificial heat sources. If we didn't have these abilities no one would be living in Alaska, Scandinavia or Northern Siberia year-round. Remember those "cheats", though, because on Mars we will be doing plenty of cheating.

Of course, things can get *dark*. On Earth it's not just a question of what we have adapted to, but what has adapted to us, and can thereby kill or maim us. We face a vast menagerie of viruses and other pathogens that can do that, despite the best efforts of our immune systems. For people with a temperate zone heritage, living in tropical malaria-infested regions is a big no-no unless they protect themselves with modern medicine. Again, remember that medicinal "cheat" when you think about our ability to live on another planet.

What about the Moon?

So, if we are to follow Musk's recommendation and become a multi-planetary species where are we going to head? Is it inevitably Mars? What about *The* Moon, our Moon - which is of course *a moon*, not a planet. Even if we put to one side that somewhat pedantic objection, it has one major disadvantage: it is only a mere quarter of a million miles away from Earth (the Apollo rockets of the 1960s could reach it in just over 3 days). Essentially Earth and Moon are a single planetary system. Any human civilisation on the Moon could quite easily be laid waste by a major asteroid impact on Earth, for instance, as the impact would release thousands of large projectiles into the area of lunar orbit. So, if we want to ensure species survival, we can cross the Moon off our list as not being up to the job. Musk makes the point also that, in terms of size of a celestial sphere, the Moon is rather a paltry thing. Furthermore, it has no atmosphere, a much more limited range of minerals than can be found on Mars and - to cap it all - its "sunlit day" lasts for just over 14 Earth days, to be followed by just over 14 days' worth of depressing darkness.

Exoplanets?

And what about Exoplanets? You might be wondering why we don't go find an Earth-like exoplanet. There are plenty to choose from now. No doubt it would be nice to think that we could choose a close relative of Earth from the thousands of exoplanets orbiting other stars that have been discovered to date. At the time of writing, the total is well over 5000 discovered exoplanets. The vast majority of these "new" planets are within our own galaxy (the quaintly named *Milky Way*) but as our own galaxy would take some 100,000 years to cross at the speed of light, these

exoplanets are sadly out of reach. We simply do not have the technology yet to access suitable candidates. Our rockets don't get anywhere close to the speed of light. A journey to even the closest stars would be hellishly long. The speed of light is 671 million miles per hour, while the fastest ever human-built spacecraft (the Parker Solar Probe) reached a top speed of 153,454 miles per hour. Our best effort in this particular space race, clocks in at a teeny-weeny 0.05% of the speed of light. Even if we could get to 10% of the speed of light, it would take over 43 years to get to the nearest star system with planets (Alpha Centurai). Sadly, we're not going to be visiting exoplanets any time soon.

The reality is that any candidate for an alternative planet has to be located within our local solar system. As Musk points out in his paper *(Making Humans a Multi-Planetary Species)*, Venus would be a human hell (its only plus point is that its gravity at 81% of Earth's is pretty close). Mercury being so close to the Sun is too hot. Some of the moons of the gas giants in the outer solar system might be candidates for human habitation but the levels of solar radiation they receive are pretty pathetic and their distance from Earth makes them extremely inconvenient.

It doesn't take too much reflection to conclude that Mars - *and Mars alone* - is the only decent candidate for a second planet which might allow us to claim we are a "multi-planetary" species in the near future.

Credit: Space X

IFT 4 – When will the next Starship launch take place?

By the Editorial Team

So, we think we know the pairing – Ship 29 and Booster 11 - but when will the two-stage Starship rocket embark on the IFT (Integrated Flight Test) No. 4? The Boca Chica watchers are saying it could be as early as next month, May. But we know that, for each flight, Space X need to pass through the hoops put in place by both the FAA (for launch safety) and the EPA (for environmental protection). In theory these regulatory hurdles should be easier to surmount with each flight but that is perhaps too simplistic a view.

THE LATEST WEATHER ON MARS

Here's your update for the weather on Mars provided by the Curiosity Rover in Gale Crater.

For the nearest Sol to **23 April 2024** we have a *high* of 2.8 degrees Celsius (37 degrees Farenheit), warmer than the figure we highlighted last month. It's a reminder that daytime temperatures on Mars are often *above* freezing. However we have another chilly *low* for that Sol, a little colder than last month, at minus 68 Celsius (or minus 90 degrees Farenheit),

Though people like to focus on the cold, it's as much the temperature *range* that will be a challenge. However, Aresians will like be able to use this temperature difference to their advantage as it can power a range of devices to supply energy – helpful when the sun is not shining.

PICK OF THE PICS

Credit:NASA

Taken at the base of Mount Sharp in Gale Crater by the Curiosity Rover….*Brody PLC* likes this one. Sometimes it seems like you could extend your hand and touch those rocks!

LET US KNOW WHAT YOUR FAVOURITE PIC IS AND WHY! WE ARE ALWAYS INTERESTED IN YOUR COMMENTS.

The Aresian makes sense of Mars.

Tell your friends about us!