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Log4J, Sudoedit, and other cybersecurity concerns

Arrival of 5G

Parker solar probe enters the solar atmosphere for the first time.

Shri Sant Gajanan Maharaj College Of Engineering, Shegaon

IEEE SSGMCE Students' Branch

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ARRIVAL OF 5G

In telecommunications, 5G is the fifth-generation technology standard for broadband cellular networks, which cellular phone companies began deploying worldwide in 2019, and is the planned successor to the 4G networks which provide connectivity to most current cellphones. 5G networks are predicted to have more than 1.7 billion subscribers worldwide by 2025, according to the GSM Association.

- 5G networks were rolled out in 2019 and will expand rapidly in 2020.
- 5G will connect everything and everyone.
- 5G will underpin remote surgery, self-driving cars - and movies you can download in seconds.

We live in a time when words meant to represent significant or unique ideas are so overused they have been trivialized.

“Revolutionary” is such a word, a victim of hyperbolic marketing that has rendered meaningless a term meant to evoke profound change in our world. When everything is “revolutionary,” nothing is. The global deployment of 5G networks got a running start in 2019 and is set to rapidly expand beyond anything we expected a year ago. But the While public understanding of 5G hasn’t caught up.

While 3G put the mobile Internet in your hand and 4G gave us mobile broadband – redefining how we interact with our world – 5G will connect everything and everyone. The technologies within 5G were and continue to be designed to vastly expand network capacity so cars, utility grids, appliances, medical devices, industrial machinery, homes, cities, farms, and more can all be connected. And 5G will reduce delays and improve reliability, thereby enabling mission-critical tasks such as remote surgery, self-driving cars, and enhanced public safety, to make possible secure connections so lightning-fast that an entire movie can be downloaded.

5G networks are cellular networks, in which the service area is divided into small geographical areas called cells. All 5G wireless devices in a cell communicate by radio waves with a cellular base station via fixed antennas, over frequency channels assigned by the base station. The base stations, termed gNodeBs, are connected to switching centers in the telephone network and routers for Internet access by a high-bandwidth optical fiber or wireless backhaul connections. As in other cellular networks, a mobile device moving from one cell to another is automatically handed off seamlessly to the current cell. 5G can support up to a million devices per square kilometer, while 4G supports only one-tenth of that capacity

Speed

5G speeds will range from ~50 Mbit/s to over 1,000 Mbit/s (1 Gbit/s). The fastest 5G speeds would be in the mmWave bands and can reach 4 Gbit/s with carrier aggregation and MIMO.

The work on 5.5G technology is expected to offer 20 Gbit/s downstream and 10 Gbit/s upstream rates, possibly between 2025 and 2030.

The theoretical throughput of 5G, with only one device connected, is as high as 1000 Gbit/s and real-life demos have shown wireless speeds over 70 Gbit/s.

initially, the term was associated with the International Telecommunication Union's IMT-2020 standard, which required a theoretical peak download speed of 20 gigabits per second and 10 gigabits per second upload speed, along with other requirements.

IEEE covers several areas of 5G with a core focus in wireline sections between the Remote Radio Head (RRH) and Base Band Unit (BBU). The 1914.1 standards focus on network architecture and divide the connection between the RRU and BBU into two key sections. Radio Unit (RU) to the Distributor Unit (DU) being the NGFI-I (Next Generation Fronthaul Interface) and the DU to the Central Unit (CU) being the NGFI-II interface allowing a more diverse and cost-effective network. NGFI-I and NGFI-II have defined performance values that should be compiled to ensure different traffic types defined by the ITU are capable of being carried.[page needed] The IEEE 1914.3 standard is creating a new Ethernet frame format capable of carrying IQ data in a much more efficient way depending on the functional split utilized. This is based on the 3GPP definition of functional splits.

• 5G will have to define the uncertainties related to security threats including trust, privacy, cybersecurity, which are growing across the globe.

• Legislation of Cyberlaw - Cybercrime and other fraud may also increase with the high speed and ubiquitous 5G technology.

5G will lead to one of the 5 biggest technological transformations of our lifetime, with unlimited possibilities. Not only will it transform lives, but it will also help save them with optimized emergency services and the reduction of car accidents. Ranging from connected cars to connected cows, this new industry standard will change everything.

CYBERSECURITY CONCERN

Cyber security is the state or process of protecting and recovering computer systems, networks, devices, and programs from any type of cyber attack. Cyber attacks are an increasingly sophisticated and evolving danger to your sensitive data, as attackers employ new methods powered by social engineering and artificial intelligence (AI) to circumvent traditional data security control.

Cybersecurity's importance is on the rise. Fundamentally, our society is more technologically reliant than ever before and there is no sign that this trend will slow. Data leaks that could result in identity theft are now publicly posted on social media accounts. Sensitive information like social security numbers, credit card information, and bank account details are now stored in cloud storage services like Dropbox or Google Drive

As digital transformation and hyper-convergence create unintended gateways to risks, vulnerabilities, attacks, and failures, a cyber resiliency strategy quickly becomes necessary for your business. A cyber resiliency strategy helps your business to reduce risks, financial impact, and reputational damages.

Kyndryl's cyber resiliency best practices, advanced technologies, and expertise help you defend against those risks, protects your business-critical applications and data, and help accelerate recovery from a data breach or similar disruption. Kyndryl's Cyber Resiliency Services helps protect platform configurations and applications data by using air-gapped protection, immutable storage, and anomaly detection while orchestrating rapid and reliable recovery at the disaster recovery (DR) site.

List of the top 10 biggest challenges of Cyber Security in 2020 so that you can protect your personal and professional data against any potential threats

Listing out some of the most common types of cyber-attacks:
1. Ransomware attacks
2. IoT attacks
3. Cloud attacks
4. Phishing attacks
5. Blockchain and cryptocurrency attacks
6. Software vulnerabilities
7. Machine learning and AI attacks
8. BYOD policies
9. Insider attacks
10. Outdated hardware

Cyber Security is becoming a severe issue for individuals, enterprises, and governments alike. In a world where everything is on the internet, from cute kitten videos and our travel diaries to our credit card information, ensuring that our data remains safe is one of the biggest challenges of Cyber Security. Cyber Security challenges come in many forms, such as ransomware, phishing attacks, malware attacks, and more. India ranks 11th globally in terms of local cyber-attacks and has witnessed 2,299,682 incidents in Q1 of 2020 already.

LOG 4J

A collection of external articles and tutorials about Log4j 2. The Log4j 2 manual is the ultimate guide for up-to-date and detailed information on how to configure and use Log4j 2.

Log4j is a tool to help the programmer output log statements to a variety of output target.log4j is designed with three goals in mind: reliability, speed and flexibility. There is a tight balance between these requirements. We believe that log4j strikes the right balance. Log4j records events – errors and routine system operations – and communicates diagnostic messages about them to system administrators and users. It's open-source software provided by the Apache Software Foundation Log4Shell works by abusing a feature in Log4j that allows users to specify custom code for formatting a log message. This feature allows Log4j to, for example, log not only the username associated with each attempt to log in to the server but also the person's real name, if a separate server holds a directory linking user names and real names. To do so, the Log4j server has to communicate with the server holding the real names..

THE FEATURES OF LOG4J :

log4j is optimized for speed.
log4j is based on a named logger hierarchy.

log4j is fail-stop. However, altough it certainly strives to ensure delivery, log4j does not guarantee that each log statement will be delivered to its destination.
log4j is thread-safe.

log4j is not restricted to a predefined set of facilities.
Logging behavior can be set at runtime using a configuration file. Configuration files can be property files or in XML format.
log4j is designed to handle Java Exceptions from the start.
log4j can direct its output to a file, the console, an java.io.OutputStream, java.io.Writer, a remote server using TCP, a remote Unix Syslog daemon, to a remote listener using JMS, to the NT EventLog or even send e-mail.
log4j uses 6 levels, namely TRACE, DEBUG, INFO, WARN, ERROR and FATAL.
The format of the log output can be easily changed by extending the Layout class.
The target of the log output as well as the writing strategy can be altered by implementations of the Appender interface.
log4j supports multiple output appenders per logger.
log4j supports internationalization.

Log4Shell is part of the software supply chain. Like physical objects people purchase, software travels through different organizations and software packages before it ends up in a final product. When something goes wrong, rather than going through a recall process, the software is generally “patched,” meaning fixed in place. One of the major concerns about Log4Shell is Log4j’s position in the software ecosystem. Logging is a fundamental feature of most software, which makes Log4j very widespread. In addition to popular games like Minecraft, it’s used in cloud services like Apple iCloud and Amazon Web Services, as well as a wide range of programs from software development tools to security tools.
It is hard to know whether a software product you are using includes Log4j and whether it is using vulnerable versions of the software. Make sure all of your software is up to date.

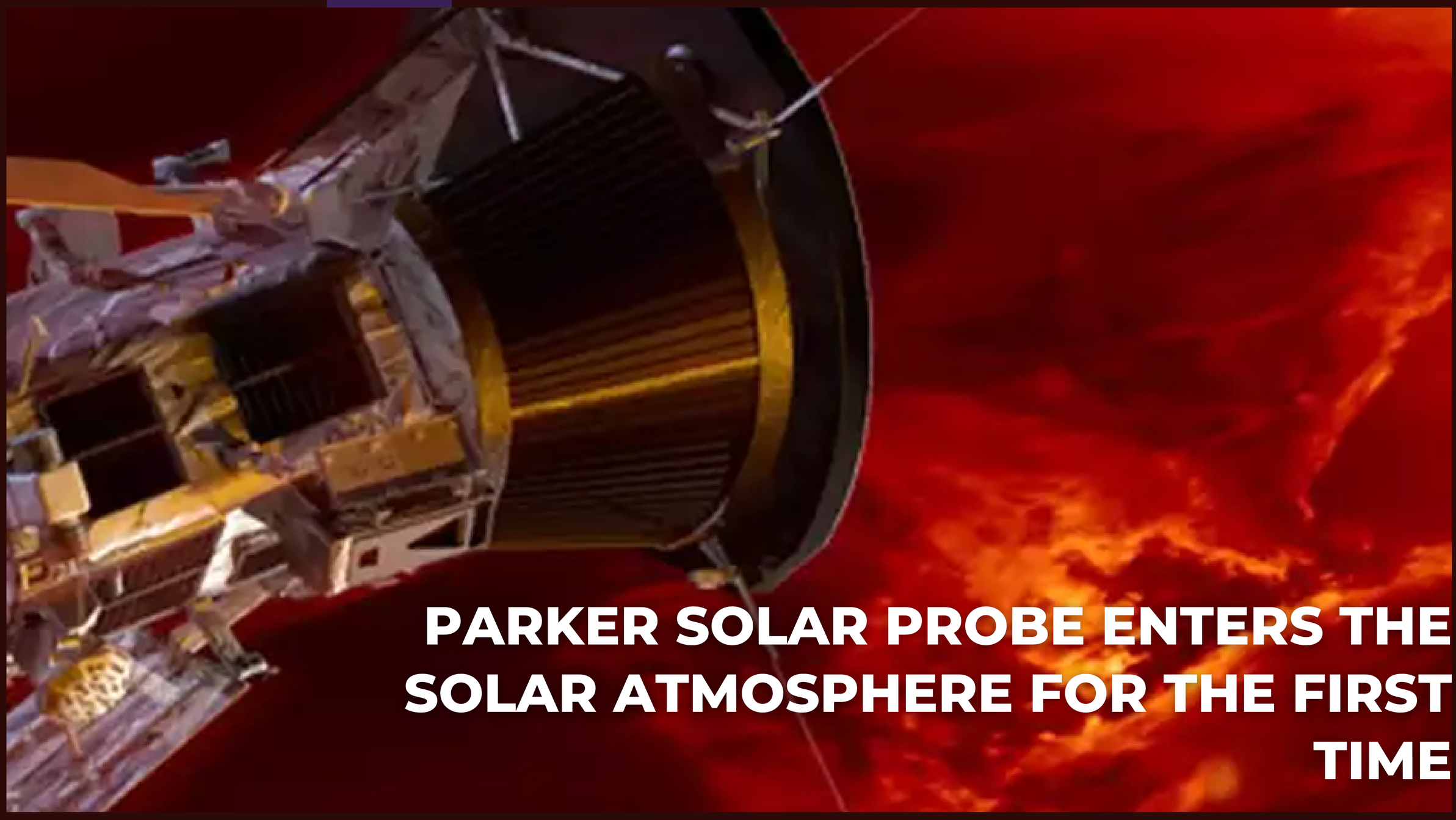
SUDOEDIT

sudoedit /etc/services are telling the shell to use whatever editor is stored in the EDITOR environmental variable to edit the file using superuser privileges. or.
sudoedit allows you to sudo as another user.
sudo supports a plugin architecture for security policies and input/output logging. Third parties can develop and distribute their own policy and I/O logging plugins to work seamlessly with the sudo front end. The default security policy is sudoers, which is configured via the file /etc/sudoers, or via LDAP. See the PLUGINS section for more information.

The security policy determines what privileges, if any, a user has to run sudo. The policy may require that users authenticate themselves with a password or another authentication mechanism. If authentication is required, sudo will exit if the user's password is not entered within a configurable time limit. This limit is policy-specific; the default password prompt timeout for the sudoers security policy is 5 minutes.

Security policies may support credential caching to allow the user to run sudo again for a period of time without requiring authentication. The sudoers policy caches credentials for 5 minutes, unless overridden in sudoers. By running sudo with the -v option, a user can update the cached credentials without running a command.When invoked as sudoedit, the -e option (described below), is implied.

Security policies may log successful and failed attempts to use sudo. If an I/O plugin is configured, the running command's input and output may be logged as well.



PARKER SOLAR PROBE ENTERS THE SOLAR ATMOSPHERE FOR THE FIRST TIME

- NASA’s Parker Solar Probe crossed the Alfvén critical surface and entered the solar atmosphere in April this year.
- The Parker Solar Probe was launched into a spiral trajectory around the sun in 2018.
- The Parker Solar Probe is the closest spacecraft to the Sun ever.

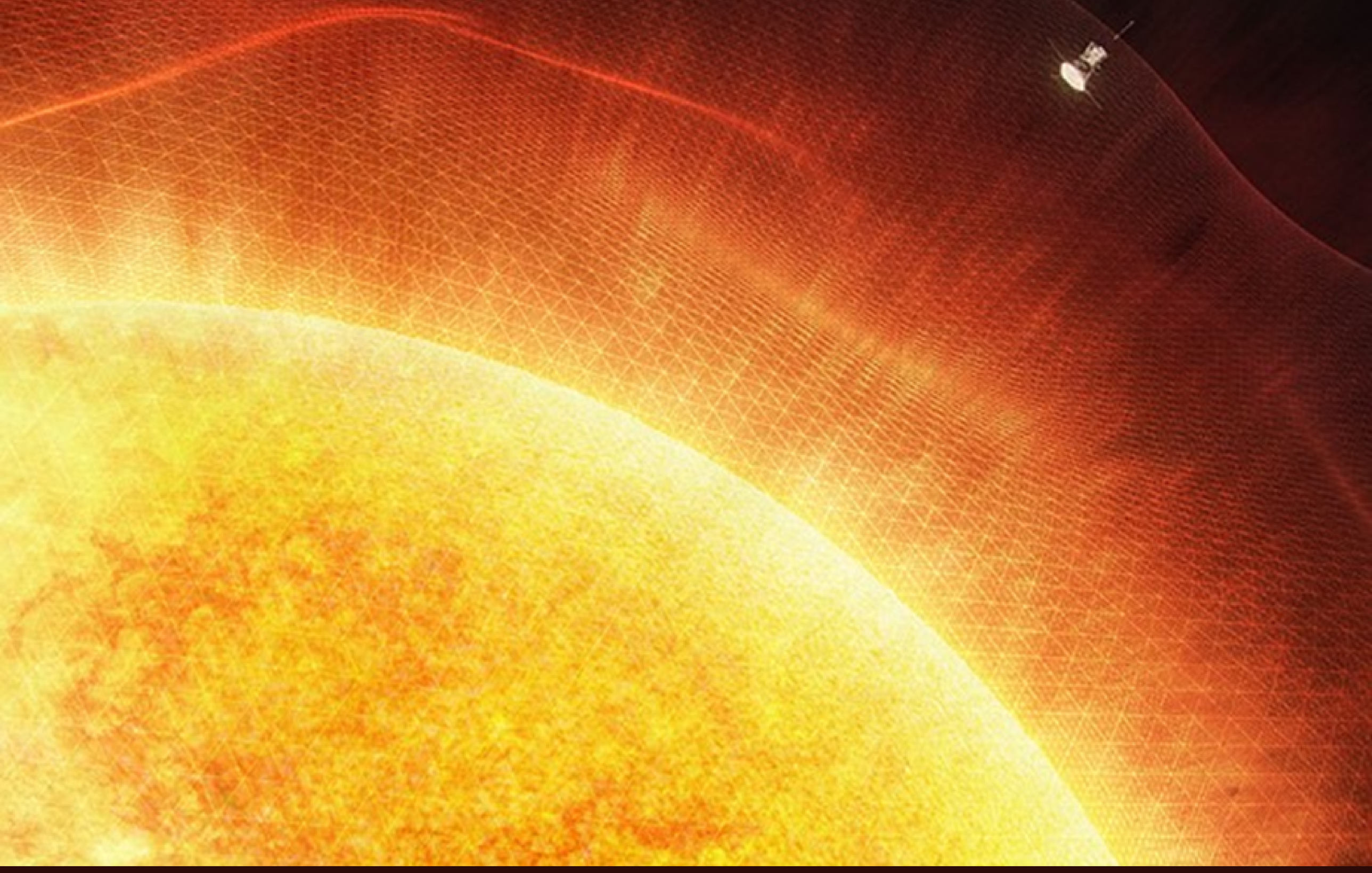
For the first time in human history, a spacecraft has entered the Sun’s outermost layer of the atmosphere called the corona. US-based National Aeronautics and Space Administration’s (NASA) Parker Solar Probe collected particles and sampled the magnetic field of the Sun.

According to the report published by NASA on December 14, the Parker Solar Probe had crossed Alfvén's critical surface, the boundary of the Sun's outer layer, for the first time and entered the solar atmosphere on April 28, 2021.

This “remarkable feat” was lauded by Thomas Zurbuchen, the associate administrator for the Science Mission Directorate at NASA headquarters who said that the Parker Solar Probe’s findings will help scientists learn more about the Sun, its evolution and the impact on the solar system and that it will teach them about the other stars in the universe.

Parker Solar Probe' touching the Sun' is a monumental moment for solar science and a truly remarkable feat,' said Thomas Zurbuchen, the associate administrator for the Science Mission Directorate at NASA Headquarters in Washington. 'Not only does this milestone provide us with deeper insights into our Sun's evolution and its impacts on our solar system, but everything we learn about our star also teaches us more about stars in the rest of the universe.'

The Parker Solar Probe is making discoveries that other spacecraft couldn't because they were too far away. The Parker Solar Probe observed the flow of particles within the solar wind and identified where they originate, the solar surface itself. Continued close flybys will offer additional data and insight on phenomena that cannot be observed from distance.



Flying so close to the Sun, Parker Solar Probe now senses conditions in the magnetically dominated layer of the solar atmosphere – the corona – that we never could before,' said Nour Raouafi, the Parker project scientist at the Johns Hopkins Applied Physics Laboratory in Laurel, Maryland. 'We see evidence of being in the corona in magnetic field data, solar wind data, and visually in images. We can see the spacecraft flying through coronal structures that can be observed during a total solar eclipse.'

After launching in 2018, the Parker Solar Probe has made other significant discoveries. The spacecraft crossed the Alfvén critical surface for the first time on April 28, 2021. Scientists had previously not known exactly where this critical surface is. It's the point that marks the end of the solar atmosphere and the beginning of the solar wind. Beyond the Alfvén critical surface, solar wind moves so fast that the waves within the wind cannot ever make it back to the Sun, which severs their connection. Before the Parker Solar Probe crossed the threshold, remote images of the corona could only narrow down the location of the Alfvén critical surface to somewhere between 6.9 million kilometers to 13.8M km (4.3 to 8.6M mi) from the Sun's surface.

The Parker Solar Probe entered the precise conditions of the Alfvén critical surface 13M km (8.1M mi) from the Sun, or at about 18.8 solar radii.

At one point, the Parker Solar Probe got as close as 15 solar radii (10.46M km / 6.5M mi) from the Sun's surface. When it did so, the craft transited a coronal feature called a pseudostreamer. These are 'massive structures that rise above the Sun's surface and can be seen from Earth during solar eclipses.' NASA likens passing through the pseudostreamer to flying into the eye of a storm. Inside the pseudostreamer, conditions are quieter. The conditions are quiet enough that the magnetic fields in the area determined the movement of particles, which further proved that the craft had crossed the Alfvén critical surface.

The mission aims to get closer to the Sun's surface. Much closer. The eventual goal is to get 8.86 solar radii (6.16M km / 3.83M mi) from the surface. 'I'm excited to see what Parker finds as it repeatedly passes through the corona in the years to come,' said Nicola Fox, division director for the Heliophysics Division at NASA Headquarters. 'The opportunity for new discoveries is boundless.'

Referred from:

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sudoedit(8): execute command as another user - Linux man page (die.net)

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