Space Garbage

SPEAKERS
Guy Clapperton, Moriba Jah

Guy Clapperton 00:05
Hello, and thanks for streaming the near futurist, a show presented by me Guy Clapperton. This is a look at the cultures and technologies that are going to affect our lives in wait for it, the near future.

Guy Clapperton 00:20
First, a deeply exciting announcement if you like that sort of thing. This podcast now has its own LinkedIn group. It's only taken me just over three years to think of doing that. And I thought of it immediately my friend William Buist said, why don't you put a LinkedIn group together. So if you'd like to join, feedback on the podcast, make suggestions for future topics or just chat, you'd be welcome. Just search LinkedIn for near futurist podcast or my name.

Guy Clapperton 00:45
Meanwhile, last year was very exciting for people of my age. Because Star Trek's Captain Kirk, known as William Shatner to mortals like us actually went into space for real. He was on Jeff Bezos' craft and our own British Richard Branson has been going to space a bit himself. Now I grew up when the Apollo mission seem to be on TV every five minutes, so it was quite a nostalgia fest on many counts. But when those older spacecraft shed their modules, when they left bits behind, I can't help wondering what exactly happened to them. Or to put it another way, very scientifically, and technically, we worry about our environment on Earth, but just how much crap are we leaving floating around in space?

Guy Clapperton 01:26
Now to discuss this, my guest today is an astro dynamicist, an aerospace engineer at the University of Texas, and one of the prime movers of a public private partnership called AstriaGraph. He and his colleagues are tracking over 26,000 individual objects hurdling round up there, of which only 3500 at most serve a useful purpose - that includes the ISS, International Space Station and other things, but everything else is refuse. His name is Professor Moriba Jah. Moriba Welcome.

Moriba Jah 01:59
Thank you for having me.

Guy Clapperton 02:02
Thanks for making the time. But let's start with some fundamentals. We just emerging, we hope, from Coronavirus, there's World War Three threatened to kick off because of Putin and Ukraine. In the scheme of things, how big a problem is it that we're leaving things behind in space?

Moriba Jah 02:17

I'll put it this way. I have been looking at the news and seeing the horrors occurring to the Ukrainians. And I can tell you that much of the data that is actually informing the rest of humanity about these atrocities is only provided by satellites. And imagine if the satellites that are imaging and providing us this very critical information if they stopped working. This is actually not unlikely, given the amount of space junk refuse, as you said, that could unexpectedly hit one of these satellites. And basically, you know, render them useless. So it's a real hazard having all this garbage in space, a lot of it we can't track and can't predict where it's going to be at any given point. And so we're left with the strategy of hope, hope that these things don't collide with a satellite providing a critical service or capability.

Guy Clapperton 03:22
That makes a lot of sense. I'm very interested to find out whether it is all quite close to the Earth. Because theories and David Bowie songs aside, there's no real evidence of life on Mars, I can see the ideal of keeping space clean. But if we're not ruining it for anybody else, what is the problem? How close is all this stuff to Earth?

Moriba Jah 03:41
Well, I would say we're really talking about most of this just being just several hundred kilometres above, above the Earth's surface. So for most of us on the planet, you know, it's, it's closer than... I live in Austin, Texas. So, you know, the space debris is closer to Austin, then New York City, for instance. I mean, it's very close. And it's where a lot of humans, astronauts, cosmonauts actually reside.

Guy Clapperton 04:12
I was going to ask about that. Is there any particular... We're jumping around a little here, but is there any particular country that's been more responsible for leaving or leaving stuff up there?

Moriba Jah 04:21
The three top countries are responsible for space debris are Russia, United States and China.

Guy Clapperton 04:29
That's the people that I'd have expected of course, the people who had the most activity. Now times and cultures change, of course, but I'm just wondering how we ended up littering space like this. I was reading an interview with a science fiction writer while ago - I know you're not a science fiction person, you're a genuine scientist, of course - but no self respecting sci fi writer of the 30s to the 60s even considered the possibility that we'd go into outer space and leave half the aircraft up there. I'm just wondering how we got there and do we still do it?

Moriba Jah 04:58
We still do it. I'm hoping that people are doing less, but still, we still do it. And most of the stuff that we put up there doesn't really come back. And if it does, it takes a very long time for it to do so depending on how high. It could be, you know, decades or centuries, that sort of thing. And it's kind of this mentality with which we've used for exploration of land, oceans, we're doing that with space, meaning people keep on saying, well, space is big, you know, the oceans are big. Who cares if you just dump this trash in the ocean, you know, the ocean's big. I think people have, by and large, tried to frame the narrative about space in that way, which is unfortunate. But we only put things in specific orbital

highways, and these orbital highways have a finite carrying capacity, and they're becoming more congested. So that is a growing issue.

Guy Clapperton 06:00
I accept it's an issue I accept it needs addressing. I'm interested in how and why you became aware of it personally. Tell us a bit about your background as an academic and I understand as another organisation involved = you now work at, Privateer, as chief scientist, tell us where that comes in.

Moriba Jah 06:15
Yeah, so I started my journey as a space environmentalist, really, after working for NASA as a spacecraft navigator sending things to Mars. I moved to Maui with my family in like 2006. So my focus shifted from Mars to Earth. And with the telescopes on top of Mount Haleakala, that's when I became acquainted with the space garbage problem. And so the Department of Defence, they're really interested in you know, "debris or not debris, that is the question". And so I became acquainted with a space garbage problem then. And it just didn't make sense to me that, you know, 96% of all human objects orbiting the Earth was garbage. And so sometime in 2015, I left the US government to pursue academic research. I've been here at the University of Texas at Austin since 2017. And then last year, I co founded privateer space with Steve Wozniak, co founder of Apple, Alex fielding CEO of Ripcord, to basically operationalize, to really scale. The research that I've been doing here at UT Austin, go from things that are just demonstrations and researchy, to things that could actually, you know, address people's real problems in space.

Guy Clapperton 07:35
[music to indicate advert is starting] Do you want to sound as confident as my interviewee in this episode? If you talk to the press or other media, are you worried you'll be misquoted or they'll just publish their story and not yours? Clapperton Media Associates can help with coaching. Drop me a note, Guy@clapperton.co.uk, and we'll arrange a time for an exploratory call. Now, back to the podcast. [music to indicate the interesting bit is starting again]

Guy Clapperton 08:10
So tell us about the formation of AstriaGraph. I've had a little play with it, just to let the listeners know - of course, I'll put a link in the text and also in the transcript of this podcast when it comes out. But what it is, as far as I could see was a sort of model of the Earth which you can pull around and superimposed over it almost like a sort of virtual reality thing, or augmented reality, I should say, is lots of little representations of all the junk that's out there and whereabouts it is.

Guy Clapperton 08:37
That's probably very simplistic tell us a bit about the science behind behind that.

Moriba Jah 08:41
AstriaGraph is a is a knowledge graph database that uses Neo4J as the software behind the knowledge graph. And it's meant to be a way to easily you know, ingest and aggregate disparate sources of information. And we hope that by linking these disparate sources of information, we can ask interesting questions of the aggregated data set to gain insights about what's going on in space, who

do things belong to what are they doing? How will they behave, and developing a body of evidence that can be used to hold people accountable. And so when you go to the astrograph website, basically there's a query to the knowledge graph database in Neo4J, and it pulls the orbital information that we have, which is... let's say it's crowdsourced from a variety of different sources, and then shows you all these opinions in a common framework. And I'll say that if you go to Privateer.com, AstrioGraph has been re rescaled re re architected as Wayfinder and Privateer, so if you go to privateer.com, you will see something similar, but it's meant to be more scalable.

Guy Clapperton 09:53
Okay, and are the modern craft like the Bezos and the Branson, the ships that we discussed earlier (or that I discussed earlier, I should say) leaving modules behind as the older models did?

Moriba Jah 10:04
At least a lot of these, I guess, you know, trips to space and back, those things are coming back with the equipment. So that part is that part is good. But you know, there's a there's a lot of risk in these trips. And it's it's definitely not like getting on a plane for sure.

Guy Clapperton 10:23
No, indeed. And of course, there's the whole ecological principle of just taking a pleasure trip to outer space and that sort of thing. And let's be honest, I made this sort of light hearted comment about finding Captain Kirk going out there very exciting. On the other hand, it was a very expensive publicity stunt. I don't begrudge him the experience. But you know, in terms of ecological impact, I think that can't be overstated. I can't see it as strictly necessary. I suppose the million dollar question is what you'd like to see happening about this. What do you do with all the information? How can you apply it?

Moriba Jah 10:56
So what we want to do is we want to have a curated, aggregated set of independent sources of information that can serve as a digital library that can help Safe Space become safer, more secure, and sustainable. And I guess more pragmatically, we want to be able to provide a layer of decision making information that helps people, you know, prevent collisions in space. We'd love to be able to provide some information to help, you know, companies that want to remove debris, know what the objects are, that can be removed with their technology, because there's no Lord of the Rings "one technology to rule them all". So, you know, each company's technology only works on things that have a certain size, shape, material properties, these physical characteristics.

Moriba Jah 11:49
And currently, there's no database that represents these objects, in terms of their physical traits, just, you know, orbits. So we plan on doing that to help these people. And even, you know, governments that are trying to monitor space actor behaviour for compliance or lack of compliance with different space laws, rules and regulations. So we want to help them. And last but not least, certainly, people like astronomers, who see themselves impacted by the reflection of sunlight off of these objects and call it on orbit light pollution, that are corrupting their, their their images, and so far, in many ways have been a detriment to astronomy. So we want to help them out as well. So, so one common logosphere of

knowledge that can be used to help all these people be successful, and do things that actually are of benefit to society and humanity.

Guy Clapperton 12:45
That's in theory. I get that this is a really good idea. I get that it's, there are a lot of benefits to be had. Have you had any takers? I'm just wondering what realistically is likely to happen, what you can achieve through this?

Moriba Jah 12:57
Yeah, I mean, right now we're, we just came out of stealth mode. In March, we already have a group of partners that have agreed to do some cool stuff with us. Our one of our first partners, that was unexpected for me was Omega, the Omega watch people, they do, you know, clearly a lot invested in accuracy and precision and incorporating that within our own platform, that that spirit of accuracy and precision to promote environmentalism, and raise awareness of the problem. We have companies, again, folks that want to remove debris that are asking for information of physical characteristics of objects we plan on basically helping them do that in the near future. So I think what you'll see over the next few months is Privateer, rolling out some of these capabilities that are very real, and, again, are going to measurably make space safer, more secure and more sustainable.

Guy Clapperton 13:57
And with any luck they might even hear about it on this very podcast. So can I ask you finally where listeners can find out more about you and of course, your activities?

Moriba Jah 14:05
Sure, if people go to privateer.com, you'll see Wayfinder and then up on the upper right there's something that says "mission", click on that, you'll get a lot more information. And there's a way to at the end of the page, subscribe and - hey, if you have a CV, we're always looking for all sorts of people that are enthusiastic and are empathetic to the problem. You know, send your CV in!

Guy Clapperton 14:31
Excellent Moriba Jah of AstriaGraph and the University of Texas and now of course, Privateer, thank you very much for joining me.

Moriba Jah 14:38
Thank you so much guy.

Guy Clapperton 14:43
And of course many thanks to you for listening. That was the near future as podcast with me guy Clapperton. Don't forget to have a look at the website at nearfuturist.co.uk. And, of course, you'd be more than welcome and the LinkedIn group. I'll be back soon. Bye

LINKS:

To visit AstriaGraph's model: http://astria.tacc.utexas.edu/AstriaGraph/

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