New Study Showcases Enhanced GNSS Accuracy in Smartphones for Urban and Open-Sky Navigation

A recent study has highlighted the advancements in smartphone positioning technology, specifically examining the multi-frequency Global Navigation Satellite System (GNSS) capabilities of the Redmi K60 Ultra. The research underscores major improvements in positioning accuracy, speed, and reliability, representing a key development in the field of high-precision navigation for consumer devices.

Smartphone positioning technologies have rapidly evolved to meet the growing need for precision in urban environments, where signal obstructions often pose significant challenges. Traditional GNSS methods perform well in open areas but can struggle in densely populated cityscapes due to interference and multipath errors. The study emphasizes the importance of addressing these challenges through in-depth research on multi-frequency GNSS performance in smartphones.

In August 2023, Xiaomi introduced the Redmi K60 Ultra, the first smartphone to feature BeiDou-3 Navigation Satellite System Precise Point Positioning (PPP-B2b) services. The study, published in the journal 'Satellite Navigation' in 2024 (DOI: 10.1186/s43020-024-00146-5), conducted a thorough performance evaluation of this multi-frequency GNSS smartphone. Researchers from Beihang University, the China Academy of Information and Communications Technology, and other institutions tested the device under various conditions, demonstrating its advanced capabilities in enhancing GNSS-based positioning.

Read more in *article*…

https://www.spacedaily.com/reports/New_Study_Showcases_Enhanced_GNSS_Accuracy_in_Smartphones_for_Urban_and_Open_Sky_Navigation_999.html

2024-08-20

AUSPOS 3.0 Goes Live, Aligned With ITRF2020

Geoscience Australia has announced the release of version 3.0 of AUSPOS, the agency's free online GPS processing service.

With the release of this new version, computation of coordinates is now being accomplished with respect to the latest International Terrestrial Reference Frame, ITRF2020, superseding the use of ITRF2014.

According to Geoscience Australia (GA), AUSPOS 3.0 has the following features:

- Computation of consistent GDA2020 coordinates.
- Use of the most up-to-date and reliable International GNSS Service (IGS) products aligned to ITRF2020.
- Improved quality of solutions due to: the implementation of Bernese v5.2 programs, more available reference sites for network calculations, updated antenna calibration values for ground receiver antenna types, and a more precise/advanced ocean tide loading model.

On the AUSPOS section of its website, GA says that "the GDA2020 coordinates from AUSPOS v3.0 are mainly consistent with the coordinates from AUSPOS v2.4. We have confirmed that for most solutions users should expect only small differences in the GDA2020 coordinates (millimetre level for horizontal coordinates and less than 1 cm level for height), with almost all differences within the positional uncertainty levels (and therefore statistically insignificant)."
Read more in *Spatial Source* article. https://www.spatialsource.com.au/auspos-3-0-goes-live-aligned-with-itrf2020/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsenc=p2ANqtz--75tFeMb-PKWQTQ24GttzsjkAX2H1hJ3Ba8X7FmfoOGRPQkNroVYg2vbHYGk1jLCt6lqvcxpImsFH-3S8a95BW-MRVvg&_hsmi=320992096&utm_content=320992096&utm_source=hs_email
2024-08-20

FCC Searching for Public Comments on NextNav Petition

The Federal Communications Commission (FCC) has issued a public notice seeking comment on NextNav's filing to reconfigure the Lower 900 MHz band (902-928 MHz band).

This action comes in response to NextNav's April 2024 filing, which proposes a comprehensive restructuring of the band to enable the deployment of a 5G terrestrial positioning, navigation, and timing (PNT) network.

NextNav’s proposal aims to create a 5 MHz uplink in the 902-907 MHz band paired with a 10 MHz downlink in the 918-928 MHz segment. This reconfiguration is designed to complement and serve as a backup to GPS while also freeing up spectrum for 5G broadband services.

NextNav CEO Mariam Sorond said the spectrum band reconfiguration compliments GPS to continue location mapping and tracking services and national security needs. “Our plan creates abundance from scarcity in this band by unleashing much-needed spectrum for wireless technology. These common-sense solutions can benefit consumers and our national interests at no cost to taxpayers,” Sorond said.

Read more in *GPS World* article. https://www.gpsworld.com/fcc-searching-for-public-comments-on-nextnav-petition/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240807003&oly_enc_id=1784A2382467C6V

2024-08-13

Ukraine Destroys an Offshore Platform Used for GPS Spoofing

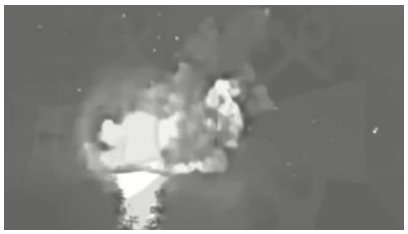
Last week, the Ukrainian Navy launched an operation to fight back against Russian GPS spoofing - with force. According to a spokesperson, Ukraine's military attacked and destroyed an idle gas platform off Crimea, which Russian units had used as a broadcasting station for GPS interference equipment.

"The occupiers used this location for GPS spoofing to endanger civilian navigation. We cannot allow this," said Ukrainian Navy spokesman Dmytro Pletenchuk. "Half a day before the strike, the enemy had placed equipment and military personnel on the platform. No civilians were there, and the platform was not performing its regular functions."

Pletenchuk emphasised that Ukraine would not have struck the installation if it were still functioning as a civilian facility. He told local media that this was not the first time

that Ukraine had destroyed an offshore jamming installation, and that Russia was using the equipment in an attempt to disrupt Ukrainian grain shipping.

Read more in *article*…
https://maritime-executive.com/article/ukraine-destroys-an-offshore-platform-used-for-gps-spoofing
2024-08-11



The Mother Of All Motion Sensors

Peel apart a smartphone, fitness tracker or virtual reality headset, and inside you'll find a tiny motion sensor tracking its position and movement. Bigger, more expensive versions of the same technology, about the size of a grapefruit and a thousand times more accurate, help navigate ships, airplanes and other vehicles with GPS assistance.

Now, scientists are attempting to make a motion sensor so precise it could minimize the nation's reliance on global positioning satellites. Until recently, such a sensor — a thousand times more sensitive than today's navigation-grade devices — would have filled a moving truck. But advancements are dramatically shrinking the size and cost of this technology.

For the first time, researchers from Sandia National Laboratories have used silicon photonic microchip components to perform a quantum sensing technique called atom interferometry, an ultra-precise way of measuring acceleration. It is the latest milestone toward developing a kind of quantum compass for navigation when GPS signals are unavailable.

Read more in *article*…
https://newsreleases.sandia.gov/motion_sensor/
2024-08-13

Simulating New GNSS Signals and Threats

Developers and manufacturers of GNSS receivers have always needed to simulate the signals from GNSS satellites to test receivers in their labs and in the field. Now, as the vital role of GNSS for critical infrastructure and the growing threat of radiofrequency attacks are increasingly recognised, simulators must keep up. In particular, they must enable users to test a variety of new positioning, navigation and timing (PNT) signals from satellites in low-Earth orbit (LEO) and geostationary orbit (GEO), as well as realistically simulate sophisticated jamming and spoofing attacks.

Read more in *GPS World* article. https://www.gpsworld.com/simulating-new-gnss-signals-and-threats/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240807003&oly_enc_id=1784A2382467C6V

2024-08-08

Navy Now Has Only One Hydrographic Survey Ship

The Royal Australian Navy's penultimate hydrographic survey ship, HMAS ***Melville***, was decommissioned at its homeport in Cairns on Thursday, 8 August 2024.
This leaves the RAN with just one remaining hydrographic survey ship, HMAS *Leeuwin*, which itself is expected to be decommissioned in the not-too-distant future after a quarter of a century of service.
Previously, the RAN's four *Paluma*-class hydrographic survey catamaran motor launches were decommissioned in pairs in September 2021 and June 2023.

The federal government is responsible for providing hydrographic services covering the Australian Charting Area. The Department of Defence has long been tasked with this activity.

Read more in *Spatial Source* article. https://www.spatialsource.com.au/navy-now-has-only-one-hydrographic-survey-ship/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsenc=p2ANqtz--3jJbWtMA59QUPhtTAY_1XWJkH0Ow8CzIXviTbJvkG1lBZndSrshzF_reBE6qUVZ4ayq7rQ-n3HL7yDE-dSWSYjsH9uw&_hsmi=319992958&utm_content=319992958&utm_source=hs_email

2024-08-12

Experts to PNT Leaders: "It's not working!"

The President's National Space-based Positioning, Navigation and Timing (PNT) Advisory Board has warned United States leaders that the nation is highly vulnerable to disruption of GPS services. Also, national PNT issues have not received sufficient priority and attention for the last 20 years, and no one is accountable for system performance.

The warning came in a four-page memo to the Deputy Secretaries of Defense and Transportation from retired Admiral Thad Allen, Chair of the advisory board. The memo was nominally a report of the board's April 2024 meeting in Colorado Springs.

The overwhelming majority of Allen's message, though, dealt with GPS and U.S. PNT being vulnerable, the importance of PNT to the nation's safety and security and the failure of the government to do the things it said it should and would do.

Read more in *GPS World* article.

https://www.gpsworld.com/experts-to-pnt-leaders-its-not-working/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240807003&oly_enc_id=1784A2382467C6V

2024-08-12

PNT Sources & Modernization Efforts			
	United States	China	
Global Navigation Satellite System[1]	GPS	BeiDou	
Low Earth Orbit - based PNT Satellites	RDT&E by govt and industry Satelles timing (fee-based)	Deployment on-going[2]	
Terrestrial Broadcast	None deployed	eLoran in east and offshore	eLoran being installed in the west[3]
Fiber-based timing	Some major telecoms have deployed	Comprehensive national program w/ 295 timing centers, 20,000km fiber[4]	
Authentication/ integration of timing*	National Guard NITRO pending cancellation	National system being implemented[5]	
*China's terrestrial timing network is designed to integrate space-based, terrestrial broadcast, and fiber-transmitted time in a coherent and consistent architecture.			

Green = Most advanced feature, or national system funded and being completed
Yellow = Less capable, or some efforts in progress but no national system planned
Red = No national capability, none planned

FrontierSI to Research Defence PNT Resilience Options

FrontierSI has begun a new research project titled 'Armouring the Clock: Providing Direction to Resilient Positioning, Navigation and Timing,' which aims to strengthen the Australian Defence Force's (ADF) positioning, navigation and timing (PNT) capabilities.

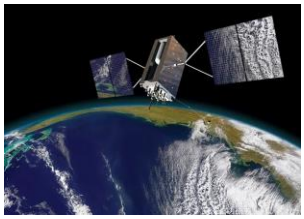
This main focus of the research will be to deliver policy recommendations, especially with regard to the Indo-Pacific maritime domain. It will build on the work begun with FrontierSI's recent white paper, A Time and A Place for Resilience.

The project is being undertaken under the federal government's 2024 Strategic Policy Grants Program (SPGP), and will:

- Help identify gaps in Australia's PNT policy;
- Gain insights from the policies and approaches of allied nations; and
- Assess the critical capabilities and technological needs essential for ensuring the ADF's resilience.

Read more in *Spatial Source* article. https://www.spatialsource.com.au/frontiersi-to-research-defence-pnt-resilience-options/?utm_campaign=SS%20-%20Overall%20Publication%20-%20Master&utm_medium=email&_hsenc=p2ANqtz-86jL8unc9IMnKB9dEHKqeD7Tjy7y0FcTCezJ9nfRFJN6ZSTfAWCXRYh9kff4DjF4vFfyYKCGW0nBJe8icsnYZbu-dazg&_hsmi=319992958&utm_content=319992958&utm_source=hs_email

2024-08-14



US, Australia Collaborate to Enhance GPS Resilience in Contested Environments

Members of the Australian Department of Defence recently joined forces with the **Joint Navigation Warfare Center** to put GPS devices to the test. The goal was to assess their performance under simulated jamming conditions and enhance their resilience in contested environments.

The combined effort brought together experts from both nations. Personnel from the Australian Joint Positioning, Navigation, and Timing Directorate worked alongside JNWC personnel to evaluate the Defense Advanced GPS Receiver.

The DAGR, a widely used GPS device by both U.S. and allied forces, plays a critical role in land, sea and air navigation. By subjecting it to an anechoic chamber that mimics contested and limited GPS conditions, the team aimed to uncover insights that could enhance its resilience.

The JNWC, known for its expertise in navigation warfare, provided the ideal setting for this assessment. Their commitment to enabling PNT superiority for the **Department of Defense**, interagency, and coalition partners drove the rigorous evaluation process. The specialised chamber allowed them to test the DAGR's performance in a jamming environment, generating useful data that informed the device's warfighting effectiveness.

Read more in *article*…

https://www.vandenberg.spaceforce.mil/News/Article-Display/Article/3863725/us-australia-collaborate-to-enhance-gps-resilience-in-contested-environments/

2024-08-07

GNSS-less Aircraft Navigation with Cellular Signals of Opportunity

Tensions between NATO and Russia have risen since the Ukraine invasion more than two years ago. In 2024, hundreds of passenger jets were affected by an alleged Russian attack on GPS signals in the Baltic region. The attack started on Easter

Sunday and lasted more than 63 hours. Due to GPS jamming, Finnair, the only international airline operating flights to the second largest airport in Estonia, suspended its daily flights for the month of May. North Korea “upgraded” its GPS attacks from mere jamming, which led to a South Korean drone crashing in 2012 killing and injuring three people, to spoofing, affecting 200+ planes over five-days in June. Alleged Israeli GPS spoofing for 5+ months has wreaked havoc in neighbouring Lebanon, even extending to Cyprus, some 200 km away from Lebanon. Whacky GPS receivers across Lebanon showed their location at Beirut’s International Airport. Lebanese citizens have not been able to rely on GPS in their daily lives, with pilots now abandoning GPS and flying with a compass and a paper map.

Several national and international regulatory bodies have put forth calls to find GNSS alternatives. In 2021, the National Institute of Standards and Technology (NIST) issued a report on “Foundational PNT Profile: Applying the Cybersecurity Framework for the Responsible Use of PNT Services,” where it identified signals of opportunity (SOPs) and terrestrial radio frequency (RF) sources as a mitigation category that apply to the positioning, navigation and timing (PNT) profile. In 2023, the International Air Transport Association (IATA) invited the International Civil Aviation Organization (ICAO), in coordination with manufacturers and airspace user communities, to develop a global strategy on Alternative PNT (A-PNT) to ensure continuity of flight and air traffic management (ATM) operations during GNSS interruptions.

Read more in *Inside GNSS* article. https://insidegnss.com/protecting-the-skies-gnss-less-aircraft-navigation-with-cellular-signals-of-opportunity/

2024-08-08

Iran Warns Airlines Of Potential GPS Disruptions Over The Country

Iran has issued a notice to airlines, known as a NOTAM, warning of GPS disruptions over the country.

The significance of the disruptions is not immediately clear, nor who may be behind them, though GPS disruptions are sometimes used to confuse the targeting of precision-guided missiles.

The notice comes as the Middle East is braced for a forceful Iranian attack on Israel following the killing of Hamas political leader Ismail Haniyeh in Tehran last week, widely attributed to Jerusalem.

Read more in *article*…
https://www.timesofisrael.com/liveblog_entry/iran-warns-airlines-of-potential-gps-disruptions-over-the-country/
2024-08-05

US Dangerously Behind, PNT Leadership Needed

Describing a dangerous “asymmetric vulnerability to navigation warfare” a recent paper from the National Security Space Association (NSSA) calls for a wide variety of actions to mitigate the threat. The most important, “Focused leadership, properly empowered and resourced…”

The nineteen-page paper, in some ways, reads like a primer on GPS and positioning, navigation and timing (PNT), providing background and context for policymakers unfamiliar with the technology and the United States’ broad dependence upon it.

The lack of focused leadership, according to the paper, is evidenced by long-standing failures to follow through on a variety of mandates from senior leadership over the course of the last 20 years.

Read more in *GPS World* article. https://www.gpsworld.com/us-dangerously-behind-pnt-leadership-needed/?utm_source=Navigate%21+Weekly+News&utm_medium=Newsletter&utm_campaign=NCMCD240724002&oly_enc_id=1784A2382467C6V
2024-07-30

Pentagon Warns of Potential Russian Action in the Arctic — Including Jamming GPS Satellites

The Pentagon has released an updated Arctic strategy that warns of low-level Russian "destabilising" activities in the Far North aimed at the United States, Canada and its allies.

The 18-page assessment also points to increased naval co-operation in the region between Moscow and Beijing and promises more allied military exercises, the deployment of new technologies and increased co-operation with NATO. The disruption activities in the Arctic involve potential Russian jamming of global positioning system (GPS) satellites, according to the report.

"Of concern, Russia's Arctic capabilities have the potential to hold the U.S. homeland, as well as allied and partner territory, at risk," said the strategy.

"In addition to nuclear, conventional, and special operations threats, Russia seeks to carry out lower level destabilising activities in the Arctic against the United States and our allies, including through global positioning system jamming and military flights that are conducted in an unprofessional manner inconsistent with international law and custom."

Read more in *article*…

https://www.cbc.ca/news/politics/pentagon-russia-arctic-gps-jamming-1.7274182

2024-07-25