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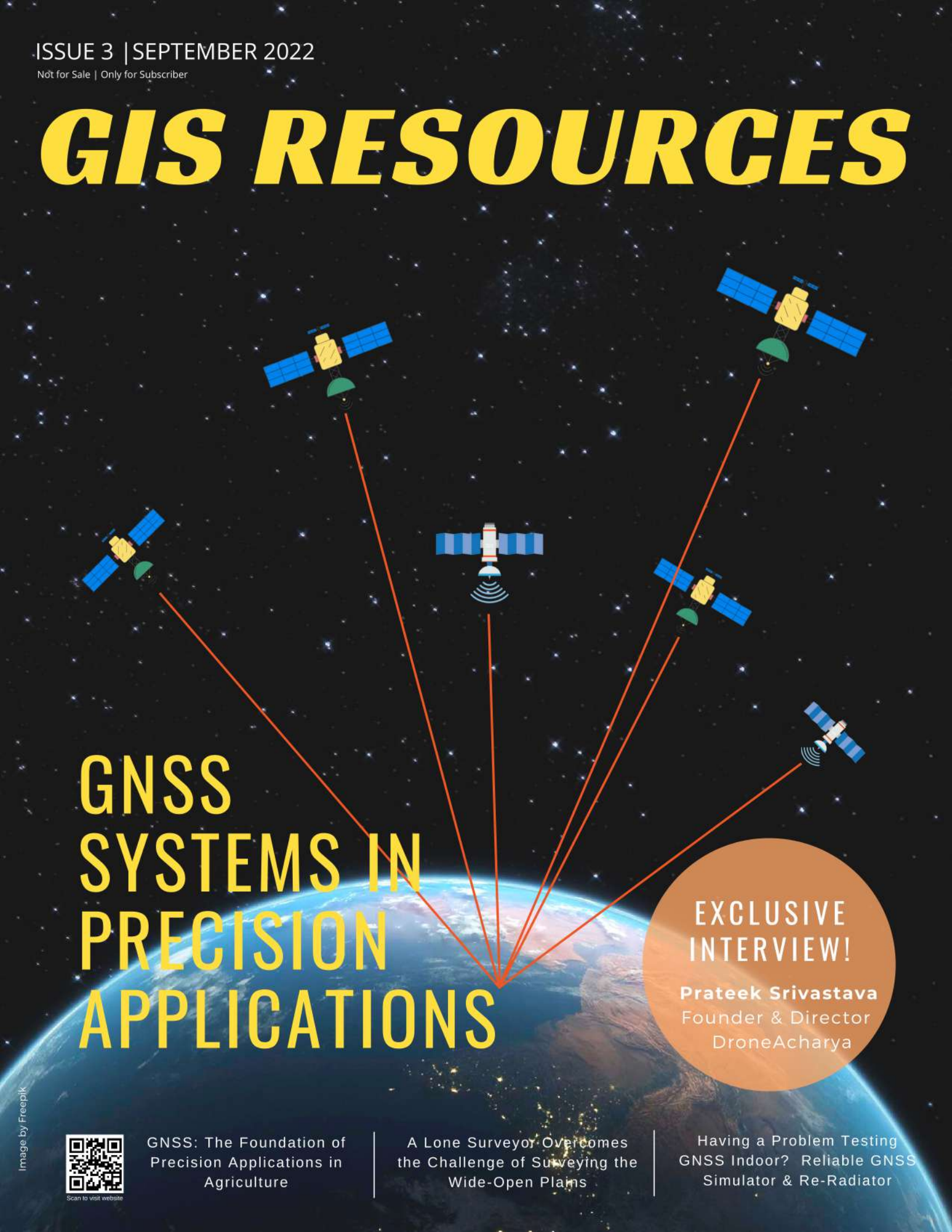

GNSS SYSTEMS IN PRECISION APPLICATIONS

EXCLUSIVE INTERVIEW!

Prateek Srivastava
Founder & Director
DroneAcharya

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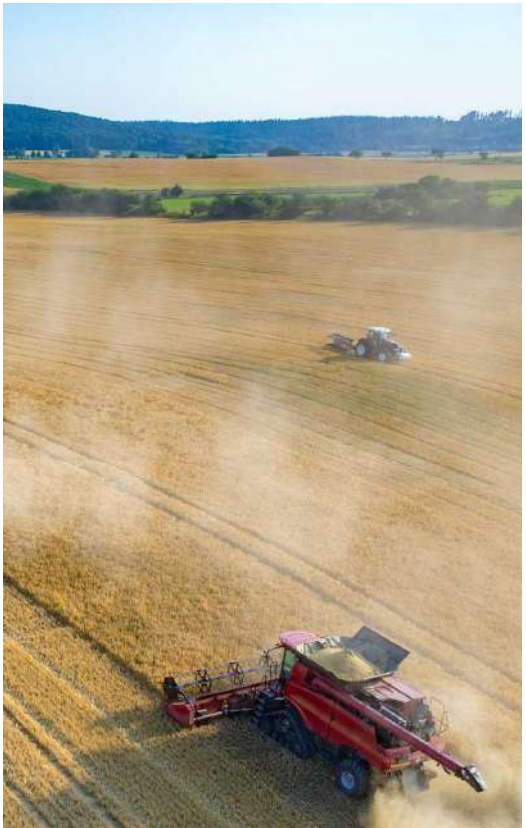

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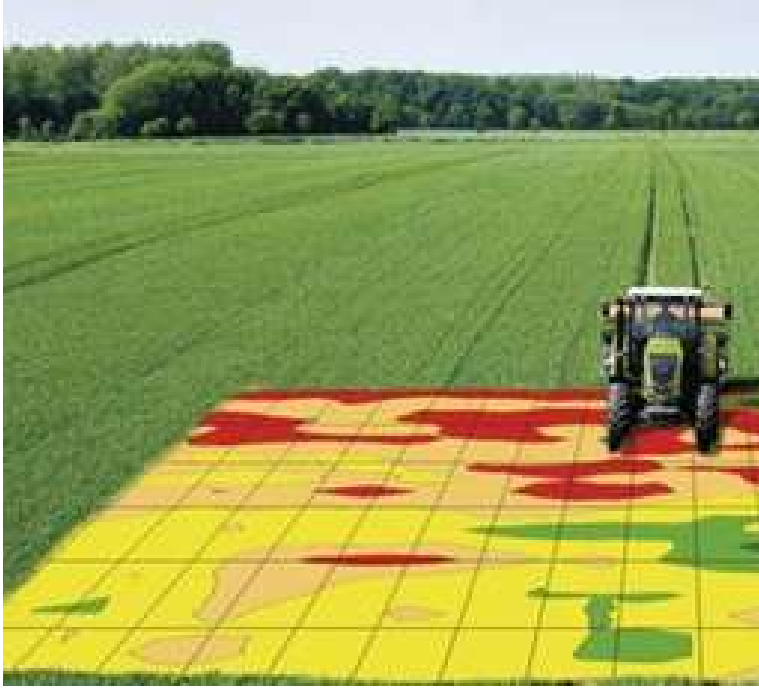
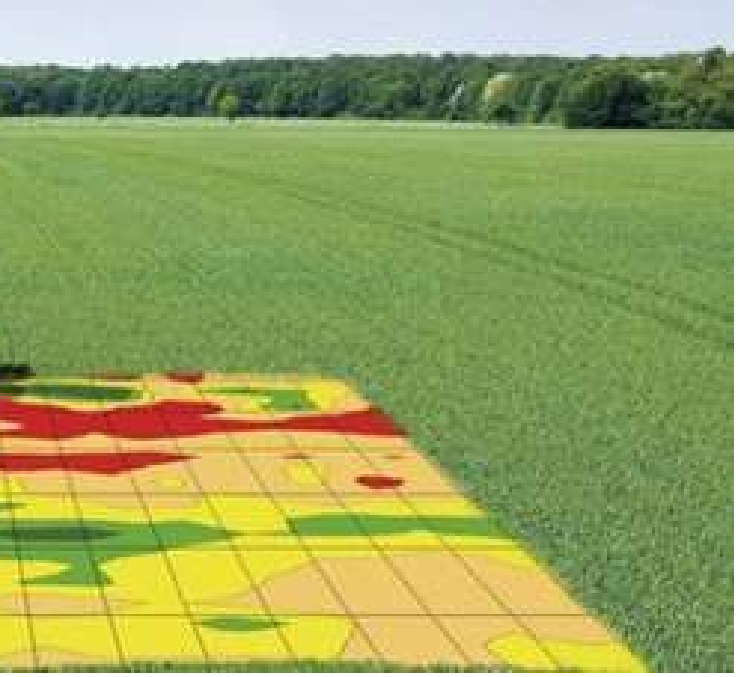
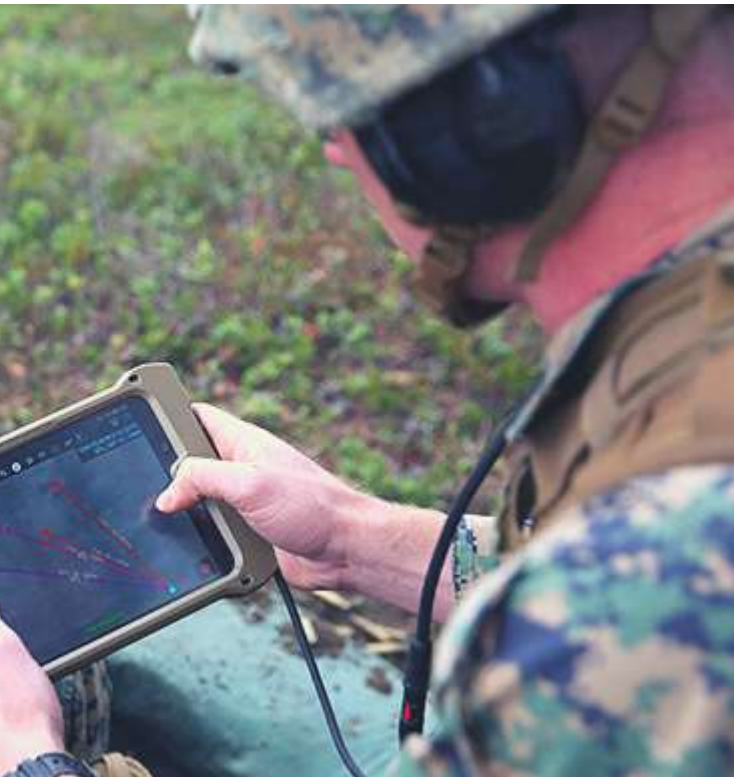






Editor's Note

By Ashok Prim

There is a continuous need for precise, reliable, and repeatable location, navigation, and timing data. GNSS systems and GNSS-based technologies provide this capability all year round covering most regions on this earth. Air travel and aviation in peace-time and in war, maritime and inland river travel & transportation, rail, road, and mass transit are but some of the domains that currently use GNSS technology. Without GNSS it would be difficult to manage and operate the world of transportation.

Several domains such as telecommunications, precision utility surveys, autonomous navigation, precision agriculture, environment assessment and impact, mining, etc use GNSS systems and technologies to improve efficiency, productivity, safety, and quality while reducing cost.

Different data streaming in from sensors are combined with location, navigation, and timing data obtained from GNSS systems to provide a holistic picture of activity for better decision-making and management.

GNSS systems and technologies are firmly established in nearly all infrastructural activities. Constant refinement is being made to remove whatever shortcomings are experienced so that more users can be made of this technology.

Decrease overlap and increase productivity with the high accuracy of Trimble CenterPoint RTX correction service.

GNSS: The Foundation of Precision Applications in Agriculture

By Maximilian Hiltmair
Strategic Marketing Manager
Trimble Positioning Services

GNSS positioning is used in a wide range of applications and has become the foundation for precision agriculture. From surveying & mapping, to transportation & navigation, even construction, automotive and telecommunications – the technology behind precise positioning across all of these industries has become a necessity to many farmers looking to capitalize on efficiency.

GNSS, Global Navigation Satellite System, consists of several hundred satellites continuously orbiting the Earth. Each of these satellites broadcasts position data including timing, location parameters, and other navigation information to a GNSS receiver. A GNSS receiver then inputs this information and calculates a rough 3-D position for its current location on Earth.

A tractor using a GNSS receiver for guidance needs at least four GNSS satellites to acquire the data needed to calculate its position. The more satellites the GNSS receiver has available to obtain signals from, the faster and more accurately it can compute its position, providing more robust and reliable positioning performance. It will be even more accurate when receiving GNSS real-time correction signals, which are necessary to get the tractor lined up year after year within a few centimeters of accuracy. Without real-time GNSS corrections data, a tractor's guidance system accuracy can only be about 5-10 meters. This can cause

errors in the precision and accuracy of the tractor, costing time and money.

Precision agriculture is dependent on receiving accurate GNSS signals sent to a receiver that can deliver robust, reliable positioning performance. Top priorities for precision agriculture farms such as planting seeds in the same spot as previous years or applying exactly the right amount of materials to a field, heavily relies on corrections. Correction services deliver precise positioning, a technique that corrects GNSS system errors, and provides the highest level of position accuracy.

Benefits of Correction Services

Knowing precisely where a farmer is in the field is the basic requirement for all precision agriculture applications including variable rate, section control, yield mapping, etc. But how does the system know where it is with precision and accuracy?

As said above, standalone GNSS positioning without using correction signals provides horizontal accuracy typically within several meters. Correction signals are required in precision agriculture applications to unlock the full potential of features and maximize the return on investment (ROI) of the overall solution. Only when leveraging high-accuracy correction services, is horizontal accuracy improved to within 2.5cm - which helps a farmer's business scale. Precision agriculture helps farmers save on extremely high input costs (e.g. - fuel or fertilizer), shorten the time spent in the field, which in turn can ease the pressure of persistent labor shortages, and also help maximize production yields while at the same time minimize the environmental impact. Precision agriculture with high-accuracy positioning has never been more impactful in times of high costs and growing food demand.

Figure 1: A driver can spend less time worrying if they are driving on their A-B line and more time focused on the work being done with the implement behind the tractor. Driver fatigue becomes less and less of a stress with high accuracy.

How to Decide Which Correction Service is Right for a Farm

There are several options on the market, so how do farmers know which correction service is right for their farm?

When evaluating the need for precision-based capabilities, considerations should include the crop and seeding type, farming practices, correction signal coverage, necessary equipment and simplicity of use - as well as the type of terrain being farmed and when farming operations occur during the day (or night).

There are a growing number of readily available correction service options scalable to just about any size farm, but that doesn't mean one size fits all. For farmers, whether they're in the Land Report Top 100 or working the family farm, understanding the pros and cons of various GNSS correction services goes a long way in maximizing the return on a precision ag equipment investment.

It's no secret that high-accuracy precision is the name of the game when planting seed, because of the inherent need to precisely control seed spacing and depth as well as a minimum pass-to-pass overlap, so utilizing a service with centimeter-level services is critical. For instance, Trimble CenterPoint RTX correction service delivers high-accuracy GNSS positions, repeatable to within just 2.5 centimeters. In accessing most available satellites, this service provides greater positioning availability, even in challenging environments such as tree lines, gullies and along contours where much of farming takes place. Trimble RTX optimizes both time and satellite-delivered corrections to ensure repeatable accuracy in auto-guided machines used in precision farming.

The Value of Trimble RTX

Trimble correction services enable an efficient coverage of swaths or rows to distribute seeds or crop inputs exactly where they’re needed. By harnessing an abundance of data from global satellite positioning systems, a farmer achieves minimal overlap and optimum spacing between rows. The advanced

Figure 2: With CenterPoint RTX running on the NAV-900, high accuracy is possible in the most extreme terrains including along tree lines and in gullies.

technology is delivered worldwide with total accuracy and initialization times ranging from 2-20 minutes depending on GNSS receiver type – with most of North America converging within two minutes. No other satellite-delivered correction service performs better when it comes to centimeter-level accuracy. Trimble's reliable uptime means that dropped signals and disruption can be left with previous seasons.

Simplicity and ease of operation are inherent to Trimble's satellite-based corrections, making them an appealing option and distinctly better-performing solution over contemporary cellular-based services. The GNSS receiver is neatly affixed to the tractor and ready to go when the farmer is. This reduces complexity and single point of failure, resulting in less time for equipment maintenance. The Trimble RTX correction signal is available 24 hours every day and coverage spans worldwide.

Trimble's premier correction service, CenterPoint RTX, is the most accurate and easy-to-use solution available on the market – and comes at a reasonable price point for a quick return on investment. This service gives farmers the best of both worlds – the accuracy of a RTK correction without the hassle and extra expense of additional hardware. It's all delivered via satellite signal and is always available so a farmer doesn't have to rely on a sometimes unreliable radio, cell, or internet signal.

Simply put, Trimble's RTX correction services provide precise point positioning anywhere on the farm without limitations such as radio and cellular coverage. When it comes to farmers, this makes life easier, thereby making work easier—especially when precision is essential and time is of the essence, like during planting, spraying and harvesting.

The Time and Place for Broad Accuracy

For applications where centimeter-level accuracy isn't as high of a priority, Trimble RangePoint RTX and ViewPoint RTX give additional correction service options.

Pass-to-pass value generally tells a farmer what overlap a planter or any farm equipment has as it drives two passes located next to each other. Smaller pass-to-pass values ensure less over planting and crop damage, which results in more yield and more savings for the business.

Relative accuracy is often associated with economical solutions and relates to short-term repeatability at the time of operation. This means that, for a certain period of time, the pass-to-pass overlap is small but increases over time, as the farmer spends time operating in the field. It may work well for mapping, and other broadcast applications where coverage is the objective; otherwise the fluctuating accuracy can cause missed productivity.

Year-to-year accuracy is of concern when working with control traffic farming, strip-till or just aligning planting with all following applications to minimize crop damage and maximize the yield. These applications require better accuracy than the accuracy generated from raw GNSS positioning. As indicated before, GNSS positioning is highly dynamic with great opportunity for error and needs correction through correction signals for year-to-year operations.

Looking at more economical solutions means that the accuracy decreases. The services are still accurate, just not quite as precise and are ideal for a range of broad acre applications. Trimble RangePoint RTX and Trimble ViewPoint RTX hold equipment to 6-inch and 12-inch pass-to-pass accuracy respectively – or about the width of a tire between passing swaths, resulting in effective coverage without reduced gaps or overlaps.

All in all, the easiest way to choose which correction service is right for a farm is deciding the accuracy level needed that will deliver the desired return on investment, the location and environmental factors of the farm, and the cost (and hassle!) a farmer is willing to endure configuring and maintaining hardware. Where VRS and RTK rely on nearby base stations and cellular or radio service, Trimble CenterPoint RTX offers the less than one inch year-to-year accuracy of RTK without the need of extra hardware. The correction is delivered to the GNSS receiver on the cab via satellite, much like a TV at home or music service in a car.

How GNSS Factors Into Other Precision Ag Applications

You may be thinking – so how do GNSS and corrections relay into the rest of precision agriculture? Without precise positioning, there really is no precision agriculture. Corrections impact steering, guidance, variable rate/prescription mapping, data management and act as a critical component to delivering greater levels of efficiency and automation on the farm. GNSS-based corrections represent a key foundational element to precision agriculture. Without corrections, there will always be a crucial piece missing in order to get to the best returns on the farm – which, after all, is the whole goal of precision farming – right?

Understanding that farmers are especially stretched thin with current resource and environmental constraints, Trimble's mission is to make precision agriculture easier and help farmers achieve better accuracy - therefore reducing input costs and increasing yields. Efficiency is possible with the foundation of high accuracy from GNSS correction services.

Far removed from the Nebraska plains, Kenna uses a Trimble R10 and CenterPoint RTX for a real-time survey in the Colorado mountains. Satellite-delivered correction data ensures accurate results anywhere on Earth.

A Lone Surveyor Overcomes the Challenge of Surveying the Wide-Open Plains

By John Stenmark
Writer and Consultant

Kevin Kenna has surveyed more than 20,000 miles of power lines in his career so a project of 10,000 square miles is not unusual for him. He has lots of experience with GNSS and major projects for utilities, government agencies, and large area mapping and he's used GPS and GNSS for more than two decades. Kenna's recent work involves establishing ground control for a series of aerial lidar mapping projects in Nebraska. He's establishing checkpoints that are used to determine and correct any vertical bias in the airborne measurements.

An array of sensing technologies, including digital imaging and lidar, are used when creating accurate maps over large areas. To ensure accurate georeferencing of the sensors, Kenna uses GNSS to provide precise positioning data. When working on projects covering large areas, real-time GNSS can be limited, so Kenna's firm, Denver-based Merrick & Company, switched to RTX.

In general, the work requires high accuracy in the vertical component - one of the most challenging aspects for GNSS surveyors. And it often takes place in isolated areas where conventional RTK isn't practical and VRS is not available.

Before employing RTX for their use, the firm conducted extensive tests to confirm that the solution could produce reliable results. They chose Trimble's CenterPoint RTX correction service to test for accuracy and high productivity.

Solo Performance

On a recent project covering 8,000 square miles in remote northeast Nebraska, Kenna captured roughly 350 points for aerial lidar. Quality control terms of the contract required 50 percent of the points to be measured twice, with the two measurements agreeing to be within 5 cm vertically.

Kenna completed the field work in roughly three weeks, alone. The project also included additional points to improve redundancy in the checkpoints as well as ties into NGS control three times in each county, with a minimum of five minutes of data at each occupation. Kenna used a GNSS receiver with a controller running special software. The receiver collects the RTX correction data directly from communications satellites and produces real-time positions accurate to 2cm horizontal and 5cm vertical. The software monitors each observation and displays information that enables Kenna to assess the accuracy at every point. At the end of each day in the field, he compiled the measurements in special software and produced results in the coordinate system specified by the client.

Easier Logistics for Aerial Surveys

For years, serial mapping has required terrestrial base stations to provide reference points for post-processed kinematic (PPK) measurements to establish ground control points as well as base stations for precise GNSS positioning of the airborne sensors. The approach required base stations to be not more than 20 miles apart. The switch to RTX removed those constraints and provided a significant increase in flexibility. Merrick uses Applanix POS AV systems in its fixed-wing and helicopter surveys and processes the data in POSPac MMS software and RTX-PP post-processing.

Matt Bethel, Merrick's director of operations and technology, sees two improvements resulting from RTX: "Historically on larger projects we would target what we felt to be the portion of a block with the best flying weather for a given day and set bases up there. If the weather changed and affected visibility from the air then we would be forced to stop flying for the day. It's really nice to have

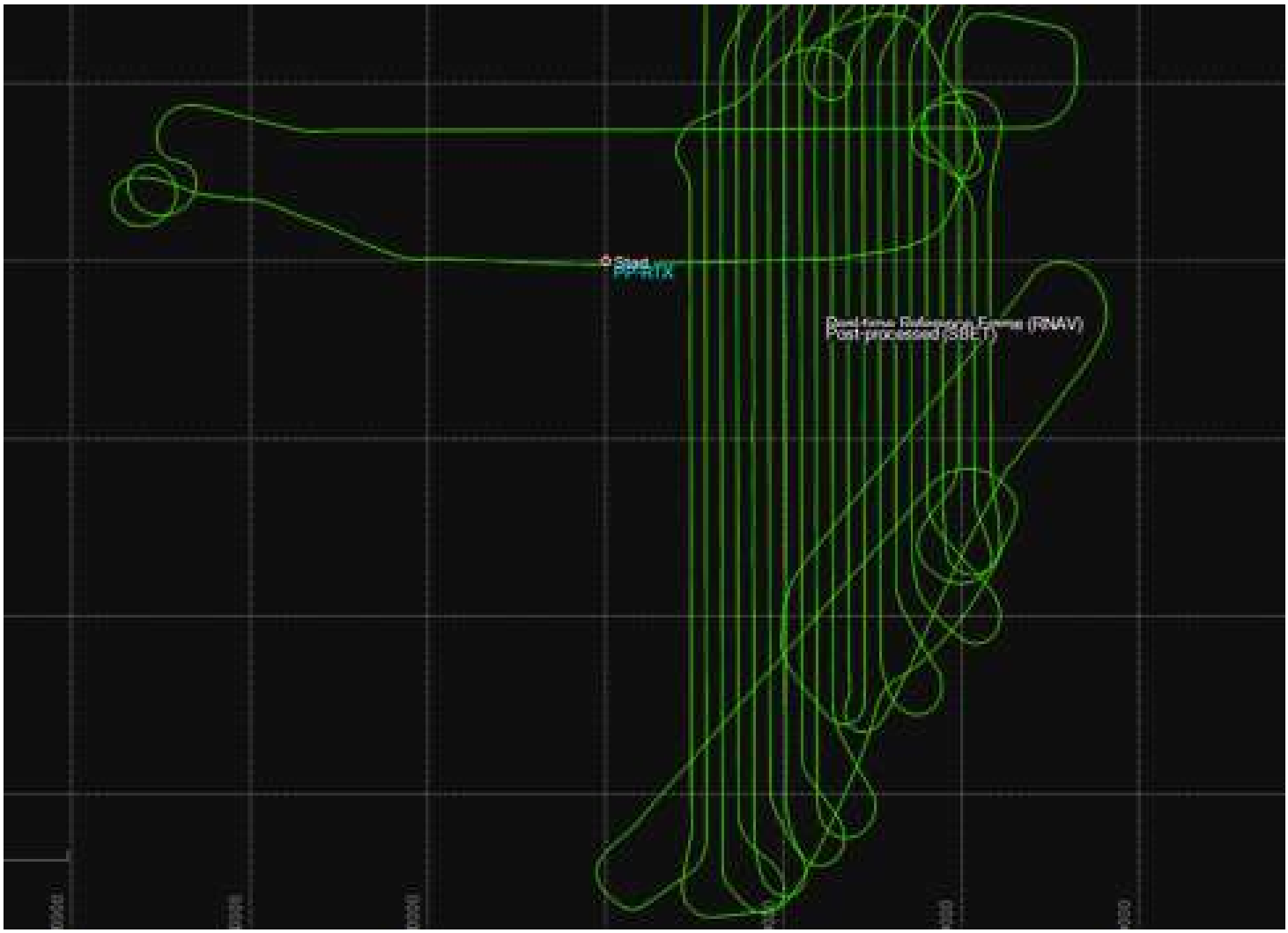


Figure 1: GNSS guidance enabled efficient flight paths for lidar surveys while RTX-PP provided precise positioning to produce accurate, high-volume terrain mapping.

the flexibility to move freely around projects without concern about base stations and CORS locations. Secondly, the plots show us that the lidar data is as good as, or maybe slightly better than, previous methods of single-base GNSS. Therefore, we didn't sacrifice any accuracy while gaining the ability to move freely around large projects and save time that was historically spent setting up bases."

RTX also eliminates the need for a fixed base stations or ties to terrestrial GNSS networks, which often require access to cellular communications. This gives Bethel and Kenna flexibility in planning and executing their projects while maintaining confidence that their results will meet even stringent accuracy requirements. "Not needing to set up base stations in the morning and go back and pick up at the end of the day is a huge advantage from the way it used to be," Kenna said. "Now, as technology advances, things become more efficient, and we get a lot more production."

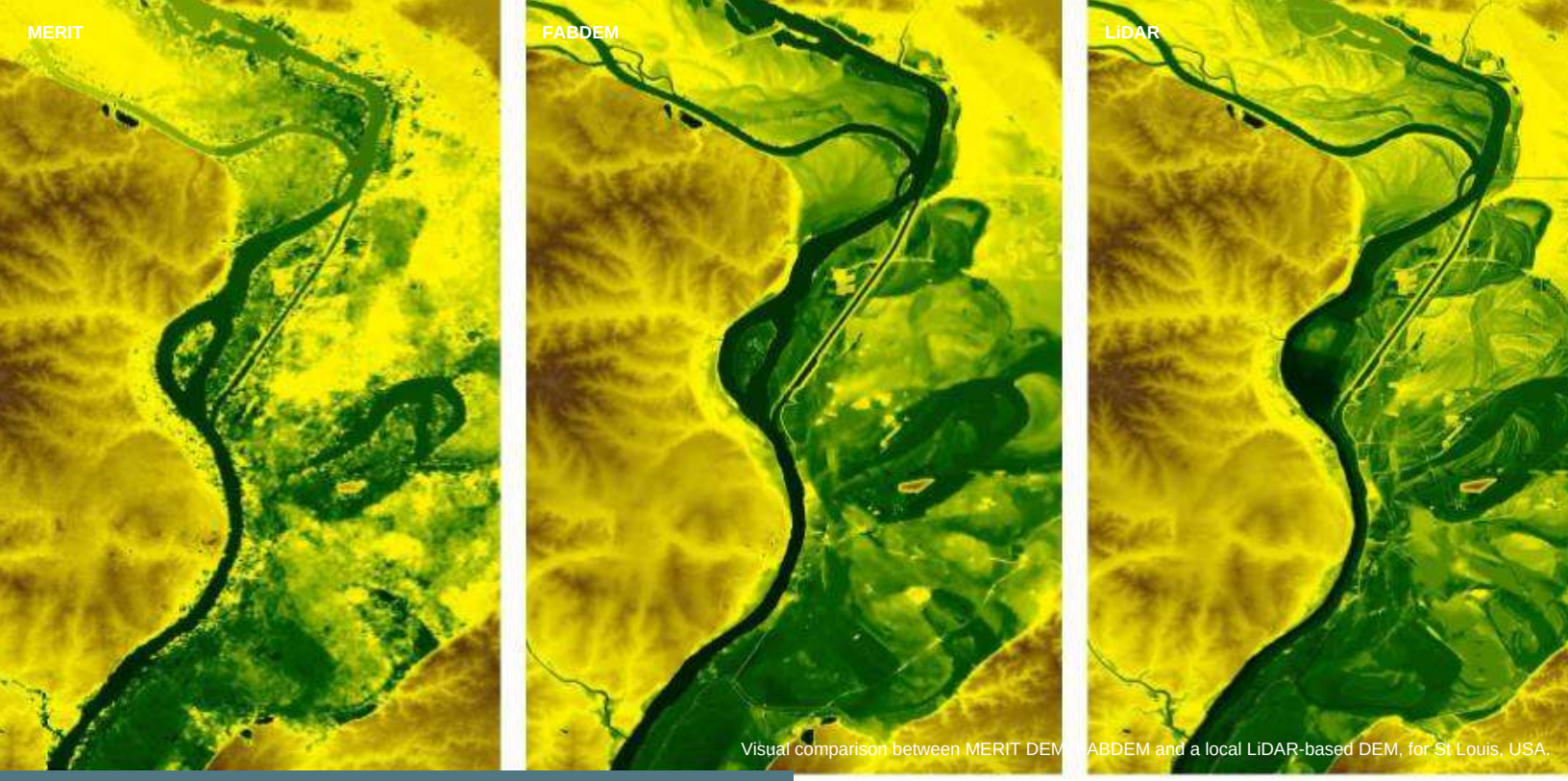
Figure 2: A GNSS receiver and RTX capture precise data while Kenna collects photos to document the site. The site identifier written on the whiteboard ensures the data and images are linked to the correct location.

Figure 3: A Trimble R10 GNSS receiver uses CenterPoint RTX to produce precise position data. RTX enabled efficient real-time measurement without the need for base stations or cellular connections.nd images are linked to the correct location.

The advent of GPS in the 1990s enabled crews to establish control in remote locations, but they still needed total stations for topography and stakeout. The big breakthrough came with RTK GPS and GNSS, which allowed for centimeter accuracy in real-time. It didn't take long for RTK to push the use of total stations aside for most electric line surveying.

Both RTX and RTK provide good accuracy, but RTK relies on a GNSS base station and radio data links to send data from the base to the rover. Although RTK is far more productive than total stations, when compared to RTX, RTK comes with lots of added costs and logistical headaches.

A similar comparison can be made between RTX and real-time GNSS networks (RTN). RTN is fast and convenient, but only when you are in a specific geographic area served by the RTN – accuracy quickly degrades as soon as you move out of the coverage area. Furthermore, RTN is dependent on cellular communications, which are often nonexistent in remote areas. In the utility fields where projects extend over enormous distances, RTX eliminates both the geographic and cellular dependencies of RTN.



Visual comparison between MERIT DEM, FABDEM and a local LiDAR-based DEM, for St Louis, USA.

The New Standard of Digital Elevation Models: Unlocking the Potential of 'Bare Earth' Mapping For GIS Professionals

Dr Peter Uhe
Senior Developer
Fathom

When it comes to modeling anything on the earth's surface, having an understanding of ground level is key. Computer-generated terrain models are known as Digital Elevation Models (DEMs), and are particularly important when it comes to building flood models at a regional, national, or even global level. Historically, this has been done using satellite-derived terrain data from NASA's Shuttle Radar Topography Mission (SRTM), which is now over 20 years old and as a result is no longer fit for purpose.

To level up the playing field for DEM users, in 2022 flood modeling experts Fathom built and released FABDEM (Forests And Buildings removed Copernicus DEM) in a collaboration with the University of Bristol. The improvements in FABDEM have the potential to change the modeling of flows across the land surface, as well as many engineering applications including remote surveying and planning of infrastructure projects.

What is FABDEM?

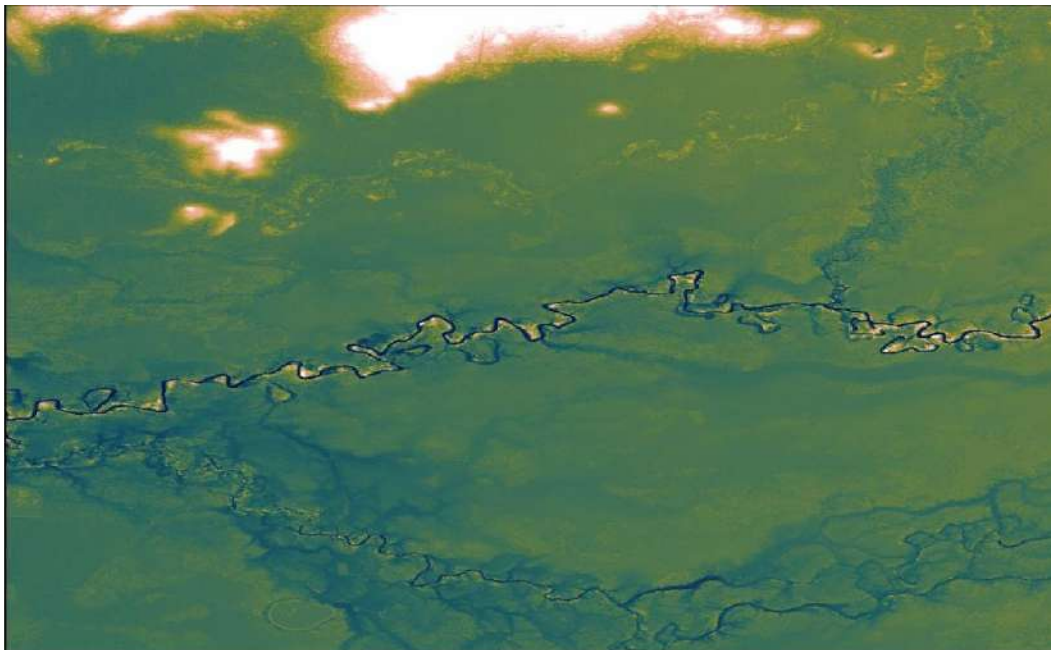
Copernicus Global 30m DEM is currently the most accurate, freely available DEM, however, it represents elevation including buildings and vegetation. This is a problem for anyone looking for models that represent 'ground level' (also called 'bare earth'). FABDEM is based on Copernicus DEM and removes vegetation and buildings to allow for a bare earth model.

The methodology to produce FABDEM has been published in a peer-reviewed journal, and it has been made available

commercially for flood modeling, its initial purpose, and for applications across all geospatial use cases.

The Availability of Different Global and Local DEMS

Digital Elevation Models generally fall into two categories: satellite-derived global or regional DEMs, and local DEMs, most of which use LiDAR technology. The high-quality LiDAR DEMs can have centimeter-scale accuracy, so are undeniably the best choice for local studies where they are available. However, LiDAR DEMs only cover a tiny fraction of the globe and it would be prohibitively expensive to build LiDAR on a completely global scale. So, at a large scale, improvements in global DEMs drive progress in many types of modeling.



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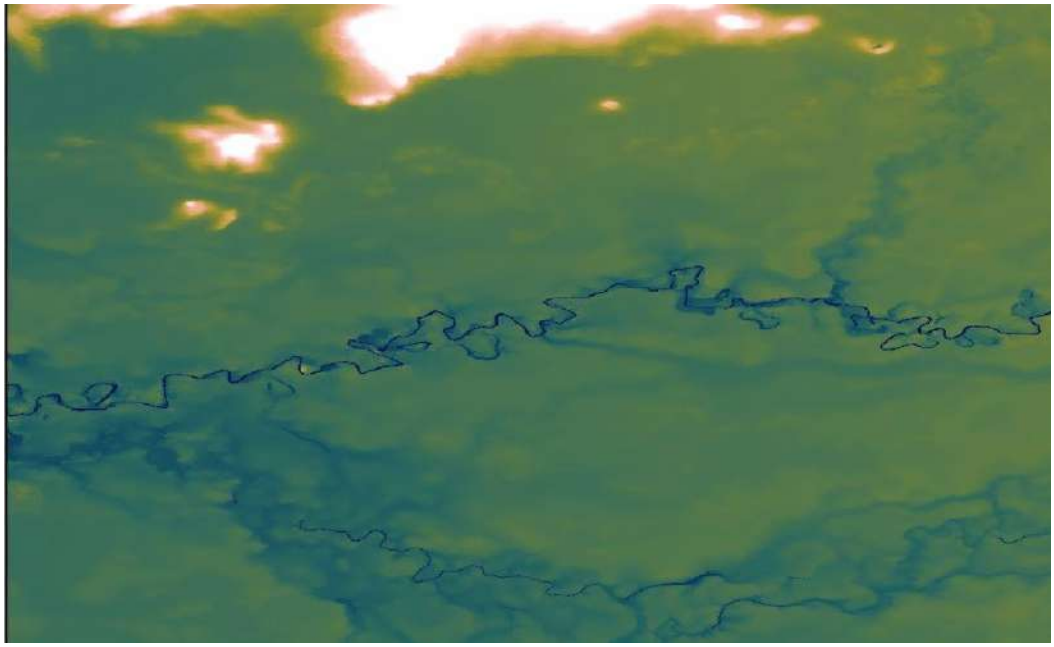

b. FABDEM

Figure 1: Example of removal of forested areas alongside a river valley.

Using LiDAR as 'truth'

Under the hood of the FABDEM processing is a machine learning algorithm. This takes high quality LiDAR data as truth and trains our model to correct the Copernicus DEM elevations to more closely match the LiDAR. Several 'predictor' datasets also drive this algorithm. By correlating these data with the vegetation and building height anomalies in the Copernicus DEM, our model is able to learn the relationships between predictors and the correction needed to produce a 'bare earth' DEM.

Comparisons with FABDEM

To determine how good our new FABDEM dataset is, we first want to compare it against LiDAR DEMs as our best-known representation of ground truth elevation. Secondly, we compare against other global DEMs with similar use cases to FABDEM. As the only other publicly available global DEM that removes forest heights alongside other errors, MERIT DEM is the closest conceptually to FABDEM. Our comparison against MERIT found FABDEM had lower errors than MERIT when compared to the LiDAR data. Importantly, spatial inspections also show clearer representations of features in the landscape in FABDEM.

When translated into a real world application of FABDEM, flood mapping (which is our expertise at Fathom), these improved representations of terrain features directing the flows of water mean a better quality flood map, and hence, a better understanding of who's at risk of flooding.

FABDEM: So What?

In essence, FABDEM gives you a true picture of the earth's terrain. Meaning that if you have a use that requires a realistic 3D simulation of the earth, then FABDEM will be valuable. At Fathom, we use it to understand the behavior of natural perils on at a large scale, but flood mapping is just one small niche of the many applications of DEMs.

We are just starting to see the potential benefits of FABDEM beyond flood modeling: from allowing remote engineering site surveys to guiding site selection for infrastructure and agriculture projects, developing artificial worlds for gaming, and studying animal migration patterns.

If you are interested in the data or know of an unusual use case that we may not have heard of, please get in touch. You can download the research for free here or you can learn more about Fathom's options for licensing here.

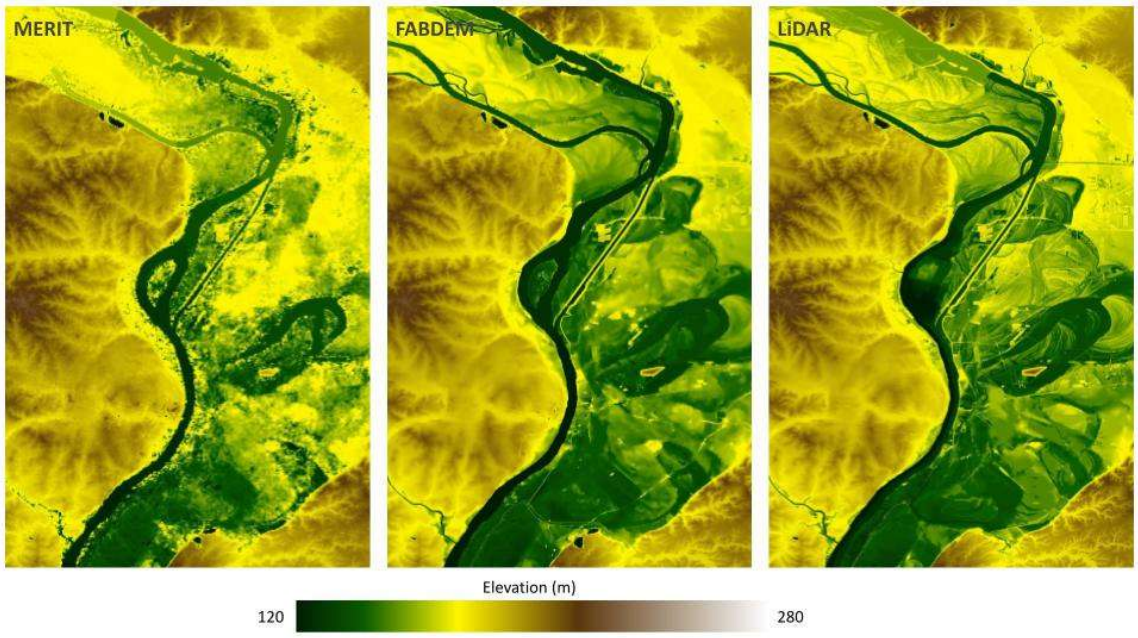

Figure 2: Visual comparison between MERIT DEM, FABDEM and a local LiDAR-based DEM, for St Louis, USA.

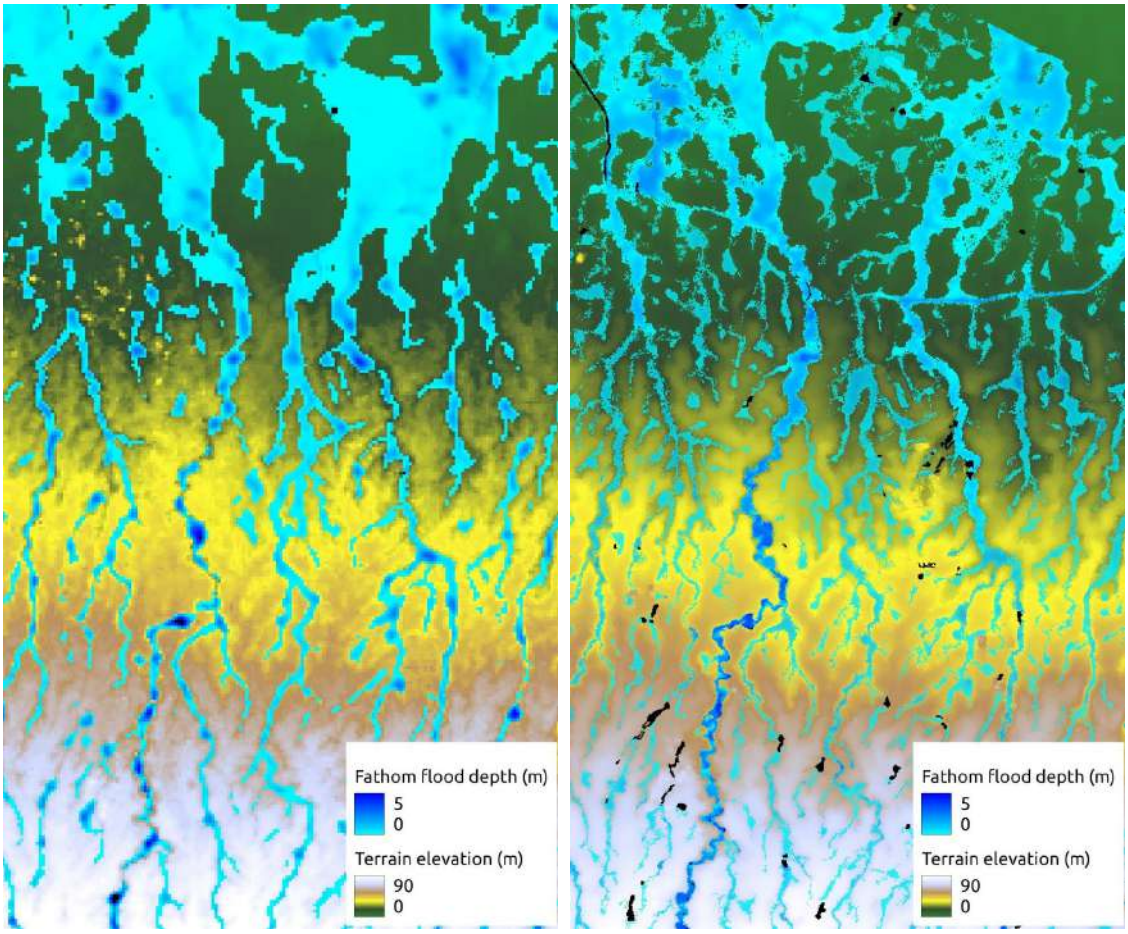

Figure 3: Flooding in the south of Jakarta, Indonesia, simulated using different terrain models: MERIT DEM (left) and FABDEM (right).

About the Author:

Dr Peter Uhe, Senior Developer, Fathom

Dr Uhe has over a decade of experience working in academia and climate-related flood risk. His career has varied from the University of Oxford, CSIRO in Australia and the University of Bristol. Now Dr Uhe works within the technical team at Fathom where he contributes to the organisation's understanding of the impact of climate change on flood inundation models.

Access his Google Scholar here.

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V3 NOVUS Pvt. Ltd is an ISO 9001-2015 Company based out in Bangalore. V3 NOVUS started in the Year 2010 with a team size of 3 and today we are about 30 members Facility who are Highly Passionate about Embedded Design.

V3 NOVUS is committed to quality and always puts the customer first in all that we do. We are guided by our quality management system which is ably supported by intelligent software applications for monitoring process performance and striving for continuous improvement. All employees of V3 NOVUS are individually responsible for the quality of our services.

V3 NOVUS has the ability to design custom software solutions for its customers. This includes not only writing code to work with standard real-time or embedded operating systems but also the ability to design to the custom OS or straight to the metal. We have years of experience implementing embedded code from complex to simple systems.

LabSat 3 Wideband GNSS Simulator

LabSat is a standalone, single, dual & triple constellation simulator for testing devices based on satellite navigation systems; it is capable of recording and replaying multiple raw satellite navigation RF signals including GPS, GLONASS, Galileo, BeiDou, IRNSS, QZSS, and SBAS.

LabSat is recognized as the most cost effective and intuitive GNSS simulator available. New to the LabSat range of GNSS Record and Replay devices is LabSat 3 Wideband, which continues with the established reliability, cost-effectiveness, and simplicity of operation that are the benchmarks of the LabSat system.

A 56MHz recording bandwidth at 4 or 6 bit allows for the capture of a very wide range of live-sky satellite Signals:

- GPS: L1 / L2 / L5, GLONASS: L1 / L2 / L3
- BeiDou: B1 / B2 / B3, QZSS: L1 / L2 / L5
- Galileo: E1 / E1a / E5a / E5b / E6
- IRNSS: L5, S-Band
- SBAS: WAAS, EGNOS, GAGAN, MSAS, SDCM

LabSat 3 Wideband is housed in a conveniently small enclosure measuring 167mm x 128mm x 46mm and weighing only 1.2kg, so it can be used to record GNSS signals anywhere. Subsequent replay is entirely realistic to allow for robust product development and testing.

The system is simple to use with one touch record and replay and SSD logging, and no requirement for a connected computer. An inbuilt battery pack gives two hours of use, and a 1TB Solid State Drive (SSD) is supplied as standard.

With LabSat 3 Wideband, you are able to develop your products and systems in readiness for new GNSS receivers capable of using the signals that will start to broadcast within the next few years. With the advent of L2C, L5, and L1C, the next generation of GNSS devices will have increased accuracy and capabilities – LabSat 3 Wideband gives you the opportunity to develop your products to be compatible with new receivers as they come to market.

V3 NOVUS Indoor GNSS Solution

GNSS Re-Radiator

Our GNSS re-radiator solution will solve your indoor GPS problems to test GPS or GNSS Based devices at R&D, testing, or production floors. We are creating a virtual sky to test GPS functionality deep indoors.

GNSS Re-Radiator operates by receiving GPS /GLONASS /Beidou /IRNSS satellite signals with an antenna located at the Rooftop outside of the building (To open Sky view), with Lightning Protector and In-line amplifier, which is used to protect Co-axial cable and Boost the signal strength, Received signals send to the GNSS Re-Radiator, Re-Radiator Amplified Signals and Split into different Channel using Splitter (ex.1/4/8/16/32/64 channels). Using LMR 240 cable up to 40-meter length, Each channel can transmit with same signal strength through Different Passive antenna which can cover around 5~10 meter Radius.

Typical Application

1. Mobile Phone Testing
2. Vehicle Tracking Testing
3. GPS Hand Held Testing
4. Car navigator Testing
5. Military equipment Testing @Indoor
6. Dashboard Testing
7. Survey Product
8. Aviation Hanger
9. Public Transportation

Technical Characteristics

1. Digital gain display: LED digital display shows current amplifier gain.
2. Touch-tone gain adjustment: upper and lower key, to adjust the gain.

Figure 1: GNSS Record and Replay with a recording bandwidth of up to 56MHz.

3. Power control: Toggle the power switch, and easy to control the power supply state.
4. Serial command control.
5. GNSS re-radiator device will support for below frequencies:
   - GPS: L1 / L2 / L5
   - GLONASS: L1 / L2 / L3
   - BeiDou: B1 / B2 / B3
   - QZSS: L1 / L2 / L5
   - Galileo: E1 / E1a / E5a / E5b / E6
   - IRNSS: L5, SBAS
6. The device features 0-30dB gain and a noise figure less than 3dB.
7. LMR 240 Cable used to connect Passive antenna up to 40 meters.
8. LMR 400 Cable used to connect From Roof Top antenna to Device maximum 120 meters.

Split GNSS Signals into Different Channels Using Splitter

1. V3N-GNSS-RR-01 (1 Channel Re-Radiator)
2. V3N-GNSS-RR-04 (4 Channel Re-Radiator)
3. V3N-GNSS-RR-08 (8 Channel Re-Radiator)
4. V3N-GNSS-RR-16 (16 Channel Re-Radiator)

**Also, 32 And 64 Channels are available*

For more details on our products, please visit www.v3novus.com

GNSS Re-Radiator Setup

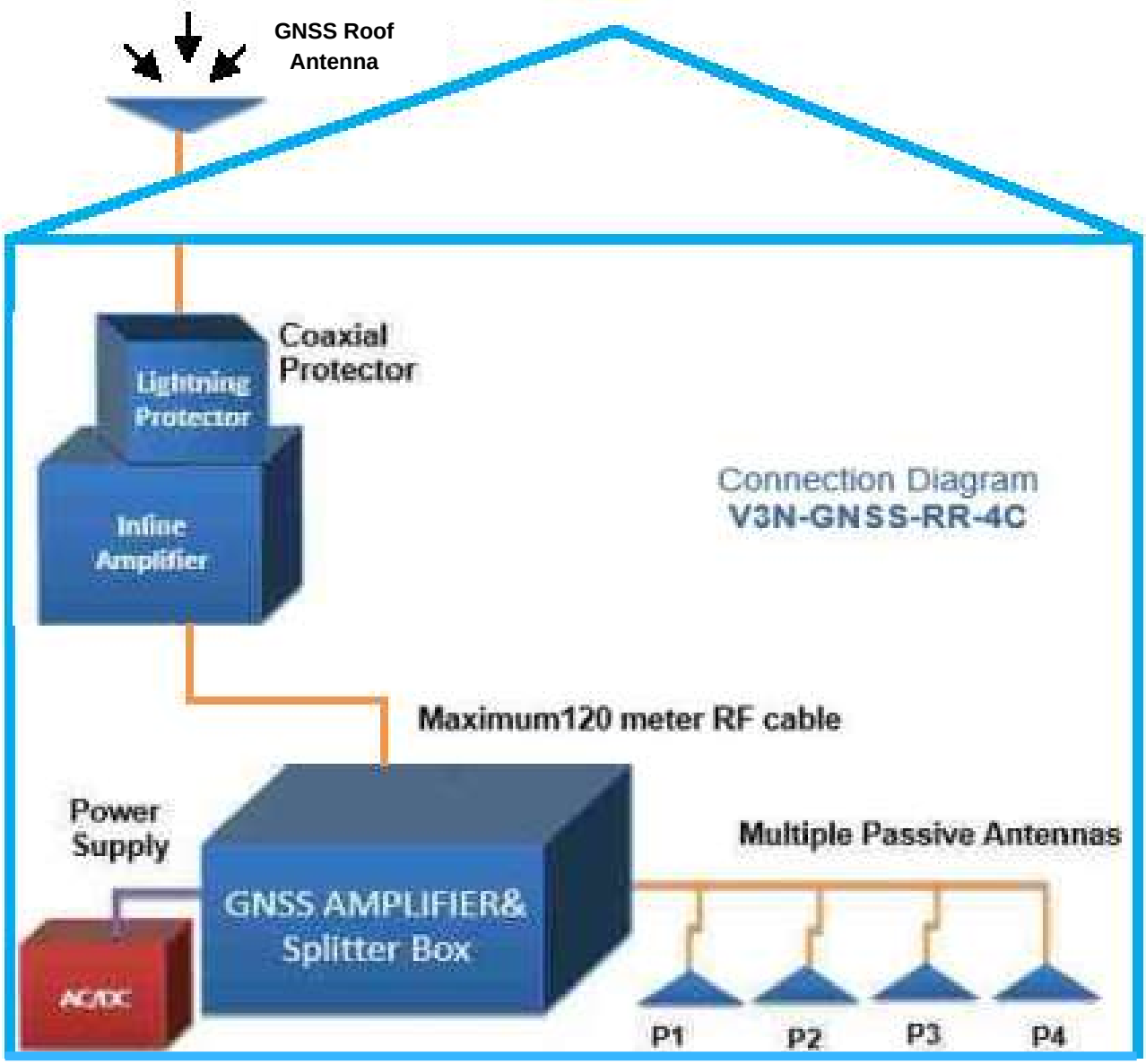

Figure 2: Connection diagram of GNSS Re-Radiator.

GNSS Systems with Built-in High Performance IMU for Precision Applications

DreamTns India Pvt Ltd
Hyderabad, India
www.dreamtns.in

DreamTnS India Private Limited is a subsidiary of DreamTnS Co., Ltd., a South Korean company catering to the needs of the South Korean metrology and geospatial market for over 15 years. DreamTnS Co., Ltd. is growing exponentially year on year. To ensure and multiply the growth, we are venturing into different businesses and an Indian subsidiary is thought to be the avenue.

DreamTnS India Pvt. Ltd. is a research and development center for metrology and geospatial products situated in Hyderabad, India. We develop smart, intelligent, and revolutionary products for the industry with our innovative, active, and motivated workforce.

DreamTnS has developed a survey-grade GNSS receiver with the brand name PozStar. PozStar GNSS receivers with lightweight and superior IMU performance are designed for surveyors on the go.

GNSS-based surveying reduces the amount of equipment and labor required to determine the position of points on the surface of the Earth when compared with previous surveying techniques. Using GNSS, it is possible for a single surveyor to accomplish in one day what might have taken a survey crew of three people a week to complete.

Determining a new survey position once required measuring distances and bearings from an existing (known)

survey point to the new point. This required measurements using theodolites to measure angular differences and metal “chains”, pulled taught to minimize sag and accurately measure distances. If the new and existing survey points were separated by a large distance, the process would involve multiple setups of the theodolite, then multiple angular and distance measurements.

Using GNSS, surveyors can now set up a DGNSS or RTK base station over an existing survey point and a DGNSS or RTK rover over the new point, then record the position measurement at the rover. This simplification shows why the surveying industry was one of the early civilian adopters of GNSS technology.

Why PozStar?

PozStar GNSS is compatible with all field conditions and is easy to manage through real-time remote monitoring. With local support for all our clients, PozStar provides reliable technology to avoid on-site downtime, reduce rework and accelerate productivity. We provide surveyors with solutions that are professional, reliable, easy to use, cost-effective, and always up to date.

PozStar GNSS receiver with IMU/Tilt sensor removes the tilt error caused in the field due to the surveyor handling. This increases the accuracy and gives freedom to the surveyor to not think about the tilt error of the receiver. Even with 45 degrees plus tilts, it achieves an accuracy of millimeters.

PozStar is providing the service to wide industries and various applications with high-accuracy hardware and user-friendly software. Application of PozStar GNSS in various industries.

Surveying

GNSS for surveying can provide centimeter-level accuracy using the RTK positioning method, or sub-centimeter levels of accuracy when post-processing algorithms are employed.

The survey industry was one of the earliest adopters of GNSS technology. GNSS technology has dramatically increased the speed and productivity of professional surveyors using on-demand centimeter-level accuracy provided by Real-Time Kinematic (RTK) positioning. Multi-constellation receivers have increased signal availability and the ability to provide excellent performance in the presence of buildings, trees, vehicles, and other obstructions that surveyors are likely to encounter in their work.

PozStar GNSS receiver comes with multi-constellation, Multi-frequency with Centimetre level accuracy. It’s a compact, rugged, lightweight, and powerful GNSS receiver for surveyors.

It consists of the Tilt sensor, which helps the surveyor to collect the data without any disturbance in the field.

Mapping and GIS

Mapping and GIS applications allow capturing, storing, manipulating, analyzing, managing, and presenting all types of geographically referenced data. GIS technology combines database, mapping, and statistical methods to integrate georeferenced data into visual displays where the relationships, patterns, and trends in the data can be more easily identified.

PozStar GNSS and mobile applications allow capturing, storing, and manipulating the field of spatial and nonspatial data. Using our solution, the user can prepare the data for GIS and prepare the maps using the GIS environment.

The receivers can integrate with the third-party GIS and mapping application for data capturing, storing, and map creating.

Figure 1: PozStar in action.

Construction

Construction sites are complicated, high-activity workplaces and a high level of precision is required. Site managers cannot afford to lose time wondering where various assets are located.

Using this technology, PozStar GNSS receivers provide high precision for heavy construction sites, Road, Rail, and Bridge constructions. This receiver increases the output of the work with high precision.

Mining

PozStar GNSS is used for surface mining for the planning of the mining. It collects the data from the surface and helps planning in mining, and drill holes activities. It helps to establish the permanent reference point with high accuracy and precise coordinate.

GNSS information is being used to efficiently manage the mining of an ore body and the movement of waste material. Position information is used by blast hole drills to improve the factorization of the rock material and control the depth of each hole that is drilled, to keep the benches level. Multi-constellation GNSS is particularly advantageous in a surface mining environment due to the obstructions caused by the mine's walls. More satellites mean more signal availability.

Automated drills are used in surface mines to increase safety and productivity. A single operator, located in the safer control room, can operate, and monitor up to five automated drills.

The blast holes drilled by the automated drills must be very precise both horizontally and vertically. The position of the holes (horizontal accuracy) is critical in controlling rock fragmentation. Rock fragments that are too large or too fine can increase wear on the rock crushers used to process the material. Hole depth (vertical accuracy) is important for creating a flat bench.

Three GNSS technologies are used on the automated drills, RTK, heading, and multi-constellation. RTK provides the precise positioning needed to accurately locate the blast holes. Heading provides the alignment of the drill to ensure the holes are drilled perpendicular. Multi-constellation receivers compensate for signal blockages common in the high wall environment typical of surface mines.

PozStar with Built-in High Performance IMU

Light and Compact design
- Fits snugly in the hand
- Ultralight - 825g

Efficiently improved GNSS+IMU
- Enhanced IMU tilt sensor survey
- Real time positioning accuracy - 2 to 3 cm at any angle
- 50% improvement in RTK GNSS work efficiency

Full satellite support and Advanced RTK engine
- 824+ Channels
- GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS
  - GPS - L1, L1C/A, LSC, L2P, L5
  - GLONASS - L1, L2, L3
  - Galileo - E1, E5a,E5b
  - BeiDou - B1, B2, B3
  - QZSS - L1, L2, L5
  - SBAS - L5
- Advanced RTK algorithm
- Multipath blocking function
- Reliable precision and stable use

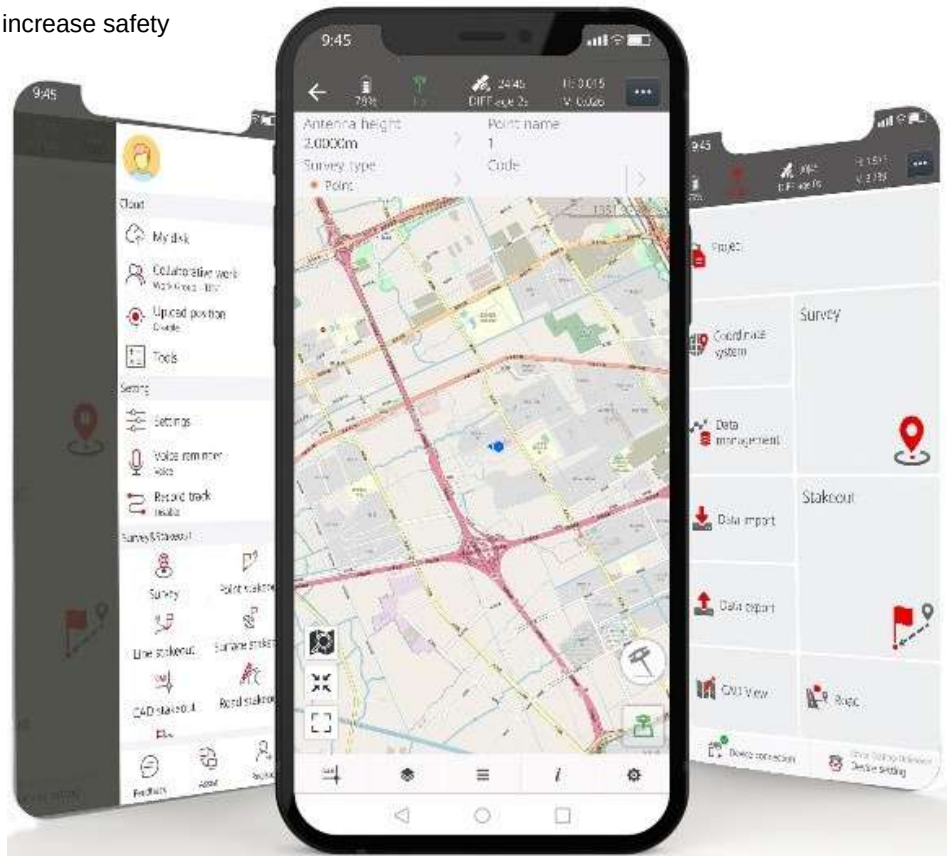

Figure 2: Comprehensive and intuitive user interface for surveying and engineering.

GISTAM 2023

9th International Conference on Geographical Information Systems Theory, Applications and Management

Prague, Czech Republic
25-27 April, 2023

The International Conference on Geographical Information Systems Theory, Applications and Management aims at creating a meeting point of researchers and practitioners that address new challenges in geo-spatial data sensing, observation, representation, processing, visualization, sharing and managing, in all aspects concerning both information communication and technologies (ICT) as well as management information systems and knowledge-based systems. The conference welcomes original papers of either practical or theoretical nature, presenting research or applications, of specialized or interdisciplinary nature, addressing any aspect of geographic information systems and technologies.

CONFERENCE AREAS

- Data Acquisition and Processing
- Remote Sensing
- Modeling, Representation and Visualization
- Knowledge Extraction and Management
- Domain Applications

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DroneAcharya - Giving Wings to the Indian Skies

A Talk with Prateek Srivastava, Founder & Director - DroneAcharya Aerial Innovations Pvt. Ltd.

DroneAcharya as Maharashtra's first DGCA (Directorate General Civil Aviation) certified Drone Pilot Training Organization according to the latest Drone Rules 2021, aims to launch DroneAcharya as India's leading Drone Pilot Training Centre. DroneAcharya is all set to launch multiple branches with centers in Mumbai and Gujarat opening very soon. The main focus here is to cater to the mass deficit in talent as against the massive demand of skilled drone pilots and GIS experts in India today.

We had a great opportunity to have a questionnaire with Prateek Srivastava, Founder & Director at DroneAcharya Aerial Innovation. He has shared interesting insights on his journey from GIS Developer to serial entrepreneurship. He also talked about products and services offered by DroneAcharya and drone solutions and services offered.

The questionnaire follows as...

GIS Resources - Tell us about DroneAcharya? What is the incubation idea behind the inception of DroneAcharya?

Prateek - DroneAcharya Aerial Innovations is your one-stop shop for all things drones. We provide drone surveying services, data processing, and customized solutions specific to your projects. We provide a wide range of services in domains like agriculture, urban planning, energy, utilities, and the environment to name a few. At DroneAcharya, we emphasize the importance of knowledge. We have a variety of drone-centric courses designed to create a group of individuals capable that is skilled and certified. Recently, we have become a DGCA-certified Remote Pilot Training Organization based in Pune and are working on establishing two more in Mumbai and Gujarat. In the near future, we are also planning to enter the drone manufacturing sector.

GIS Resources - What are the training programs offered by DroneAcharya? And how will these training programs help experienced professionals?

Prateek - In recent years, the demand for drone pilots and GIS professionals has skyrocketed. Due to the high demand, coupled with our expertise in these industries, we have curated a number of training programmes, including DGCA Certified Drone Pilot Training, Drone Data Processing, Drone Uses in Agriculture, Drone Building Course, and

Prateek Srivastava

Prateek Srivastava has come a long way from being a GIS Developer to a serial entrepreneur and Founder of multiple GIS companies. Nominated as AsiaOne 40 Under 40 Most Influential Indians 2018-19, his business acumen and market potential is widely being noticed and applauded.

With more than 16 years of experience in the Geospatial industry as a Techno-Commercial Expert, Prateek holds a holistic approach towards growth of the company.

Holding an M. E. Degree in Remote Sensing and GIS from Asian Institute of Technology, Bangkok and B. E. Degree in IT from Saurashtra University, Gujarat, Prateek possesses the right balance of technology and business, needed to lead a technology-driven company.

Implementation of Python for GIS among others. These courses are open to both working professionals and students. These courses are customizable according to the age group and educational background of every individual. The students who complete these courses become equipped with the essential skills required for that job and gain industrial exposure through our experienced trainers. These courses are designed to enhance the skill set of individuals looking to become job ready. The courses also offer awareness regarding the Geospatial industry to the common public, and how GIS can be applied to multiple sectors of the economy.

GIS Resources - What ecosystems of drone solutions and services are provided by DroneAcharya?

Prateek - At DroneAcharya, we provide end-to-end solutions for the Drone and GIS industries. Right from carrying out specialized drone surveys, drone data processing, and output creation, to final delivery and hand holding of the client, we cater to every stage of a project as it matures. Apart from GIS mapping and 3D modeling, we have the expertise in carrying out deliveries using drones, drone videography, and live video feed and activating drones for emergency situations such as search and rescue and crowd control missions. Our ecosystem of solutions is completed by our extensive list of specialized drone-centric courses that catapult our students to attaining jobs as DGCA-certified drone pilots, GIS analysts, and Python coders. Our solutions enable our clients to achieve all their data requirements for any project.

GIS Resources - How do you see the role of DroneAcharya in building a sustainable ecosystem for drone solutions and services in India?

Prateek - The development of UAVs (Unmanned Aerial Vehicles), or drones as they are more commonly known, is becoming an important ally of sustainability. Drones are being used as a primary resource by many businesses and organizations to monitor their assets or infrastructure. The use of drones reduces costs while increasing efficiency.

They are being used in every stage of an asset, right from planning, to construction and eventually operations and maintenance. Drones are now being tested for deliveries as well. Although drone delivery is still in its early stages in India, this application will prove to be a game changer for critical operations at times of disasters and medical emergencies.

GIS Resources - How can these solutions and services help in precision applications?

Prateek - With our survey-grade drones capable of operating at centimeter-level accuracy, crucial for precision-based applications such as mapping and agriculture, we at DroneAcharya have been highly successful in catering to the needs of our customers.

However, without highly skilled and experienced personnel on the field monitoring these excruciating operations, achieving this level of accuracy is impossible. We are proud to have employees having experience of more than 20 years in the field, who always deliver their best ensuring the projects are executed with perfection.

GIS Resources - Would you like to share the biggest achievement of DroneAcharya, such as fundraising or awards, or project?

Prateek - With funding of USD 4.6 Million, DroneAcharya has now gathered the highest pre-seed funding of all drone startups in India. One of our current set of projects that have helped us gain such valuable numbers includes the Medicine From The Sky Project executed in association with The World Economic Forum. The project was one of the first of its kind in India, as it involved drone delivery flight trials with Beyond Visual Line of Sight (BVLoS) operations. Another feather in our cap is the Drones for Carbon Financing project which has been initiated by the World Bank Group for understanding how drones can leverage farmers in achieving net carbon neutrality. Our team was also successful in carrying out the survey of major archaeological sites situated at Vadnagar, Gujarat which is also the birthplace of our Prime Minister Shri Narendra Modi.

GIS Resources - With new regulations by the Government of India related to Drones/UAVs, what's your take on the ease of doing business?

Prateek - Drone industry is constantly evolving, and the prospects for the use of drones in various industries appear to be limitless. India has taken a progressive stance by enacting new drone regulations in recognition of the technology's limitless potential in the near future. In the new rules, the government has primarily focused on self-certification and non-intrusive monitoring, removing a range of operational challenges for all stakeholders in the drone industry. This will consequently open up a lot of new opportunities for research and innovative technology in this domain.

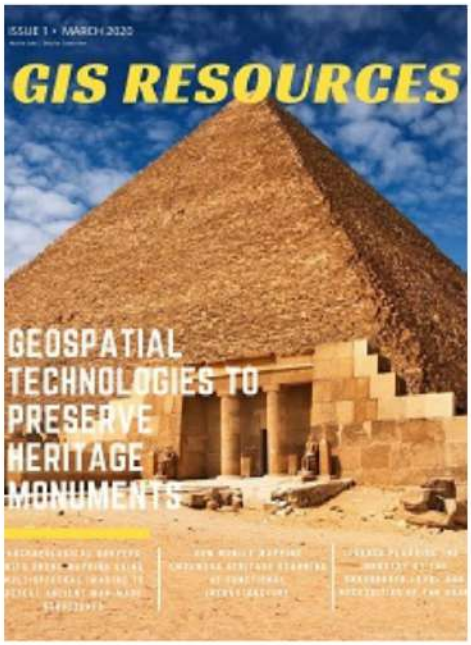
GIS Resources - What are the major trends that you think could influence and drive the drone market most in the coming years?

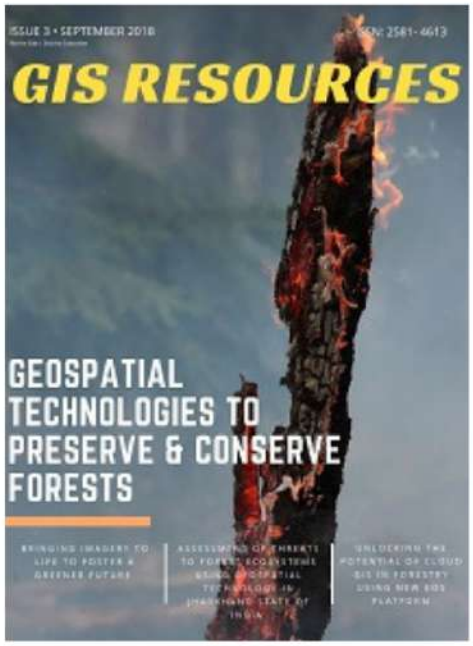
Prateek - Urban Air Mobility: Since the emergence of the commercial drone sector, "Urban Air Mobility" has gained huge popularity. This sector will definitely boom in the coming years, especially with provisions being made such as the “Drone Superhighway”.

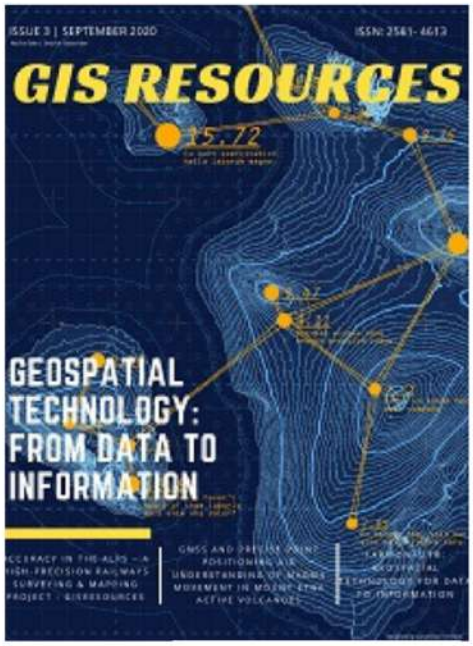
Drone Delivery: This sector's growth is already accelerating at an exponential rate. Looking at the promising potential of drones in delivering items, such as life-saving medicine and food supplies, especially in times of crisis/disasters. This industry will continue to grow and achieve greater heights in the future.

GIS Resources - Final question, any closing comments for our readers?

Prateek - We encourage all those interested in the drone sector to maintain a positive outlook as it reaches new heights. Particularly at DroneAcharya Aerial Innovations, we always promote and welcome new team members to strive for excellence to help India in becoming the Drone Hub of the world by 2030.







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BUSINESS

June 16, 2022 - September 15, 2022

Trimble and CLAAS Strategic Alliance Develops Next-Generation Precision Farming System for CLAAS Agriculture Equipment

Trimble and CLAAS have developed a next-generation precision farming system for CLAAS tractors, combines and forage harvesters. The precision farming system includes the new CLAAS CEMIS 1200 “smart” display, GPS PILOT steering system and the SAT 900 GNSS receiver. The CEMIS display utilizes Trimble's new embedded modular software architecture for positioning, steering and ISOBUS technology for a seamless connection to control and monitor implements in the field. Trimble’s new architecture accelerates the development of a customized precision agriculture system by linking CLAAS’ machine interface and Trimble’s guidance capabilities into one common in-cab user experience.

Brookings Municipal Utilities Streamlines Processes, Boosts Efficiency with Modern GIS

Locana has announced Brookings Municipal Utilities (BMU) successful deployment of a modern geospatial enterprise leveraging Locana services. The solution, built on the Esri ArcGIS System, including the ArcGIS Utility Network, removes silos to create timely, accurate, and complete information used for improved decision-making. BMU selected Locana as its geospatial implementation partner after initially planning to execute much of the project with Locana in a support role. The goal of the implementation was to replace legacy mapping with an enterprise GIS solution that would integrate data, leverage powerful analysis capabilities, and provide a foundation for the future.

Letitia A. Long to Receive 2022 Lundahl-Finnie Lifetime Achievement Award

The United States Geospatial Intelligence Foundation (USGIF) has announced Letitia A. Long as the 2022 Arthur C. Lundahl-Thomas C. Finnie Lifetime Achievement Award recipient in recognition of her myriad achievements and community leadership. With more than four decades of exceptional service in government and industry, Ms. Long has been a trailblazer and steadfast advocate of the GEOINT tradecraft and the Intelligence Community.

Pix4D viDoc RTK smartphone rover accuracy certified by Bureau Veritas

Pix4D has announced the certification of the viDoc by Bureau Veritas. This official recognition confirms that the viDoc is accurate enough to be used in industry. The Bureau Veritas found the viDoc to have a margin of error of less than 5cm, which is half the required accuracy for Class A measurements. They tested it for volume calculations as well as measurements for digitizing as-builts in a trench. The Bureau Veritas is a company that specializes in testing, inspecting, and certification (TIC) across multiple industries, which it has been doing for 190 years and is highly regarded worldwide. The viDoc was submitted to them to be inspected and certified.

rasdaman Validated as INSPIRE Compliant WCS

rasdaman WCS is the first product to be validated as an INSPIRE complaint Download Service, fully following the requirements laid down for INSPIRE Download Services as well as the Technical Guidance for the implementation of INSPIRE Download Services using Web Coverage Services (WCS).

Phase One and Trimble Announce Collaboration to Streamline High Quality Photogrammetric Workflow

Phase One, a pioneering provider of professional aerial cameras, has announced a collaboration with Trimble, a leading provider of software and hardware in the geospatial market. A new integration between Phase One and Trimble® Inpho® Suite, will simplify the process to transform raw images into final mapping products. The support of Phase One’s proprietary raw data format, IIQ, directly from their cameras streamlines the production process, increasing customer productivity, and enables the creation of highly accurate photogrammetric deliverables.

Seequent named NZ Hi-Tech Company of the Year 2022

Seequent, the Bentley Subsurface Company, has been named the PwC Hi-Tech Company of the Year at the 2022 NZ Hi-Tech Awards. The awards celebrate New Zealand’s most successful high-tech companies and the highest achieving individuals. Seequent CEO Graham Grant says he’s incredibly proud of the Seequent team, both present and past – who have worked with remarkable skill, focus and passion for building Seequent into a global subsurface software success story.

USGIF Announces 2022 Scholarship Award Winners

The United States Geospatial Intelligence Foundation (USGIF) has selected its 2022 scholarship winners. A record-breaking $100,000 raised from donations by the GEOINT community will help the Foundation support students pursuing degrees in geospatial intelligence (GEOINT) and related topics.

Trimble RTX Integrity Validates Positioning Data Accuracy to Support Safety-CriticalApplications

Trimble has introduced data integrity monitoring for its precise point positioning (PPP) correction service, CenterPoint® RTX Fast. The Trimble RTX Integrity™ monitoring system is an innovative, patented solution, built in direct response to client requirements for production-ready applications. It continuously validates the reliability of correction data processed by the network, which is broadcast to users in the agriculture, geospatial, construction and automotive industries, ensuring positioning data is right the first time.

Trimble Ventures Invests in Sabanto - an Autonomous Farming-as-a-Service Company

Trimble Ventures, Trimble's corporate venture capital fund, has announced its investment in Sabanto, Inc. Sabanto is a U.S.- based agricultural technology company focusing on autonomous workflows throughout the farming cycle being offered as Farming as a Service (FaaS). This investment supports Trimble Ventures' mission to invest in early and growth-stage companies that are accelerating innovation, digital transformation and sustainability in the industries.

The Knowledge Hub for Spatial & Unstructured Data Launches on ProductHunt

Unstruk Data, the first data portal designed specifically for geo-enabled businesses, has announced its commercial product launch on ProductHunt. Now, it's easier than ever for new customers to manage, analyze and visualize their spatial and unstructured data. New users can upload up to 100GB of spatial and unstructured data during the free trial.

Wingtra 2.7 Update Brings First-ever Smart RTH

Wingtra is regularly updating the capabilities of its premiere WingtraOne platform. This is evident in frequent, free software updates. But there's something groundbreaking about 2.7. A more precise geofence setup based on a polygon instead of a circular area; new return-to-home (RTH) logic that makes the system even more autonomous and is completely novel in the industry; remote ID, more efficient battery swap and resume, and more features. With all of these updates, plus a simplified min and max height logic, the system offers peace of mind that you are always within a set airspace.

YellowScan Announces Collaboration with UAV Developer FIXAR for a Fully Integrated LiDAR and Drone Solution

YellowScan is delighted to partner with FIXAR, a European unmanned aerial vehicle developer. FIXAR provides a range of solutions which includes its flagship model, the FIXAR 007, a UAV dedicated to outdoor VLOS and BVLOS missions, which will be upgraded with a YellowScan LiDAR system. The FIXAR 007 is an autonomous vertical take-off and landing fixed-wing drone, customizable with diverse sensors to handle aerial photography, video monitoring, laser scanning, dispensing and more.

ISRO and Pataa to Develop Satellite Image-based Digital Addresses

Pataa Navigations and Indian National Space Promotion and Authorisation Centre (IN-SPACe) signed an MoU on June 10 in Ahmedabad, Gujarat, at the inauguration of In-Space headquarters for enabling access to ISRO's Geospatial Services and APIs for the development of an addressing system. PM Narendra Modi was also present.

T-Hub Partners with Hexagon to Build a Geospatial Experience Centre in Hyderabad

Hyderabad-based business incubator T-Hub has partnered with Hexagon, a digital reality solutions firm, the company announced on Friday. Both organisations are looking to combine sensor, software, and autonomous technologies to build a Geospatial Experience Centre at T-Hub to help the country's growing startup ecosystem. Hexagon plans to leverage T-Hub's expertise in providing an innovation ecosystem for startups, corporates, and investors. Hexagon is also looking to provide the startups opportunities such as access to hardware and software technology, co-creation and innovation of products, support in building pilots and Proofs-of-Concept (POCs), and providing mentorship wherever required.

Vodafone Signs Agreement with Topcon to Develop New Satellite Technology Able to Locate IoT Devices and Autonomous Vehicles Within Centimeters

Vodafone has signed an agreement with Topcon Positioning Group to develop a new mass-market precise positioning system that will locate IoT devices, machinery, and vehicles with a greater degree of accuracy than using only individual GNSS. Pinpoint accuracy is critical to the mass adoption of Vehicle to Anything (V2X) technology - the ability for vehicles to speak with other vehicles, road users, and infrastructure - driverless vehicles, as well as for autonomous machinery and robots. Topcon is proud to be partnering with Vodafone to bring high accuracy correction services to enable V2X applications to operate at the accuracy needed to help improve road safety.

YellowScan Releases the Latest Upgrade to its Software Solution for Managing Point Cloud Data, CloudStation

YellowScan has developed a new global release of the CloudStation which focuses on increasing their customers' productivity. CloudStation provides a complete software solution to create and manipulate point cloud data. It allows you to extract, process and display data immediately after the acquisition flight in the field or back at the office. The auto-generation of strips and the production of LAS & LAZ files are now done in only few clicks. Fully integrated with all of the hardware platforms in YellowScan's portfolio, CloudStation is a powerful tool that is easy-to-use and helps you save your most valuable asset, time.

Leica Geosystems Announces New Leica DMC-4 Airborne Imaging Sensor Delivering Superior Image Fidelity

Leica Geosystems has announced the introduction of the Leica DMC-4, a highly efficient airborne imaging sensor providing unsurpassed image quality for various applications and complex mapping environments. The sensor provides superior image fidelity by leveraging the CMOS-based Leica MFC150 camera module with Leica Geosystems' unique mechanical forward-motion-compensation (FMC). The production-proven technology extensively used in Hexagon's Content Program has already surveyed 1.2 million square kilometres and delivers crisp, full radiometry at faster aircraft speeds across various operating conditions. The DMC-4 fully integrates with the Leica HxMap end-to-end processing workflow, a powerful but intuitive workspace supporting customers from mission planning and execution to product generation.

Hexagon and Fujitsu Announce Strategic Partnership to Solve Societal Challenges for Trusted Society

Hexagon and Fujitsu will work together to provide joint use cases leveraging digital twin technologies and solutions from both companies, including IoT sensors, data processing, AI analysis and advanced data visualization in the cloud and high-performance computing infrastructure. The partners will deploy these technologies to develop joint solutions that deliver richer information and deeper insights to customers in government, the public sector, transportation and utilities to help reduce emissions, increase safety, optimize operations and more.

Hexagon's Luciad Adopted by DTS as Standard Platform for Developing New Chilean Defense Systems

Hexagon's Safety, Infrastructure & Geospatial division has announced Technology Development and Systems (DTS), a subsidiary of the National Aeronautical Company of Chile (ENAER), has selected Luciad as the standard platform for the development of a new generation of defense systems for the Chilean Armed Forces, including two command-and-control systems for the new Pillán II aircraft. After rigorous technical evaluations, DTS selected Luciad from among other solutions in the Defense industry as the standard for new systems. Luciad is a developer platform used by militaries around the world for creating custom high-performance, mission-critical geospatial solutions. It enables greater situational awareness through 2D and 3D visualization of large amounts of static, dynamic and real-time data. Hexagon's Luciad software is widely used by systems integrators and defense organizations around the world.

Kerala State Spatial Data Infrastructure Has Rolled Out Kerala Geoportal 2.0.

The Kerala State Spatial Data Infrastructure (KSDI) under Kerala State IT Mission (KSITM) has rolled out Kerala Geoportal 2.0, a revamped version of the spatial data portal. From locations of government hospitals to tribal hamlets, the platform integrates geospatial data which come under various government departments. The platform is equipped with a system to share and explore data related to the state's political and administrative boundaries, natural resources, transportation and infrastructure, demography, agro and socio-economy etc. This can be used by policymakers, entrepreneurs, and researchers for various purposes.

Leica Pegasus TRK Reality Capture Mobile Mapping System with AI and Autonomous Workflows

The Leica Pegasus TRK Reality Capture Mobile Mapping System is the latest advancement in reality capture technology. Leica's Pegasus has been on the market for a few years, but this new product offers an unparalleled user experience with its wireless connectivity and fold-up design. The Leica Pegasus TRK is perfect for capturing fast-moving objects or scenes that are too dangerous or difficult to access. It also has multiple sensors, RTK positioning, and cameras to ensure 360° coverage and accuracy. Leica Pegasus TRK's sensor architecture includes a complex integration of IMU and SLAM technologies that enables georeferencing in GNSS-denied conditions. The system captures real-time 3D scans of buildings, landscapes, and other physical spaces while moving, enabling users to create high-quality, detailed 3D models and maps.

Indian Home Grown Geospatial Companies Are taking on Google

In a partnership with Tech Mahindra, Genesys International, and MapMyIndia, Google Maps has introduced Street View in India. This is the first time the service would be entirely managed by local partners anywhere in the globe. Due to legal restrictions, the service enabling a 360-degree view of streets, attractions, and landmarks has yet to be introduced in India. With images obtained through local partners and covering more than 150,000 km in ten cities, including Bengaluru, Chennai, Delhi, Mumbai, Hyderabad, Pune, Nashik, Vadodara, Ahmednagar, and Amritsar, Street View will be accessible on Google Maps. By the end of 2022, Google, Genesys International, a mapping and geospatial business, and Tech Mahindra hope to have more than 50 cities using the service.

ISRO Successfully Launched PSLV-C53/DS-EO Mission with 3 Satellites

On June 30, 2022, ISRO launches the PSLV-C53/DS-EO mission. PSLV-C53 is the second dedicated commercial mission of NewSpace India Limited (NSIL). Along with two other co-passenger satellites, it is intended to orbit the DS-EO satellite from Singapore. This is the 15th mission using the PSLV-Core Alone version and the 55th mission overall for PSLV. This launch marks the sixteenth PSLV launch from pad two. After the satellites have been separated, the mission aims to show how to use the launch vehicle's spent upper stage as a stabilised platform for research payloads. DS-EO, a 365 kg and NeuSAR, a 155 kg satellite both belonging to Singapore. The third satellite is a 2.8 kg Scoob-1 of Nanyang Technological University (NTU), Singapore.

Bentley Systems Announces Michael Campbell Joining as Chief Product Officer

Bentley Systems has announced that Michael Campbell has been appointed chief product officer and will lead more than 1,500 colleagues in the company's product advancement group. Campbell joins Bentley from product engineering software leader PTC Inc., where he has spent his whole career since earning his mechanical engineering degree from Boston University in 1995. He has had product leadership responsibility for PTC's mainstream design applications and for its IoT acquisitions, and most recently served as executive vice president and general manager for its augmented reality offerings.

Esri India Completes Transfer of the Majority Interest to Country MD

In order to comply with the government's new geospatial policy, the India branch of the international GIS technology supplier Esri has finished the process of transferring the majority interest to Agendra Kumar, its MD in the country. Esri India has begun providing international customers with GIS solutions from the Indian market. The guideline, which was revised last year, states that foreign companies working in the geospatial solutions industry may obtain such data from Indian enterprises' local servers.

Woolpert Selected by North Central Texas Council of Governments to Provide Orthoimagery

Woolpert has been contracted by the North Central Texas Council of Governments to provide orthoimagery, lidar, survey and value-added mapping services through its Spatial Data Cooperative Program. This is Woolpert's third consecutive, five-year geospatial contract with NCTCOG.

U.S. Army Signs Cooperative R&D Agreement (CRADA) With HawEye 360

HawkEye 360 Inc., the world's leading commercial provider of space-based radio frequency (RF) data and analytics, has announced its two-year Cooperative Research and Development Agreement (CRADA) with the U.S. Army Space and Missile Defense Command (SMDC). Under the CRADA, HawkEye 360 will develop and demonstrate new commercial overhead RF-sensing capabilities that could provide relevant tactical support for the warfighter. SMDC will assist in the testing of these capabilities in relevant exercises to evaluate the utility to the tactical warfighter.

Citility Collaborates With HERE to Promote Smart, Sustainable Living in India

HERE Technologies has announced that Citility, an integrated mobility platform in India, is leveraging HERE location services and application programming interface (APIs) for its solutions and products. Aimed at city authorities, governments, and transport agencies, Citility provides a holistic view of urban mobility by combining data from various sources to solve urban mobility challenges within cities. The Citility mobile application further analyzes multiple commute options and suggests the fastest, safest, and greenest routes for citizens. Now with HERE location services, the Citility mobile app has undergone a refresh to improve user experience by providing citizens with vital commute information such as precise Estimated Times of Arrival (ETA), the amount of time spent commuting, the amount of carbon emissions produced for each route, and even the number of calories one might burned on selected routes.

PRODUCT LAUNCH

June 16, 2022 - September 15, 2022

Trimble Introduces Next Generation High-Accuracy Mapping Solution for GIS Field Applications

Trimble has announced a new high-performance data collector for its Mapping and GIS portfolio—the Trimble® TDC650 handheld. Built for GIS data collection, inspection and asset management activities, the TDC650 provides users a rugged solution with scalable high-accuracy GNSS positioning for professional field workflows. The TDC650 is fully integrated with today's demanding GIS data environment, powered by the Trimble SDK that enables precision GNSS positioning for industry leading apps such as Esri® ArcGIS® Field Maps and Trimble TerraFlex™ software. The TDC650 is also a scalable solution that allows customers to choose their desired accuracy down to the centimeter-level to meet needs and budget requirements.

New Scanning and Imaging Solution from Trimble Simplifies 3D Deliverables

Trimble has introduced the new Trimble® X12 scanning system to the geospatial scanning portfolio. The X12 integrates intuitive Trimble software for precise data capture and in-field registration with state-of-the-art 3D laser scanning and imaging hardware technology from Zoller+Fröhlich (Z+F), combining the expertise of two industry leaders into a single solution.
The Trimble X12 can be operated by using Trimble Perspective field software installed on a Trimble T10x tablet to enable registration and refinement of scans in the field, ensuring project accuracy and completion before leaving the jobsite.

SimActive Releases Correlator3D Version 9.2 with Phase One IIQ Integration

SimActive and Phase One announce a strategic partnership. This collaborative effort has resulted in the new release of SimActive's Correlator3D Version 9.2, featuring several productivity enhancements that include the support of Phase One's Intelligent Image Quality (IIQ) format. Imagery can now be processed in Phase One's IIQ format, without going through an intermediate format. Working directly with the compressed files allows for much easier data management on large projects.

Leica Geosystems Launches New Safety Awareness Module in Leica ConX Cloud Solution

Leica Geosystems, part of Hexagon, has announced the launch of the new safety awareness module in the cloud-based collaboration platform Leica ConX. The integration of Leica Geosystems' safety awareness solutions with ConX increases safety on construction sites by collecting and visualising data that enhances awareness, speeds up hazard response and provides better insights.

Geneq Inc Announces the SXblue SMART, the Newest Addition to the GNSS Smart Antenna Line

Geneq Inc. has released the SXblue SMART to meet the requirements of accuracy and flexibility for fieldwork. The SXblue SMART features a GNSS engine capable of tracking all-in-view GNSS signals with high speed, saving time on the field. In addition, its mechanism and antenna design are at the forefront of interference mitigation technology and optimize its ability to handle a wide frequency band.

GEO EVENTS

September 19-22, 2022
EuroCarto 2022
Vienna, Austria
https://eurocarto2022.org/

September 27-28, 2022
One Day Photogrammetry
Potsdam, Germany
https://open-day-photogrammetry.de/de/

October 13, 2022
Pix4D Conference 2022
Denver, USA
https://www.pix4d.com/user-conference

October 18-20, 2022
Intergeo 2022
Essen, Germany
https://www.intergeo.de

November 7-9, 2022
Trimble Dimensions+
Las Vegas, USA
https://bit.ly/3IiYm5T

November 23-23, 2022
BIM World 2022
Munich
https://www.bim-world.de/

November 15-17, 2022
Geo Smart India 2022
Hyderabad, India
https://geosmartindia.net/

December 07-08, 2022
National Disaster Expo Asia 2022
Singapore
https://www.naturaldisastersshowasia.com/

February 13-15, 2023
GeoWeek 2023
Denver, CO, USA
https://www.geo-week.com/

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