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GIS RESOURCES

GEOSPATIAL TECHNOLOGIES IN FIRE PROTECTION INFRASTRUCTURE DEVELOPMENT

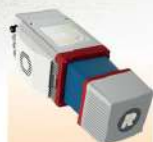
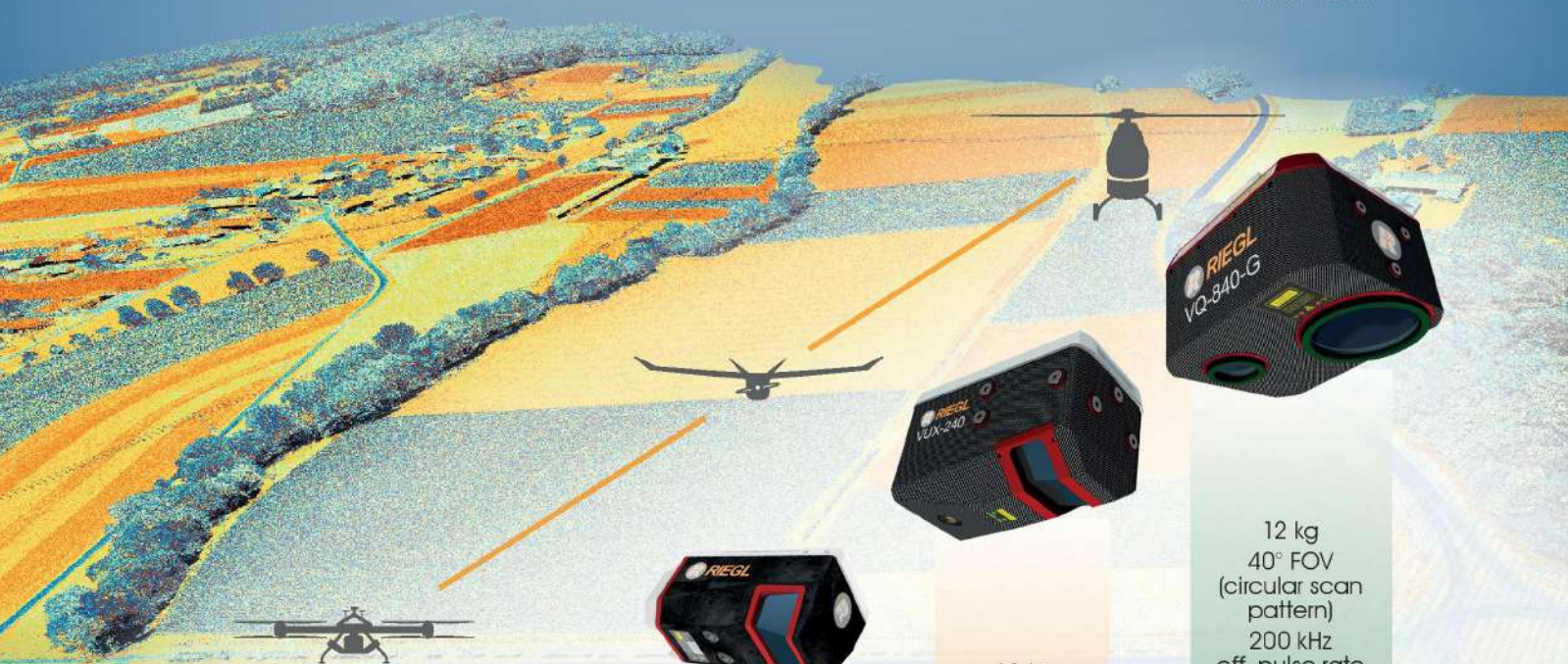
CHINA'S LEADING SURVEYOR
USES 3DREALITY CAPTURE
TO DELIVER A FIRE
SAFETY PLATFORM

HOW TECHNOLOGY AIDES TO
REDUCE THE DECISION
MAKING TIME IN
EMERGENCY SITUATIONS

LIFE-SAVING SOFTWARE
FOR EMERGENCY
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A vertical photograph on the left side of the page shows a firefighter in silhouette against a massive, intense fire. The firefighter is wearing a helmet and carrying a tank, holding a hose. The fire is bright orange and yellow, filling the background.

editor's note

Fire can be both a boon and a bane. As a boon, it is vital in supporting life. It is a bane when, out of control, it destroys life and property. More often than not, we hear about the adverse effects of fire. It is more in the news because of an electrical short circuit, leading to loss of life and livelihood. Climate change is also taking its toll in the form of huge forest fires, leading to loss of life and livelihood as well as the loss of vital habitat for flora and fauna.

Preparedness and prompt action is the only way to prevent any kind of loss due to fire. This is where the full gamut of GeospatialTechnology plays a vital role.

Satellite, aerial, and drone-based mapping combined with ground-based socio-economic surveys will provide the necessary data that will go into creating an information system that will be used to create hot spot scenarios of sites prone to fire incidences. Measures can then be taken to take preventive measures against fire incidents by establishing fire fighting infrastructure nearby as well as creating data-based Standard Operating Procedures (SOPs) for fire prevention, mitigation, evacuation, and rehabilitation in such areas. Continuous updating of data must be ensured to keep the information current and relevant.

Information Systems can be created that will monitor parameters that affect climate change over a region. High temperatures and drying forests are a perfect combination for fire. Hence how well a community can use Geospatial Technologies to generate risk scenarios will determine how well the community can manage to mitigate forest fire incidences in order to keep its forests from being consumed by fire.

Geospatial Technology can provide vital data and information to prevent and mitigate incidences of fire. Creating the necessary infrastructure, training, and ensuring its widespread adoption will make it more effective.

Ashok Prim
Editor

CHINA'S LEADING SURVEYOR USES 3D REALITY CAPTURE TO DELIVER A FIRE SAFETY PLATFORM

Data collected using NavVis technology can be used as a 3D visualization platform for online inspection.

by Bulent Yusuf



A Digital Inspection Platform For Fire Safety

Modern large-scale urban complexes in mainland China present a unique set of challenges. These sprawling clusters of residential and commercial buildings cover a large geographical area, with highly concentrated numbers of people, which can be dangerous if a fire breaks out.

Flames can spread quickly, making evacuation difficult and even harder for fire-fighters to bring the situation under control, resulting in heavy

casualties and property losses. To properly safeguard people's lives and property, regular fire safety inspections of these complexes are essential.

Challenge

China Resources Gas Group Limited, otherwise known as CR Gas, is one of the largest gas operators in China. Their activities are comprised of research and development, production, management, sales, after-sales service and solutions of gas supporting hardware and software.

About Author



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When conducting inspections in large urban complexes, their teams are required to make detailed checks on firefighting equipment, the condition of gas pipes and facilities throughout the complex, and self-certification records of property companies. CR Gas needed a smarter solution for gas supervision and management in terms of efficiency and accuracy.

Solution

NavVis Mapping Parter South Group was contracted by CR Gas to develop such a solution. Specialists from South Group use the NavVis M6 to collect high-quality point clouds and 360-degree panoramic images from each location at speed and scale. Thereafter, the data is uploaded to NavVis IndoorViewer to create an interactive digital twin of the site that's accessible through a web browser.

According to Lin Shanqiu, CR Gas Manager in Fuzhou, capital city of the Fujian province: "This is an advanced 3D inspection platform which improves efficiency and accuracy for our staff."

Regular scans of as-built conditions ensures that personnel can conduct accurate inspections according to the set patrol route, location, time, and necessary stops at key junctures. This digital inspection platform guarantees the safe, stable and reliable operation of gas pipelines, fire-fighting equipment, safety sensors, and more.

"This is an advanced 3D inspection platform which improves efficiency and accuracy for our staff."

Lin Shanqiu
CR Gas Manager

Results

CR Gas is conducting safety inspections at the Jinyuanshiji Exhibition Hotel in Minjiang, Fuzhou, China. Since June 2019, they have been regularly scanning a space of 6,000 square meters at regular intervals with the NavVis M6, so that inspectors are always working with the most current spatial data. They can also select and examine multiple data sets captured at earlier stages, to compare changes made to a site over time.

Risk Danger Warning

Large indoor complexes can connect safety sensors – e.g., smoke alarms, thermometers and barometers – to a custom solution built on top of NavVis IndoorViewer to better visualize safety supervision within the building. This enhances the aspect of prevention and control; the platform will monitor and automatically generate relevant alarm information, such as smoke detection and temperature spikes.



Figure 1: Jinyuanshiji Exhibition Hotel in Minjiang, Fuzhou, China. Data collected using NavVis M6.



Figure 2: Custom solution built on top of NavVis IndoorViewer to visualize safety supervision within the building.

Real-time Updates to Points of Interest (POI)

The inspectors only need to carry mobile devices to the scene to do a visual comparison with NavVis IndoorViewer. Upon visiting each POI in NavVis IndoorViewer, the relevant inspection forms and notes can be added to that POI. After inspection, personnel can upload photos and notes of their findings in real-time, providing immediate context and up-to-date information for the condition of the POI.

Emergency Exit Planning and Placement

Emergency exit routes can be set up and examined overhead in the 2D digital floorplan. The most appropriate exit route can be indicated (and revised) in the context of where the emergency might occur. In addition, the placement of security equipment like fire extinguishers and breathing apparatus can be optimized for deployment with maximum effectiveness. In this way, the inspectors will continually

Planning Inspection Routes in 2D and 3D

The panoramic images and point

cloud data from the NavVis M6 can recreate an inspection site in precise detail. Inspectors can browse the location in advance on any browser or mobile device – seamlessly switching between 2D digital floorplans and immersive 3D digital buildings – and plan the most efficient route in take in every POI like pipelines, pipeline valves, and key equipment and facilities. In the NavVis IndoorViewer instance, personnel can use the measurement tool to quickly acquire heights, widths and volume of a POI.

Integrated Maintenance Service Work

Another benefit of the digital inspection platform is how it has simplified inspection, repair and maintenance. For example, if the indoor pipeline, instrument, or sensor state is defective, the manager can create a POI and share it with the maintenance personnel.

Through one-click sharing via NavVis IndoorViewer, maintenance personnel can schedule a visit, knowing exactly where the problem is located and the work required, and make repairs on the spot.

Actionable Insights from 3D Visualization of Real Locations

Today, CR Gas has a complete workflow for the digitalization, visualization, and real-time management of pipelines and facilities, which effectively improves their ability to inspect and anticipate problems before they arise.

The last word goes to YeJing, project manager at South Group: “Nowadays, indoor spatial intelligence is the main area of development in the construction and hospitality industry, and NavVis can easily achieve 3D visualization of real locations to deliver actionable insights,” he says.

“Using NavVis technology to scan the indoor space of a large complex with dense pipelines and meters, we can record the real situation at the time of scanning,” Ye Jing continues.

“This can be used as a 3D visualization platform for online inspection; personnel equipped with a tablet can update the inspection information in the points of interest, and their efficiency is doubled.”



Figure 3: The panoramic images and point cloud data from the NavVis M6 can recreate an inspection site in precise detail.

LIFE-SAVING SOFTWARE FOR EMERGENCY DECISION MAKING

Drone Process and Savoie firefighters tested the OPS BOX workflow with Pix4Dreact to reduce the decision making time in emergency situations.

by Pix4D



FIR Unit and Savoie firefighters in the Savoie mountains testing the OPS BOX

The idea of the OPS BOX is to provide the tools to do the mapping fast, with accurate data and no internet connection necessary. The OPS BOX also monitors aeronautical radio frequencies to ensure the safety of drone flights in connection to the position of nearby planes. The project is in its final phase and has already been tested and used during real field operations and during training activities.

OPS BOX That Saves Time and Potentially Lives

The main objective of the project was to find a way to get rapid information from the field. "The problem with

online software is that you need the internet," says Bastien Alorent, Managing Director at SAS Drone Process and Principal Coordinator of the Rapid Intervention Force (FIR). "Usually we work on in-field operations where there is no internet and we can't wait several hours to get precise information. That's why we were interested in Pix4Dreact for the data processing part, because it doesn't require a lot of computing power but is able to produce fast and accurate results which we depend on."

The second objective was to reduce the weight and size of the command post, for which the FIR Unit normally

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uses a vehicle. "We thought of a new arrangement so that all our equipment (drone, accessories, information equipment, radio transmission equipment and applications) fits in a small suitcase," explains Bastien.

Testing the OPS BOX In-Field with Pix4Dreact

The team's project motto and guideline is "to order, you need to know, you need information." In order to get the information, the team had to choose the perfect tool not only for the data processing part but also for the data collection part.

"We have a lot of different drone models and we tested the images captured by our drones one by one," says Bastien. "We have done tests in all possible conditions: in the rain, snow, day, night, at temperatures above 40 degrees and below -20 degrees Celsius. Everything must work everywhere and at all times."

Operation Details: Special Partnership with Savoie Firefighters

Testing the OPS BOX in such extreme conditions is vitally important for the team, as they need to be able to trust their material to work with them in any scenario, however difficult. The range of work their OPS BOXs may be used for requires total coverage, from the Savoie in France to other harsh.

Because the FIR Unit was testing the OPS BOX with Pix4Dreact high in the mountains where navigation errors can be fatal, data accuracy was extremely important. "Pix4Dreact provides geographic coordinates (Latitude and Longitude), so we were able to send a second drone for surveillance," says Bastien.³ "We also managed to zoom in on the map to see the trail appear on the ground to guide our teams."

While there are many advantages of Pix4Dreact, the FIR unit specifically noted the use of importing an XML

file containing custom camera parameters. "Thanks to the possibility of modifying the database, we have succeeded in making all the drones in our unit compatible with Pix4Dreact," Bastien summarized.

Respond and Make Decisions Quickly

The operation with Savoie firefighters made it possible for the FIR unit to demonstrate their skills are useful during an emergency operation, even more so when teamed up with the correct software.

"The concept of the OPS BOX has helped to reduce the length of decision making in emergency situations, which is an essential

What is an OPS BOX?

OPS BOX is a mobile command post that allows the FIR Unit to obtain live video feedback from drones and to do on-site mapping during their operations in the field. This command post is meant to be used for event surveillance, forest fire reports and area observation.

point for any security or rescue operation," concludes Bastien.

"Pix4Dreact is the benchmark for emergency operational mapping. Using drones is good, but enhancing the information captured by a drone using Pix4D and GIS is even better." FIR Unit, Drone Process.



Figure 1: OPS BOX with the Pix4Dreact software.

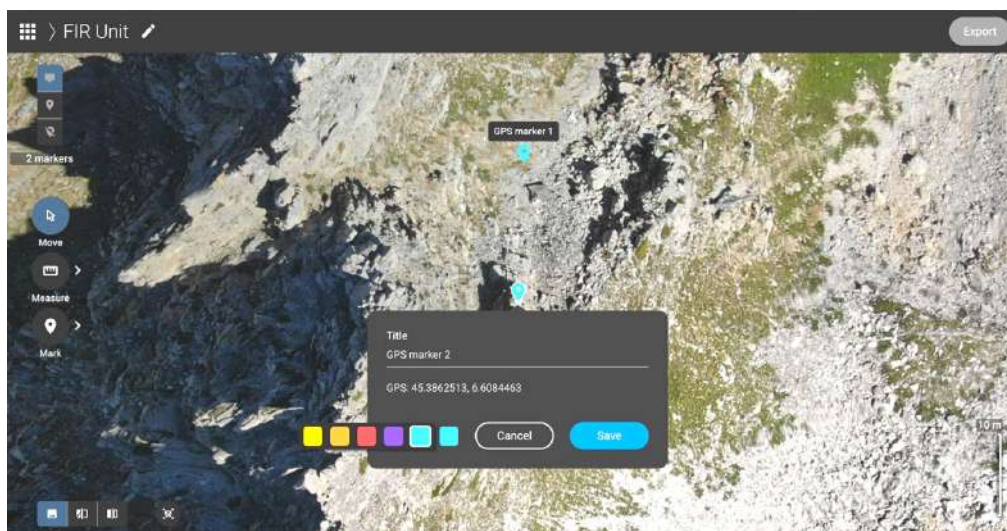


Figure 2: Adding GPS markers in Pix4Dreact. Check out the latest Pix4Dreact update for the new and improved look and feel of markers.

HOW TECHNOLOGY AIDES TO REDUCE THE DECISION MAKING TIME IN EMERGENCY SITUATIONS

Wildfires are a growing threat to humans, animals - and the climate as a whole. Predicting their spread may be the key to stopping them.

by Pix4D



A suburban living room is gutted after a fire. Image Credit: Pix4D

Wildfires generally left extreme devastation behind them. The effect of wildfires is both immediate, and long-lasting. Although wildfires are often a part of natural cycles that can encourage regrowth in the environment, the scale of wildfires across the globe over the past few years has been exacerbated by the climate emergency. When a wildfire devours an area where people live, a community will return to the space to try and rebuild. It is a difficult and dangerous process, where buildings may have been left damaged or unstable by the force of the fire. Returning people safely to their homes requires up-to-date information and precautions to be

followed beforehand.

The predication of wildfire spread and the mapping of devastation is very important for people to safely return to their homes.

The article talks about how Pix4D solutions in combination with other technologies can help to slow the spread of wildfires and mapping the devastation after the wildfires.

How to Slow the Spread of Wildfires

Most wildfire responses are reactive, with the focus on putting fires out. The Wildfire Aversion by Forecast and Early Response System (WAFERS) aspires to be something different.

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WAFERS hopes to not only halt the spread of on-going fires, but also provide a pro-active assessment of potential imminent fires.

The current wildfire prediction model has a number of time-consuming steps.

- Liaise with on-site firefighters about conditions, including vegetation and the team fighting the fire
- Fetch satellite imagery and retrieve weather forecasts
- Simulate a computer model with accurate physical qualities of the area's vegetation, topography, and weather conditions

The WAFERS system can generate an estimate of the fire spread within a matter of minutes. The WAFERS system consists of two parts: a custom-made smart-drone, equipped with both RGB and thermal cameras, and a computer algorithm.

The team chose to make their own drone both to control the inputs - and because as Mechanical Engineering undergraduates, they enjoyed the challenge. As well as collecting both RGB and thermal images, the drone records other data, such as longitude and latitude, and slope topography.

The WAFERS rotary drone is well-suited for shorter flights over rugged terrain, and while rotary drones have a shorter flight-time than a fixed-wing drone, they can take off from anywhere making them the better choice for a project such as WAFERS.

Once back on the ground, the images are uploaded into Pix4Dmapper photogrammetry software where a thermal map is generated to check for hotspots. This map is then fed to the WAFERS computer algorithm for evaluation.

When a fire is detected, the algorithm automatically runs the simulation to model the fire's spread pattern over time. The algorithm can also conduct a 'what-if analysis,' in order to assess a potential fire's damage, even before

it takes hold. All that's needed to estimate the wildfire spread pattern is a simple orthomosaic map of the area, made with the emergency mapping software Pix4Dreact.

Through the use of Pix4Dreact and Pix4Dmapper, the predicted wildfire spread can be projected onto the 3D model of the surveyed area - or the orthomosaic photo of the area - giving a visual representation of the potential wildfire before it occurs.

The next is communication: to firefighting teams, local authorities, and citizens. Wildfires are a stressful situation for firefighters too. The WAFERS team was sensitive to the needs of first responders, and have made every effort to simplify the process.

"The biggest challenge was to minimize the amount of inputs necessary to run the simulation, while still maintaining the accuracy needed to

allow firefighters to make decisive action, such as placing fire barriers, or digging trenches around the fires," says Abdulmohsen Aleissa, team lead WAFERS.

Like all projects, WAFERS needs to be tested and verified in the field. However, preliminary results are excellent. The team ran data from the Australian Grass Fire experiment through the WAFERS algorithm. The predicted results mapped closely to the actual fire.

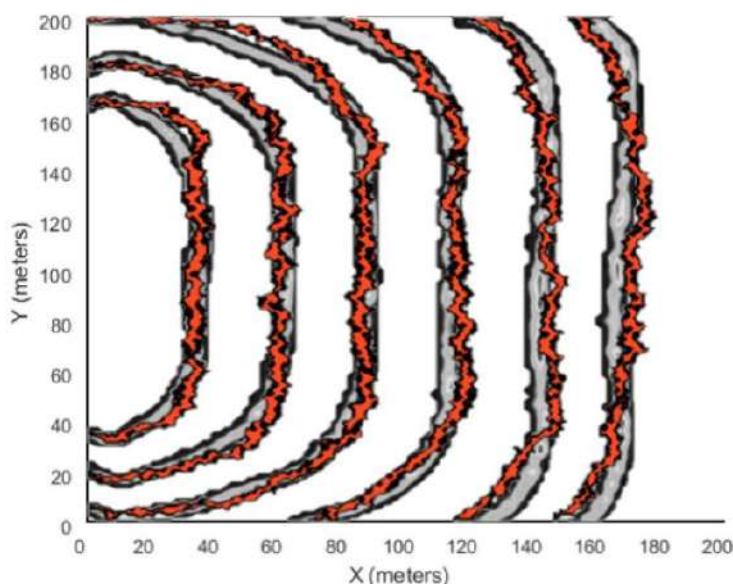


Figure 1: WAFERS' predicted wildfire spread pattern over time (orange perimeter) overlaid over the actual perimeter of the Australian Grass Fire experiment (Cheney P. et al. 2006).



Figure 2: Devastation after the fire surveyed with Pix4Dmapper | Image courtesy of Scholar Farms.

Mapping Devastation After the Wildfires (California 2020)

Following up after a fire is an important part of public safety work. Greg Crutsinger, a veteran of wildfire management and recovery, told Pix4D about his work with GeoAcuity in the California wildfires this year.

GeoAcuity provides spatial insight, analytics and mapping solutions in the USA. Their work includes helping environmental, municipal and federal government bodies in a variety of fields. Depending on their assignment they can either complete surveying projects on their own or help coordinate a group of people. They were called out to Boulder Creek by the local Sheriff to help with damage assessment before people moved back into the area. Crutsinger and his team coordinated members of the Alameda County Sheriff's Department who led an interagency task force of drone teams. Flying a variety of drones, the team used patrol maps as a bounce point or base to plan their movements.

Overcoming Obstacles in Mapping Wildfire Damage

Mapping 6,000 acres (24 square kilometers) is a big project. Crutsinger was supporting law enforcement drone teams in data processing and to provide expertise in mapping. Teams were deployed to different zones with the drone and planned missions. The Sheriff's department organized flying permissions and having enough drone pilots available to work together.

The terrain in this mission was very hilly with tall trees, including Californian Redwoods which are the tallest in the world, as well as urban structures. Real-time situational awareness was important for making decisions and establishing methods. This is where the fast-processing aspect of Pix4Dreact was most helpful. Crutsinger could load basic maps stitched together to his phone and assign them to different teams, sending teams out to collect data for

the next map. Once images were collected it could be processed in Pix4Dreact. The efficiency of this public safety response technique was very successful, as it provided quality control and documentation to keep the local authorities informed of exactly what had been achieved and what still needed to be surveyed. This way, teams could instantly be reassigned once they had completed an area because of the rapid processing and stitching in Pix4Dreact. The low cost and ease of use were combined with ultra rapid imagery processing.

The processing only took 10 to 15 minutes. The team could export a GeoTiff to overlay the maps so that

they could see what progress had been made and save time. This time-saving element was a priority for Crutsinger and GeoAcuity, as they wanted to ensure no one's time was wasted to provide the information for the recovery effort quickly. This meant a total turnaround time of 24 to 48 hours. Meeting this challenge meant Crutsinger was coordinating imagery for 12 and 15 teams at a time as they were flying drones to collect data as fast as possible.

"Damage assessment looks different every time. After 6 separate wildfire incidents, no fire has been the same and we have to adapt to each one." Dr Greg Crutsinger.



Figure 3: Planning the data collection assignments.



Figure 4: Crutsinger rapidly processing on his laptop.

How Photogrammetry Helps Recovery After the Fire

Using photogrammetry software for these missions saves authorities and residents time whilst also gathering more data. In the past, local teams would have to manually tag damaged homes, with little or no further information available for the community. Now, high-resolution drone imagery collected by these public safety teams can complement ground-based information.

Layers of data can be added as it is collected, making the process fast and up-to-date. This includes elements like property boundaries and annotations about what has been damaged. When compared with previous maps or records, these new maps provide a visual before/after of the entire event.

In this case, the final result was shared with the community after the mapping was complete. Pix4Dreact created a bridge between the pilots and the data team to efficiently plan, track and submit the final results to the agencies involved. The community could see what the fire had damaged and its path

clearly, which meant they understood where the most rebuilding would be required. GeoAcuity's outputs were also featured in a [Washington Post article](#) brilliantly explaining the escalation of wildfires in California.

It is also helpful for learning about the path of the fire, and how authorities can slow or prevent similar events in the future. Which fires may not be easily stopped, [helping slow or understand wildfires in California](#) is crucial as it can save

lives and infrastructure. Crutsinger and his team managed to deal with assessing the aftermath of this fire and provide the data in a quick turnaround of 48 hours. The data and information they gathered will be relied upon over the coming months and years as California adjusts to more extreme wildfire seasons.

The maps created by GeoAcuity are available online for the public.



Figure 5: The final map could be searched for specific addresses.

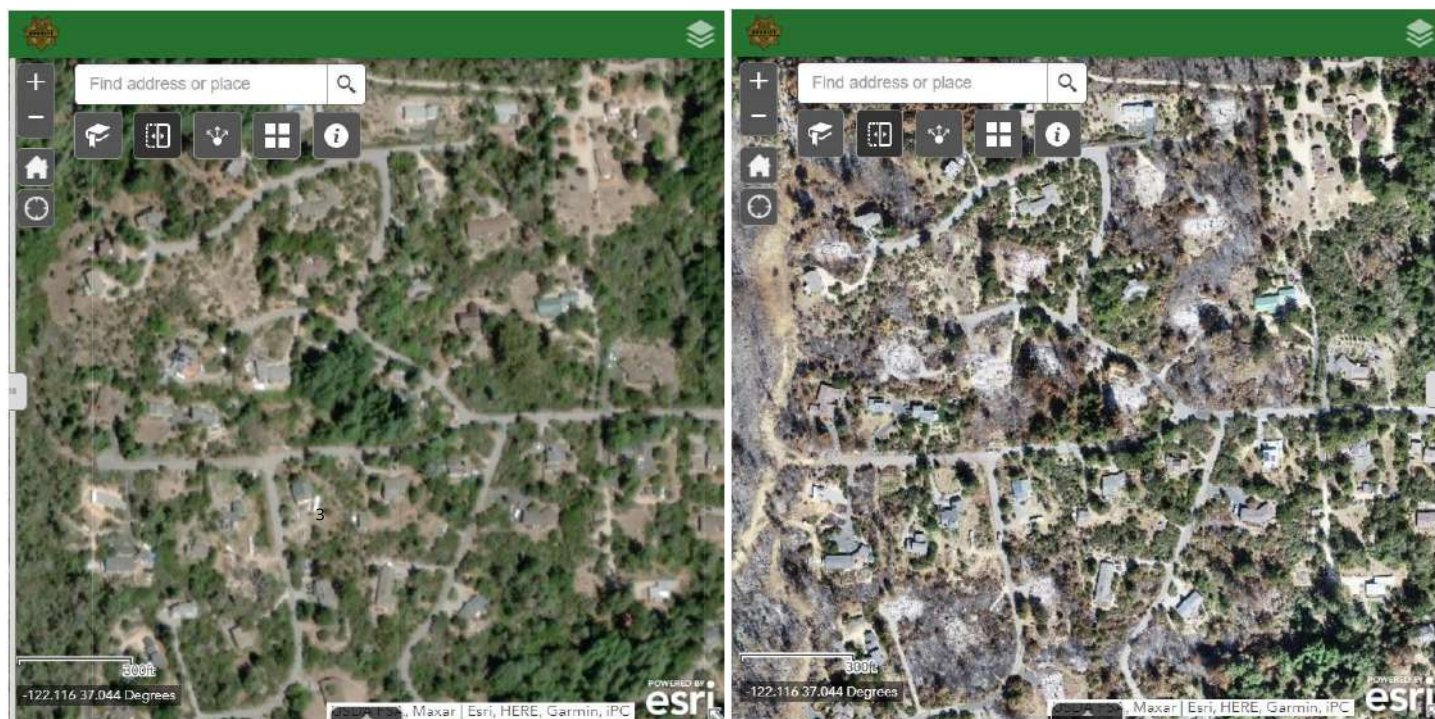
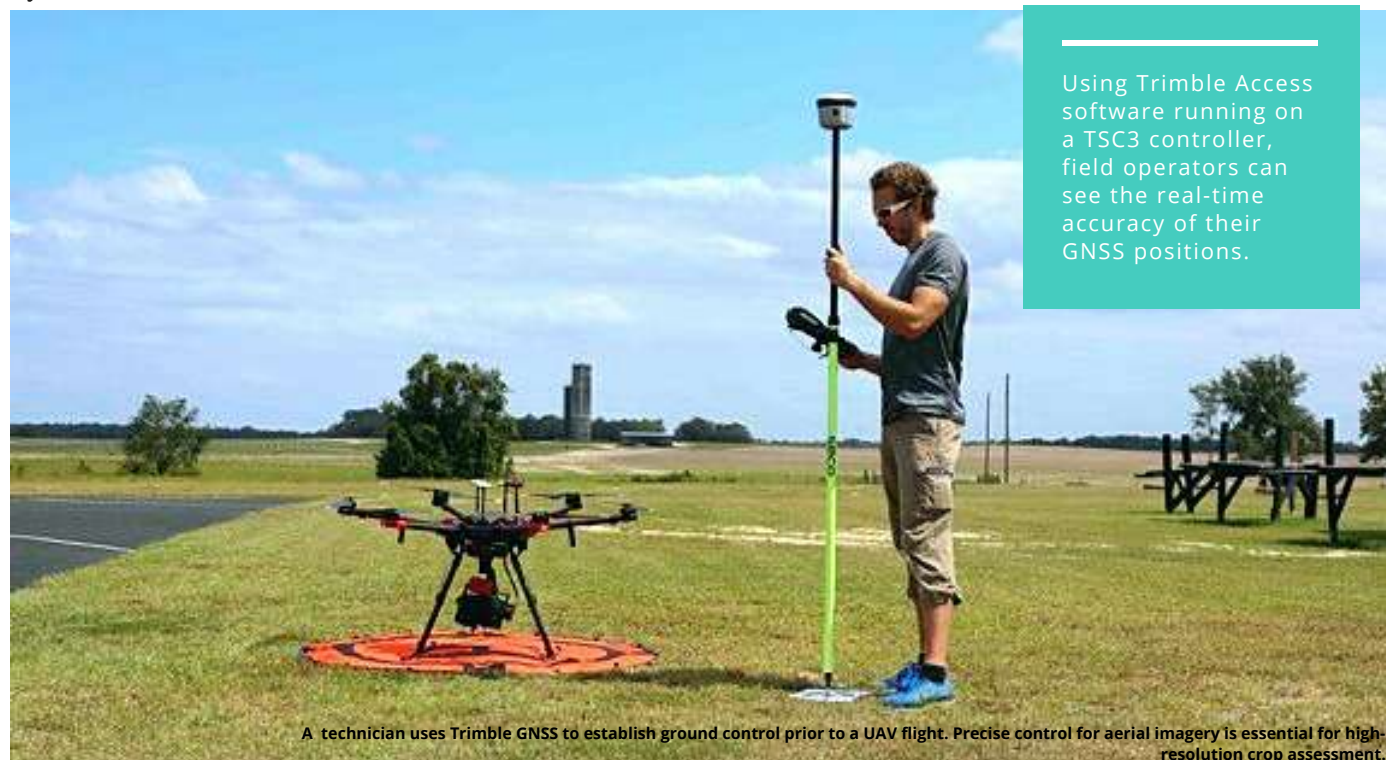


Figure 6: The before/after map generated by GeoAcuity used Pix4Dreact for the 'after' images.

GNSS HELPS ENSURE A BUMPER CROP

To produce the desired results, the aerial imaging system needs precise ground control points. Using GNSS receiver in conjunction with Trimble CenterPoint® RTX positioning service to establish survey-grade accuracy on the control marks.

by John Stenmark



As part of the effort to maintain and increase the world's food supply, agrochemical companies conduct ongoing research to develop and improve their products. An essential task is measuring the performance of crops treated with new additives. Once handled by technicians in the field examining individual plants, crop assessment is now implemented with uncrewed aerial vehicles (UAV). By using precise GNSS, researchers ensure high accuracy and productivity in collecting and processing the aerial data.

Precision Silver is a Florida-based start-up company providing specialized services for the

agriculture industry. The company is focused on automated ratings for agricultural research and provides plot- and plant-level analysis of test sites scattered across North America. Their clients include some of the world's largest agrochemical companies.

According to Precision Silver President Taylor Glenn, typical test sites (or "blocks") comprise multiple trial plots that are treated with differing levels of additives. Each plot is rated multiple times during a test period to quantify the additives' effects. Glenn said this work is often done manually using measuring sticks and clipboards. The tedious work requires skilled scientists to

About Author



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spend hours in the field collecting data; time that could be better spent on analysis and interpretation.

Glenn's company is replacing the in-field evaluations with aerial imagery and specialized software. Using customized UAVs, Precision Silver can obtain high-resolution imagery over the entire site in minutes. "With our system, we automate the process to magnify their productivity," he says. It provides sort of a 'superpower,' where they can be out there for a half hour, instead of all day. Precision Silver then processes the images to obtain more than 20 industry-standard ratings on crop performance on crop types ranging from broadacre crops such as wheat and barley to orchard products including fruit and nut trees.

Precise GNSS in Remote Locations

To produce the desired results, the aerial imaging system needs precise ground control points. Glenn uses a GNSS receiver in conjunction with Trimble CenterPoint® RTX positioning service to establish survey-grade accuracy on the control marks. Glenn often works in areas where RTK or VRS is not practical due to coverage or terrain issues, and appreciates the speed and flexibility of RTX, which provides accuracy better than 2 cm horizontal and 5 cm vertical.

Using Trimble Access software running on a TSC3 controller, field operators can see the real-time accuracy of their GNSS positions. "We like to get horizontal accuracy of 5 cm or better," Glenn said. "Having that kind of accuracy with a system we can ship across the country to different operators is great. They just need the system once when they start up their block; we use those same coordinates throughout the rest of the project."

Once a flight route is established, blocks may be reflight 10 to 20 times over a season. "We can do extraordinarily high-resolution images, up to 1 mm per pixel," Glenn said. "We can really see everything



Figure 1: Supported by precise GNSS, high-resolution imagery enables assessment from field level (top) down to individual wheat plants (bottom).

that's going on in the plots." The precise ground control ensures that the high-resolution imagery is accurately georeferenced and helps ensure reliable ratings over the season.

Glenn added that the local operators are often skilled agricultural scientists but have no background in GNSS positioning. The simplicity of RTX enables them to quickly establish accurate control

and then focus on crop assessment. "Our dealer helped us overcome our lack of deep background in surveying or GNSS," he said. "They helped us set up a very nice streamlined workflow that works reliably and gets the job done."

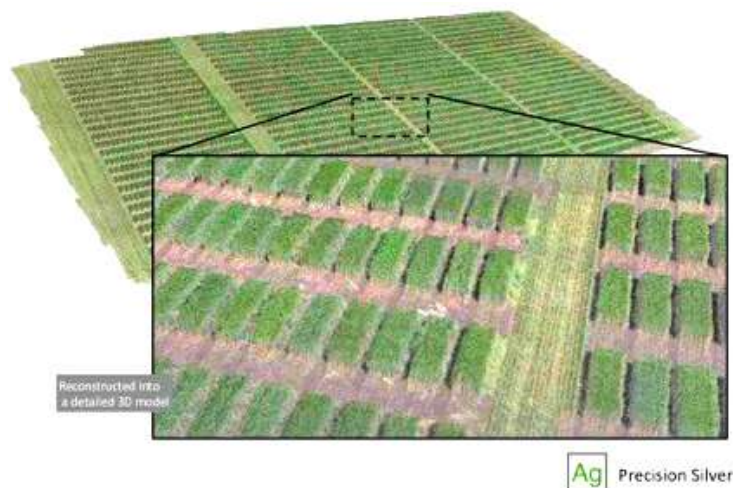


Figure 2: Accurate 3D models enable assessment of plant heights, elevation, and slopes in test plots.



Figure 3: Automated measured and rated per plot.

HOW TRIMBLE RTX WORKS

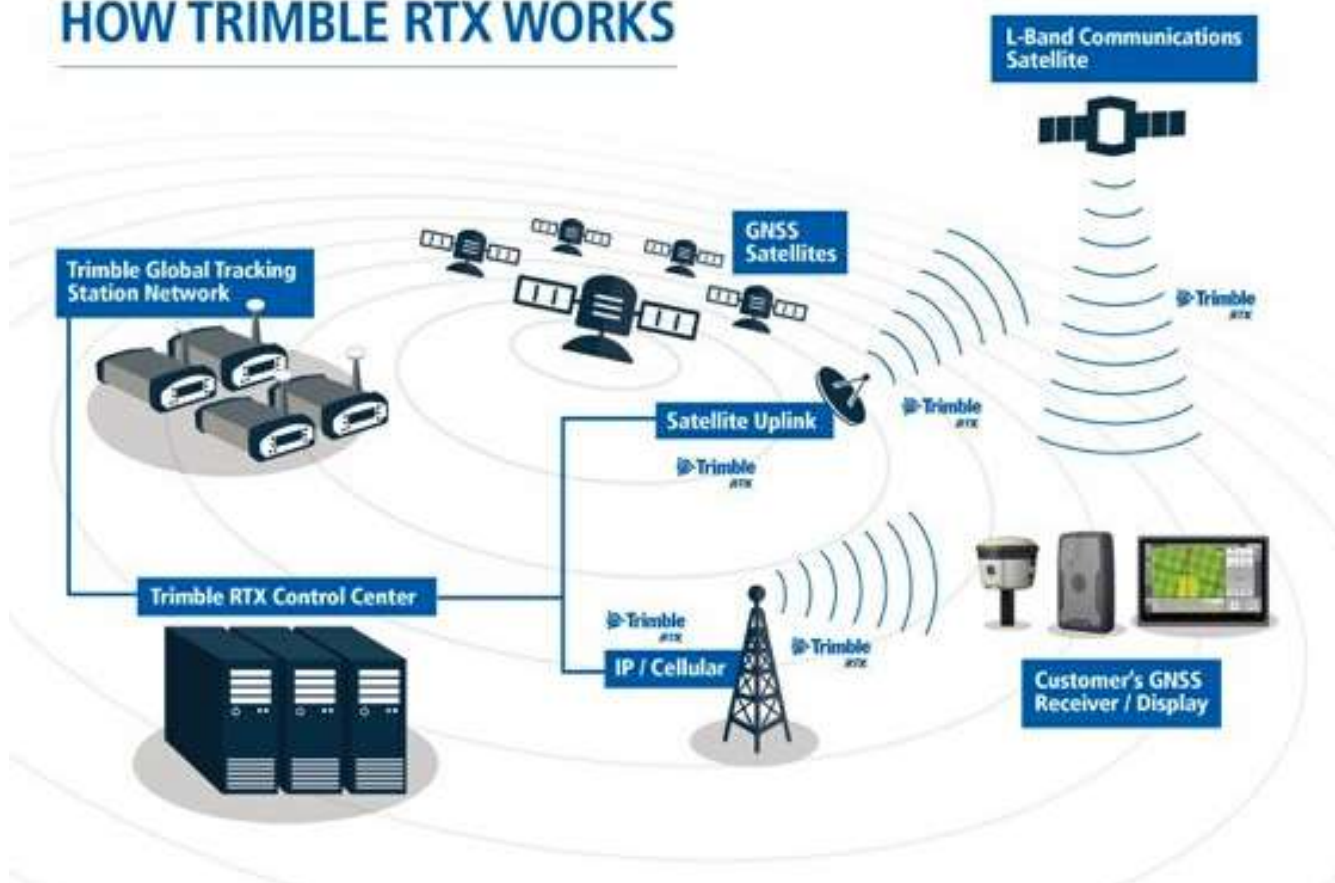
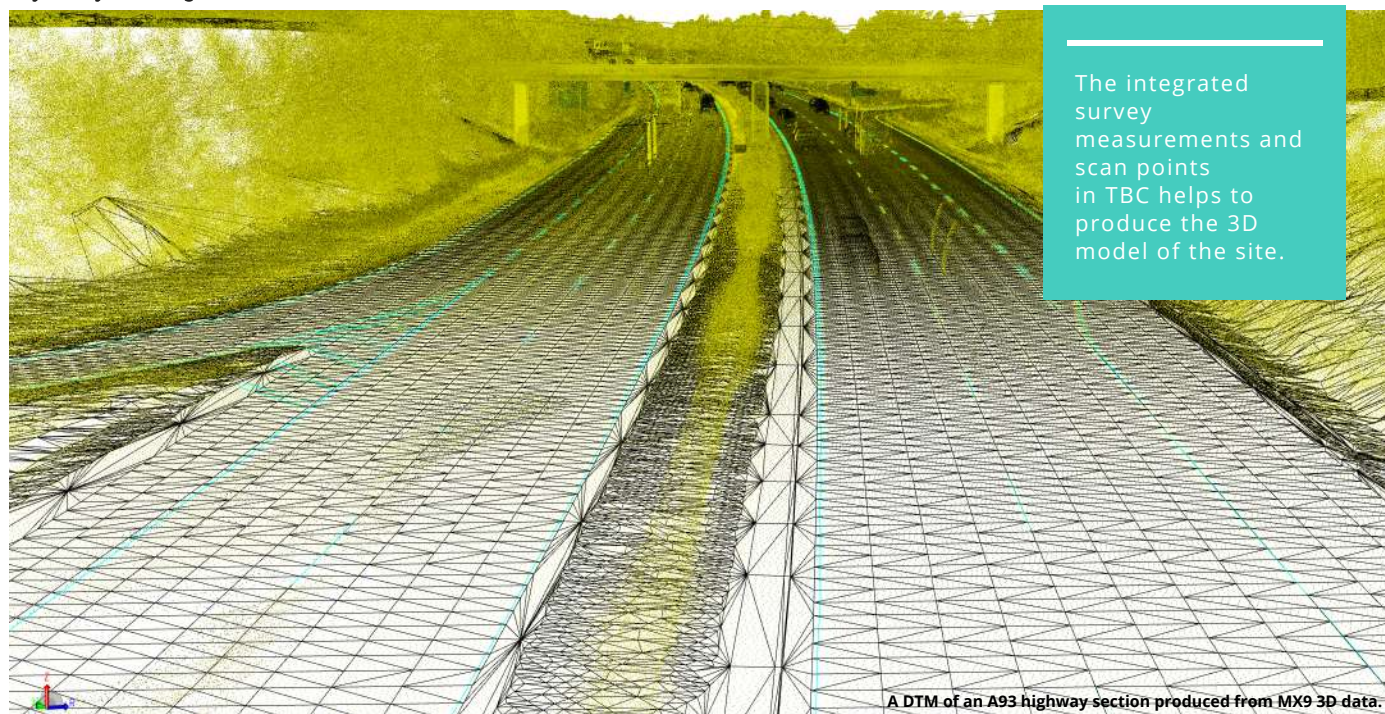


Figure 4: By delivering corrections via satellite, CenterPoint RTX enables easy and precise positioning without need for GNSS base stations or networks.

DRIVING DATA: SAFELY

A conventional surveyor would need about three weeks to measure a 50-km highway. With mobile mapping, can set ground control points, drive that highway, and process the 3D data in about a week.

by Mary Jo Wagner



A DTM of an A93 highway section produced from MX9 3D data.

When it comes to surveying for road construction projects, speed matters. Surveyors need speed to be efficient in the field and to reduce costs. But the speed of cars racing by matters too—particularly in Germany where there are no speed limits on some Autobahn sections. Here, surveying is not for the faint of heart.

International construction company Strabag AG is well versed in the complexities of collecting survey measurements along active highways.

“It can be quite unnerving to capture ground measurements when cars are racing past you at 150 km/hour,” says Thomas Gröninger, division manager of digitalization in Strabag’s office in Regensburg, Germany.

“Transport infrastructure projects challenge us to acquire precise field data as efficiently as possible while protecting our crews’ safety. Most conventional methods still require us to close roads or re-route traffic to work safely, which adds time and cost to projects. And it’s difficult to get permission to fly drones over highways. Ideally, we’ve needed a system that would allow us to be safely on the road.”

Enter mobile mapping.

Strabag viewed vehicle-mounted 3D mobile mapping technology as a promising solution to allow crews to work in traffic, giving them the tool to acquire centimeter-grade spatial data at highway speeds without sacrificing data quality or the crews’ welfare. Turns out, their view was correct.

About Author



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One year after first mounting its system on a minivan, the mobile spatial imaging technology has not only become a needed complement to its traditional survey instruments and unmanned aerial systems (UAS), it's helped Gröninger's division redefine the business of road and railway projects, discover new applications for mobile mapping and steadily drive them toward new opportunities.

The Case for Mobile Mapping

According to Gröninger, the case for acquiring mobile mapping technology crystalized in 2018. The company, which Gröninger says is one of the biggest construction companies in Europe and the leader in Infrastructure construction in Germany, had become increasingly focused on integrating building information modeling (BIM) into its roadway projects -- both by choice and by request -- which require frequent measurement updates for planning and for monitoring construction progress. Crews were not only challenged to collect that information on a weekly, and sometimes daily basis with their conventional survey methods, they were also at risk each time they returned to the roadway.

With its reputation for delivering complicated transport projects on time and on budget, Gröninger says they needed technology that would allow teams to keep up with the breakneck pace of their design/build assignments.

"Mobile mapping can be used to map everything in your path, enabling you to extract features and objects whenever you need them," he says. "All of the features are in the point cloud and imagery, so there's no need for follow-up visits or rework. Additionally, the technology enables you to collect data in traffic over long distances. A conventional surveyor, for example, would need about three weeks to measure a 50-km highway. With mobile mapping, we can set ground

control points, drive that highway and process the 3D data in about a week--the driving itself would only take two hours. It's a great tool for construction, as-built surveys and rapidly changing sites."

After testing a few options, Strabag purchased the Trimble MX9 mobile mapping solution, a field-to-finish system that combines high-

density laser scanning, a spherical camera for panoramic and multi-angle imagery, and a high-precision Applanix GNSS IMU component. All sensors are time synchronized with precise GNSS time tags and are linked to the trajectory that is recorded with the GNSS/IMU subsystem. This synchronization allows all recorded points and images to be properly aligned in a post-processing step.

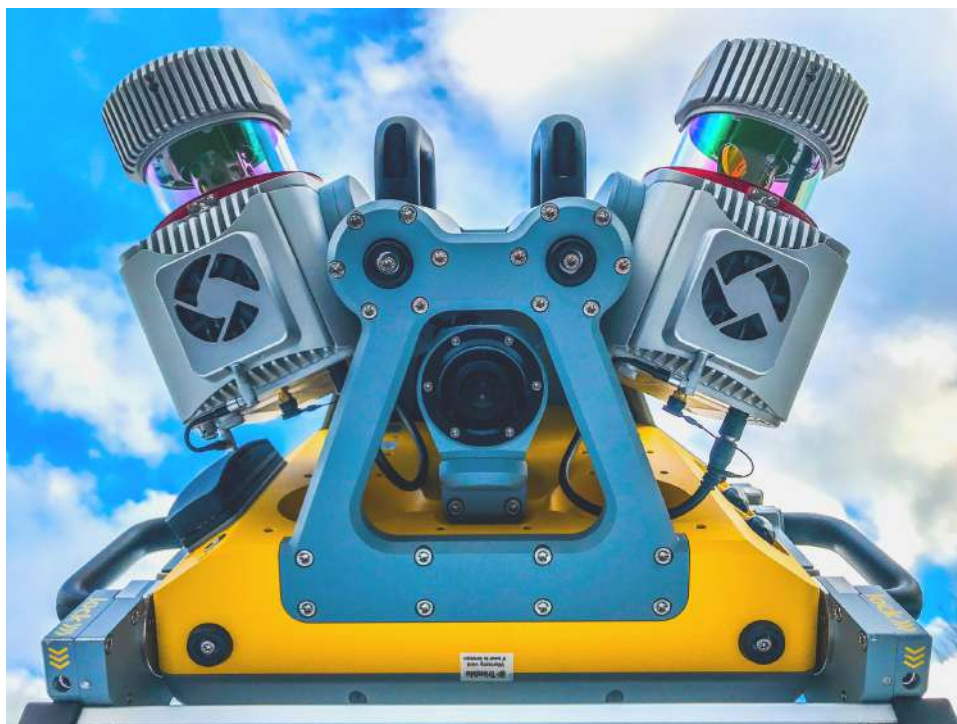


Figure 1: The butterfly configuration of the MX9's two lasers. The angles allow it to scan 'cross-wise' and capture features that might otherwise be blocked.

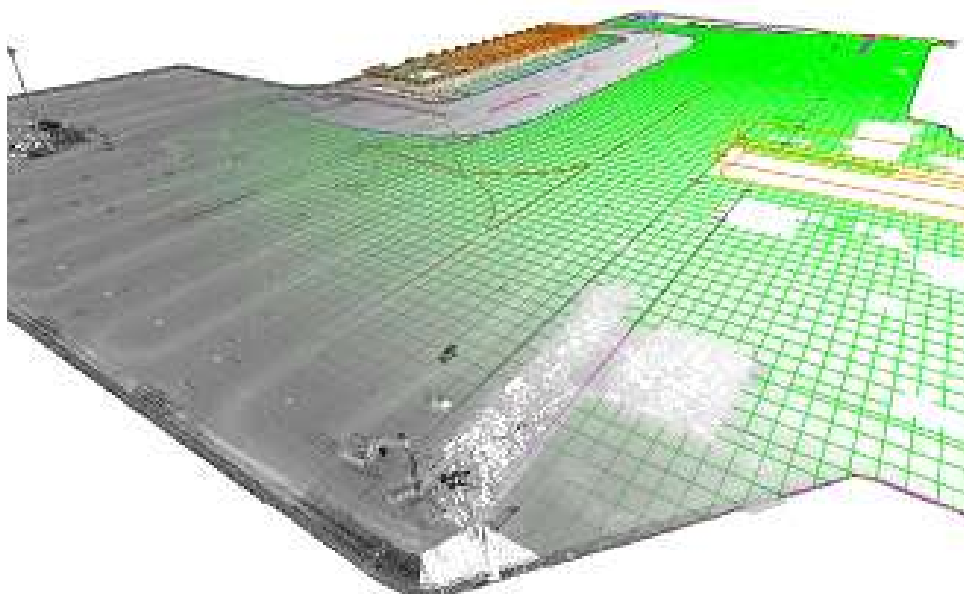


Figure 2: Final data of the Munich Airport extracted from the MX9 point cloud, showing the real-world view of the terminal's infrastructure, from the smallest concrete joint feature to the tallest light pole.

We trialed other systems that only offer one laser scanner,” Gröninger says. “If you drive 100 km/hr with one laser scanner, you get a less-dense point cloud, which makes it difficult to extract features like the edge of a curb. The MX9 provides two laser scanners that each capture one million points per second. That gives us an incredibly high-density point cloud. It’s also quite compact and lightweight, which makes it easier to set up.”

Since acquiring the MX9 in late 2018, the company has wasted little time in getting it on the road, establishing efficient workflows for collecting and processing the geospatial data and building its 3D mobile mapping business—both in responding to tenders and proactively creating work opportunities through demonstrating the technology’s capabilities.

Mapping the Highway

One of those educational opportunities came soon after Strabag began using the MX9. The Northern Bavaria Motorway Directorate (NBMD) was planning to renovate a highway near Regensburg; Gröninger’s division viewed this as a chance to show the public authority how a mobile mapping, multi-sensor approach could be of benefit in designing and constructing the new highway.

“Part of our job is to educate existing and new clients on what new technologies can do for them, and in particular, how multiple technologies can be integrated for surveying and design projects,” says Gröninger. “So we went to the Directorate and offered to map the highway segment planned for renovation using a mobile mapping system and UAS to show them the data and the benefits of the technologies.”

Intrigued, the NBMD launched a pilot project, tasking Strabag to scan and collect imagery of a section of the two-lane A93 highway and create a DTM with an absolute accuracy of 1.5 cm horizontal and 2 cm vertical.

Covering a 20-km stretch, they would also pair the 3D mapping data with UAS imagery that captured features 200 m either side of the highway.

To achieve the required data accuracy and quality, a field team used a Trimble SX10 scanning total station to survey and mark 120 ground control points (GCPs) to provide control for the mobile mapping. A traffic safety vehicle protected the ground crew as they marked and measured the GCPs with a transparent spray paint only visible to the MX9.

After the two-day GCP process, they were ready for the data-collection drive. With the MX9 mounted on their 2-m-high vehicle, the team drove the highway in two directions, with each trajectory totaling 10km. As they traveled the highway at 80 km/hr, the system scanned structural features such as break lines, pavement edge lines, road and building signs and road markings—any feature within 50 m of the side of the road—and captured panoramic and multi-angle photos every 5 meters. In two hours, they collected the entire point cloud of the 20-km section.



Figure 3: A section of the A93 highway combining vectorized break lines from the MX9 data and a DTM..



Figure 4: The MX9 3D mapping system sits ready to capture data at the Munich Airport.

A significant advantage of the MX9 is the so-called 'butterfly configuration' of its two lasers," says Gröninger. "That unique positioning enables them to scan 'cross-wise' and capture features that might otherwise be blocked. For example, if you're driving on the highway and a car passes, if we have only one scanner, then we'll have a shadow in the point cloud. But because the MX9 has two scanners, if one is blocked because a car passes, the other scanner will capture the points behind the car. It's perfect for optimizing data capture."

Back in the office, a team used Trimble Business Center (TBC) software to integrate the GCPs with the scanning points to process the 30GB point cloud. From the 3D view, they extracted a host of features such as break lines, pavement edge lines, markings, crash barriers and curbs and produced a more user-friendly vectorized dataset. In a final processing step, they created the centimeter-accurate DTM of the A93 highway, and then they delivered the vector dataset, the UAS images and the DTM to the NBMD.

"Many people think that they can only use one technology for a project, but that's not true," says Gröninger. "This project proved that you can combine mobile mapping with other technology to give clients a rich dataset. Having a 3D model of the highway can greatly assist the Directorate in designing the new roadway, and once construction is underway, mobile mapping will allow them to quickly and precisely acquire as-built data to support their progress."

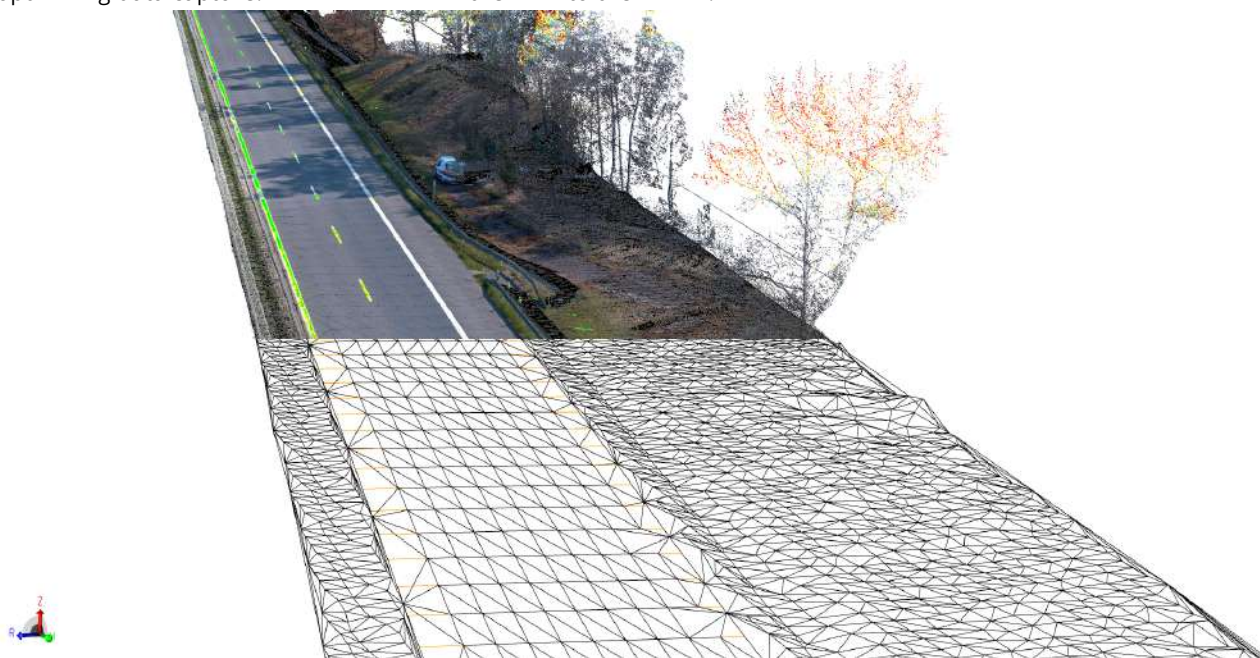


Figure 5: Image of the A93 highway along with a DTM.

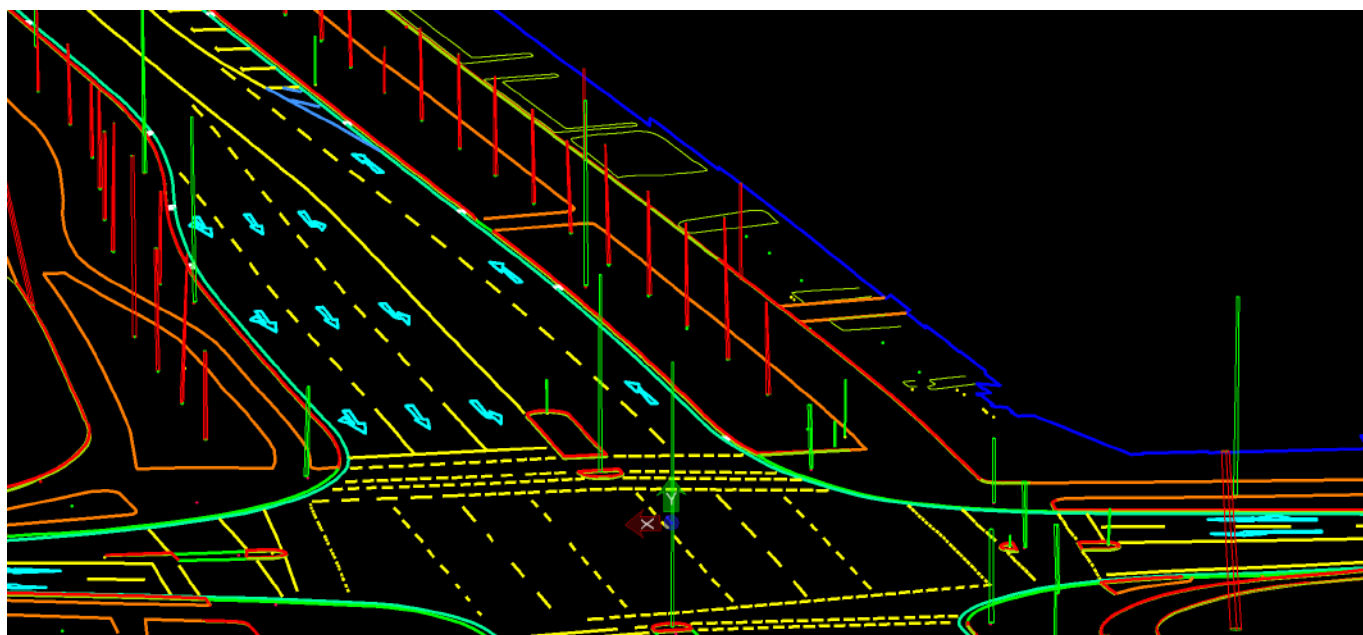


Figure 6: The Strabag team extracted a host of highway features from the MX9 point cloud including break lines, pavement edge lines, markings, crash barriers and curbs. This section shows vectorized laneway markings (yellow) as well as different curb break lines: lower edge, top edge, leading edge (green and red).

Carrying out this pilot project will also put Strabag in a strong position to respond to the NBMD when it issues the official tender for the A93.

Racking up kilometers

In addition to demo projects, Strabag has been putting on hundreds of kilometers on the MX9 with numerous other transport infrastructure projects both in and out of Germany. They've taken it to planned construction sites to capture 3D measurements of existing sites and for calculating quantities, they've scanned buildings, they've driven roads to produce DTMs of routes and buildings to support planning and BIM processes, and they've navigated railway lines with it.

Austrian transport company, Graz-Köflacher Bahn- und Busbetrieb (GKB), commissioned Strabag to use the MX9 to scan and measure a 51-km-long stretch of railway for a planned electrification of its route network in Styria, Austria.

To avoid disrupting rail operations, the point cloud needed to be collected at night. Mounted on to a special locomotive of the GKB, the system scanned all visible features, including those overhead along the track between Lieboch and Wies.

The data was again processed in TBC and the 3D dataset was provided to the GKB to help simplify and inform the planning and design of the new electrical infrastructure that is scheduled to go into operation by 2024.

"The ability of the MX9 to capture data at night gives us great flexibility for projects like railways where operations can't typically be stopped," says Gröninger. "And because it scans overhead, we can measure power lines, which are a very complicated to survey with a tachymeter."

Although one of Strabag's specialties has been road and rail infrastructure projects, mobile mapping has enabled them to successfully venture into new territories such as airports.

Gröninger's division has been on the ground floor of Munich Airport's Terminal 1 expansion project, a €455-million undertaking that will construct a new pier and create a 95,000-sq-m apron to accommodate six wide-bodied aircraft or twelve smaller aircraft.

Before construction could begin, the lead engineering company needed a precise survey to retain an accurate as-found map of the existing space and its structures before it was demolished.

The fieldwork began with setting out a network of GCPs across the 95,000-sq-m concrete apron and measuring them with the Trimble SX10. With ground control set, a team used the MX9 to scan the whole area of interest, capturing all the buildings, markings, lights, signage and concrete joints and seams in one hour.

They integrated the survey measurements and scanning points in TBC to produce the 3D model of the site, clearly showing the real-world view of the terminal's infrastructure, from the smallest concrete joint feature to the tallest light pole. The

point cloud provided the critical foundation for planning the massive construction project, the first phase of which began in July 2019.

"Surveying such a large site with conventional methods would've required several days of work and added cost," says Gröninger. "With mobile mapping, we collected all the needed field data in one hour. And there's no question about data quality or choosing which features to measure because every object is contained in the detailed point cloud. If the MX9 can see it, it captures it. That gives us a lot of confidence and security in the field, which is particularly important on highway projects and airports where revisits are difficult."

As pressures to cut field time and reduce costs are as common as survey tools themselves, technology that enables crews to be nimble and productive, and keeps them safe, is a smart approach. Mobile mapping has proven to be a clever choice for Strabag as it drives them toward a long highway of success.



Figure 7: The MX9 mobile mapping technology is an asset on railway projects because it can scan overhead power lines, which are complicated to survey with a tachymeter.

September 16, 2020 - December 15, 2020

BMW selects HERE and Cedar Electronics to Deliver Traffic Camera Information Service

HERE Technologies and Cedar Electronics has announced that BMW customers in the U.S. are the first to access a new connected vehicle service that alerts drivers of permanent and mobile traffic camera locations in advance. The service, BMW Traffic Camera Information, provides BMW owners with timely, relevant and accurate driving information. The alerts are powered by the HERE Safety Cameras product which identifies permanent traffic camera locations and the positions of mobile traffic cameras, based on automated sensor data from Cedar Electronics. The information is integrated on the HERE platform and delivered seamlessly to BMW vehicles with the service enabled.

Bentley Systems Expands Alliance with Microsoft to Accelerate Infrastructure Digital Twin Innovations

Bentley Systems and Microsoft Corp. has announced an expansion of a strategic alliance focused on advancing infrastructure for smart city urban planning and smart construction. The alliance will combine Microsoft's Azure IoT Digital Twins and Azure Maps with Bentley Systems' iTwins platform, enabling engineers, architects, constructors and city planners to work within a comprehensive city-scale digital twin, empowering better decision-making, optimizing operational efficiency, reducing costs and improving collaboration. Microsoft and Bentley Systems, a leader in engineering software for professionals to design, build, operate and maintain critical infrastructure such as road and rail networks, and public works and utilities, will collaborate to develop new smart city solutions. The companies will explore opportunities for digital twins in urban planning and citizen engagement for cities around the world. The collaboration will enable improved decision-making.

Bentley Systems Appoints Artem Avedian General Manager of Business Operations in Russia and the CIS

Bentley Systems, Incorporated the infrastructure engineering software company, has announced that it has appointed Artem Avedian as general manager of business operations in Russia and the Commonwealth of Independent States. In this role, he is responsible for Bentley's regional sales strategy and business growth development. Based in Moscow, Avedian reports to Mattias Hemmingsson, regional director for Nordic and Baltic countries, as well as Russia and the CIS.

Trimble and Boston Dynamics Announce Strategic Alliance to Extend the Use of Autonomous Robots in Construction

Trimble and Boston Dynamics has announced a strategic alliance to integrate a variety of construction data collection technologies with Boston Dynamics' Spot® robot platform. The jointly-developed solution will combine the Spot robot's autonomous mobility with Trimble's data collection sensors and field control software to enable automation of repetitive tasks such as site scans, surveying and progress monitoring, while taking advantage of the robot's unique capabilities to navigate dynamic and potentially unsafe environments. The relationship gives Trimble exclusivity to sell and support the Spot robot with integrated scanning, total station and GNSS technologies for the construction market.

Hexagon Strengthens its Industrial Lifecycle Management Capabilities with PAS Global Acquisition

Hexagon AB has announced the signing of an agreement to acquire PAS Global, LLC (PAS). PAS is a leading provider of Operational Technology (OT) integrity solutions used to prevent, detect, & remediate cyber threats, reduce process safety risks and enable trusted data for decision-making in asset-intensive industries like manufacturing, oil & gas, utilities and more. PAS has expanded its expertise to helping customers identify and reduce OT cybersecurity risks, ensuring OT integrity.

South Carolina Department of Transportation selects Hexagon for Safety Management System

South Carolina Department of Transportation (SCDOT) has selected Hexagon's Geospatial division to implement a transportation safety management system that will support the state's roadway safety programs and federal reporting requirements. The integrated system will allow SCDOT to leverage existing crash data from the South Carolina Department of Public Safety's databases for quicker and more accurate analysis. It will provide a data-driven environment to help transportation analysts and safety engineers identify high-risk locations based on crash rates, frequency, roadway characteristics and other criteria. The system will also support data collection and project identification for South Carolina's Highway Safety Improvement Program, which is critical to funding transportation safety programs.

Esri Releases Annual Update of Ready-to-Use US Census Bureau Data for ArcGIS Users

Esri, the global leader in location intelligence, has announced that ArcGIS software users now have easy access to the newest values for five-year estimates of current data on demographic, housing, and workforce characteristics of the US population. Through ArcGIS Living Atlas of the World, users can employ over 1,700 annually updated attributes of American Community Survey (ACS) tables from the US Census Bureau. The current five-year ACS data can be accessed in ArcGIS Pro and ArcGIS Online, Esri's configurable mobile apps and dashboards, and ArcGIS StoryMaps. All maps using these layers will automatically contain the newest ACS figures.

New RIEGL Office in UK Opened!

With the new office in York, England, RIEGL will now provide direct representation throughout the UK and Ireland, offering full support to its existing RIEGL customers and access to the full range of RIEGL products to new clients.

SimActive Develops New Workflow for Faster Processing of Large Projects

SimActive has announced a new workflow to accelerate processing of large projects.

These can comprise several tens of thousands of images, which can now be collected very quickly using today's commercial drones. The new workflow allows hardware resources to be managed dynamically, automatically adapting processes to PC specifics. It also handles input/output in a way that optimizes reading/writing of data.

SimActive Software Integrated in LiDAR Solution for Drones

SimActive has announced the integration of its Correlator3D™ product into LiDAR systems for drones developed by LiDAR USA. Possible configurations include two side-by-side cameras that allow matching the footprint of the LiDAR sensor, a particularly useful setup for corridor mapping. SimActive's Correlator3D™ software is used for automatically registering the imagery with the LiDAR data. Once a perfect alignment has been achieved, the point clouds are colored using the photos.

YellowScan Launches its New Updated Mapper Product Offering

ellowScan, a global leader in UAV LiDAR solution, has launched its updated Mapper product offer. The YellowScan Mapper sets a new standard for LiDAR scanning by integrating Livox's Horizon laser scanner into a solution benefiting from YellowScan's years of experience. The disruptive pricing and high performance of the Horizon scanner allows YellowScan to offer an integrated solution that lives up to its high standard of technical capabilities and customer support, at a price point affordable to a larger base of professional users.

Trimble to Support Team Rubicon for Disaster Relief and Recovery

Trimble has announced it is partnering with Team Rubicon, a nonprofit organization that mobilizes military veterans alongside first responders and community members to help communities prepare, respond and recover from disasters and humanitarian crises. As part of this support, on the recommendation of Trimble Foundation—a

donor-advised fund—a grant was made to Team Rubicon for its Ready Reserve Fund.

Trimble and Deloitte Collaborate to Deliver Innovative Cloud-Based Real Estate Management Solutions

Trimble has announced a collaboration with Deloitte as part of Trimble's Real Estate Global Alliance Program. This alliance brings together the technology and cloud hosting experience of Trimble's ManhattanONE business with the implementation experience and global footprint of Deloitte's Real Estate Transformation & Technology practice. Trimble's ManhattanONE™ software suite is a comprehensive Integrated Workplace Management System (IWMS) solution for centralizing key real estate functions and data analyses essential for optimizing real estate performance, improving decision-making and enhancing employee experience. With simple and flexible access to current and future software modules—across leasing, financials, space, projects, maintenance and sustainability—organizations can more easily manage the features and functionality they need as their real estate requirements evolve.

HERE Technologies Achieves AWS Public Safety & Disaster Response Competency

HERE, the location data and technology platform, has announced that it has achieved Amazon Web Services (AWS) Public Safety & Disaster Response (PSDR) Competency status. This designation recognizes that HERE delivers proven technology and deep expertise in location-based services to help customers leverage the power of AWS to protect the public and prepare, respond, and recover from natural or man-made emergencies and disasters. Achieving the AWS PSDR Competency differentiates HERE as an AWS Technology Partner that has demonstrated proven customer success developing technology focused on PSDR Data & Analytics. To receive the designation, AWS Partners must possess deep AWS expertise and design AWS Well-Architected solutions delivered seamlessly on AWS. AWS is enabling scalable, flexible, and cost-effective solutions from startups to global enterprises.

Velodyne LiDAR Announces Three-Year Sales Agreement with Baidu

Velodyne LiDAR, Inc. has announced a three-year sales agreement with Baidu for its Alpha Prime™ LiDAR sensors. The Alpha Prime LiDAR sensors will be utilized for autonomous applications. Velodyne's low-cost, high-scale manufacturing delivers attractive pricing for Baidu and its Apollo partners. Baidu and Baidu's Apollo program, an open-source autonomous vehicle software platform, selected the Alpha Prime for its range, resolution and field of view that collectively address the high-performance requirements for autonomous vehicles. Quality 3D LiDAR vision is a critical component for autonomous vehicles to accurately perceive the environment.

EOS Data Analytics to Launch a Satellite with Dragonfly Multispectral Imagers in 2022

EOS Data Analytics has announced the conclusion of an agreement with Dragonfly Aerospace for the delivery of two HR-250 high-performance multispectral imagers. A satellite equipped with the Dragonfly imagers will be launched into Low Earth Orbit (LEO) early in 2022. The side-by-side payloads will allow for the creation of wide-swath images in 7 spectral bands at close to 1m resolution. Multispectral images are critical for tracking environmental changes. They allow the monitoring of selected areas and the accurate detection of zones experiencing destructive human impact. This technology facilitates timely response to the smallest changes in land-use or land-cover and helps to prevent undesired outcomes both in a particular region and worldwide.

Aspectum and Planet Enter into a Partnership to Offer Powerful Analytics Paired With Robust Satellite Imagery

Aspectum and Planet have announced the formation of a strategic partnership to offer businesses turnkey change and object detection projects based on satellite imagery. From now on, Aspectum users are able to access customized maps that feature analytics and high-resolution data from Planet's constellations of satellites.

India-US Signed Basic Exchange and Cooperation Agreement for Geospatial Cooperation

In the third round of India-US two-plus dialogue both the countries signed the Basic Exchange and Cooperation Agreement (BECA) for geospatial cooperation. The Basic Exchange and Cooperation Agreement (BECA) will allow India to use US expertise on geospatial intelligence and to enhance military accuracy of automated hardware systems and weapons like cruise, ballistic missiles, and drones for pinpointed strikes on enemy targets. BECA is an important precursor to India acquiring armed unmanned aerial vehicles such as the Predator-B from the USA. Predator-B uses spatial data for accurate strikes on enemy targets.

Iranian Defense Ministry Unveils Military Geographic Products

The Iranian Defense Ministry unveiled new products and systems related to geographic data and information for military purposes. Defense Minister Brigadier General Amir Hatami inaugurated a geospatial unit developing small-scale digital maps. The minister also unveiled a location data management system called 'Samam'. The homegrown system is utilized for categorizing and managing the geospatial data for the military forces. In 2016, Iran began to sell a series of aerial topographic maps to a number of regional countries.

3D Laser Mapping Benefits Corridor Monitoring

RedTail LiDAR Systems recently partnered with an award-winning engineering firm to demonstrate the RTL-400 LiDAR system's high-resolution, high accuracy mapping capability. LiDAR technology is increasingly being used in everything from iPhone 12 virtual reality apps to self-driving automobiles. The technology – which provides 3D representations of areas – is increasingly being deployed on unmanned aerial vehicles for mapping purposes, including energy sector corridor monitoring, construction planning and environmental restoration.

Kochi Metro Rail Completes LiDAR Survey for Kochi Water Metro

Kochi, the commercial capital of Kerala is the second-largest city along India's western coastline, after Mumbai. The backwaters network of brackish lagoons and lakes lying parallel to the Arabian Sea coast (known as the Malabar Coast), as well as interconnected canals, rivers, and inlets, has tremendous opportunity to utilize as waterways in Kochi. The project "Integrated Water Transport System for the City of Kochi" has a total value of 819 crores. As a part of the Kochi Water Metro project, 15 routes have been identified. There will be Navigational buoys and night navigational assistance throughout the routes. KMRL is reviving six major canals in the city. An advanced LiDAR survey has been completed to prepare a detailed topographic map, a bathymetric survey, and to map the sub drains, which join the canals. Data has been collected for the study of Social Impact Assessment, and water quality studies.

MIT Develop Battery Free Underwater Navigation System

To navigate and track undersea objects like drones or whales, researchers rely on acoustic signals. Acoustic signals or sound waves travel faster and further underwater than through air, making them an efficient way to send data. MIT researchers have built a battery-free underwater navigation system dubbed Underwater Backscatter Localization (UBL). The system does not emit its own acoustic signals rather UBL reflects modulated signals from its environment. That provides researchers with positioning information, at net-zero energy. Though the technology is still developing, UBL could someday become a key tool for marine conservationists, climate scientists, and the U.S. Navy. In principle, the same technology as GPS could provide location information. In the underwater navigation system, an observation unit could emit a soundwave, then clock how long it takes that soundwave to reflect off the piezoelectric sensor and return to the observation unit. The elapsed time could be used to calculate the distance between the observer and the piezoelectric sensor. But in practice, timing such backscatter is complicated, because the ocean can be an echo chamber.

ISRO Launches EOS-01 and Nine Other Satellites

India's Polar Satellite Launch Vehicle (PSLV)-C49 launched from Satish Dhawan Space Centre in Sriharikota on 7th November 2020 at 15:12 hours (3:12 pm IST). PSLV-C49 rocket carried the all-weather earth imaging satellite EOS-01 from the Indian Space Research Organisation (ISRO) along with nine international satellites. After 15 minutes and 20 seconds, EOS-01 was successfully injected into its orbit. Subsequently, the other 9 satellites were successfully placed in their orbits. Nine international satellites are from Lithuania (1), Luxembourg (4), and the USA (4) were launched under a commercial arrangement with NewSpace India Limited (NSIL).

Startup EarthDefine Uses AI for Building Footprint Geocoding

EarthDefine, a provider of high-resolution geospatial spatial data that uses artificial intelligence (AI) to analyze aerial and LIDAR imagery, has announced the release of an updated building footprint database, which contains over 156 million footprints of commercial and residential structures across the continental United States. EarthDefine's latest update will allow insurers to identify with rooftop accuracy where structures fall within a parcel of land to improve risk rating, quoting accuracy, and claims response.

OSM Kerala Community Releases Local Body Boundary Map of Kerala

Recently OSM Kerala Community has released a free Local Body boundary map of Kerala. The data have map boundaries added for Corporations, Municipalities, and Gram Panchayat. As part of Kerala Open data initiative by Kerala IT Mission and OSM Kerala Community, plans to map roads and buildings in Kerala. In Kerala there are 1200 Local Self Government Institutions (LSGIs) which includes 941 are Grama Panchayats, 152 are Block Panchayats, 14 are District Panchayats and 87 are Municipalities & 6 Municipal Corporations. The open-source maps will be useful in visualizing and sharing geospatial or geographic data as an interactive map.

September 16, 2020 - December 15, 2020

Topcon Introduces GT-1200 and GT-600 Robotic Total Stations

Topcon Positioning has introduced new flagship GT Series robotic total stations. The GT-1200 and GT-600 total stations are available in multiple accuracy levels and are suitable for survey, construction, and machine control applications. The new total stations are part of a full Topcon GT Series workflow solution. This includes a new field computer (FC-6000), a full-version update to Topcon field and office software (MAGNET), as well as GNSS receivers (HiPer Series). The system is designed to work in sync for improved performance, better data handling with built-in, field-to-office connectivity, increase precision, reduce rework, and improve quality control.

Pix4D Launches New Ground Image Capture App for 3D Modeling With the iPad Pro and iPhone 12 Pro

Pix4Dcatch empowers users to easily create ground-based 3D models using an iOS mobile device. No need to be an expert, the user simply scans the area of interest with Pix4Dcatch. The app records pictures along with GPS positions. Compatible with recent iOS devices, but optimized for the newest iPad Pro and iPhone 12 Pro and Pro Max with LiDAR sensors, scanning is done with real-time 3D meshing for scene completion feedback. This process of giving live feedback enables a workflow that secures optimal results. Images are then automatically uploaded to Pix4Dcloud for a fast generation of scaled and georeferenced 3D models and points clouds that can be measured, shared and exported.

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Hexagon Releases Luciad 2020.1, Featuring Unique Dynamic Panoramic Imagery Capabilities

Hexagon's Geospatial division has launched Luciad 2020.1, a significant update to its platform for building advanced location intelligence and real-time, situational awareness applications. Luciad 2020.1 delivers immersive 3D experiences with 360° panoramic imagery support that can be combined with other 3D data layers, a unique capability in the geospatial application market. The latest release also features additional styling for 3D meshes and 3D data integration capabilities. Hexagon's Luciad portfolio allows developers to create powerful, high-performance applications that leverage data from any source for visualization and analysis in 2D and 3D. Combining static, dynamic and real-time data, including moving tracks, Luciad-powered applications support defense, aviation, infrastructure and other critical sectors.

Trimble Business Center Streamlines Point Cloud Workflows and Adds Vertical Applications Enabling Survey and Mapping Professionals to Maximize Productivity

Trimble has announced version 5.40 of Trimble® Business Center office software, which adds new automation and integrates additional data types to generate compelling deliverables. In addition, new subscription options also lower the point of entry—increasing the accessibility and scalability for survey, mapping and engineering businesses. Trimble Business Center 5.40 introduces eCogAI™ software library, a fusion of Trimble's eCognition technology and state-of-the-art Deep Learning AI, which automates the extraction of information from 3D point cloud data. The powerful new tools dramatically reduce the time to create CAD and GIS linework and objects that are used to generate topographic plans, surface models and GIS database layers.

GEO EVENTS

February 09 – 10, 2021

Geodesign Summit

Virtual

<https://bit.ly/3rxExRaoverview>

February 22 – 23, 2021

GeoPython 2021

Online

<https://2021.geopython.net/>

February 22 – 24, 2021

Esri Federal GIS Conference

Virtual

<https://bit.ly/3nTTJ8V>

March 24-25, 2021

Geo Connect Asia 2021

Singapore

<https://www.geoconnectasia.com/>

April 23-25, 2021

GISTAM 2021

Prague, Czech Republic

<http://www.gistam.org/>

May 19-20, 2021

GEO Business

London, UK

<https://www.geobusinessshow.com/>

July 4-10, 2021

XXIV ISRPRS Congress

Nice, France

<http://www.isprs2020-nice.com/>

August 24-27, 2021

FME International User Conference 2021

Vancouver, Canada

<https://www.safe.com/fmeuc/>

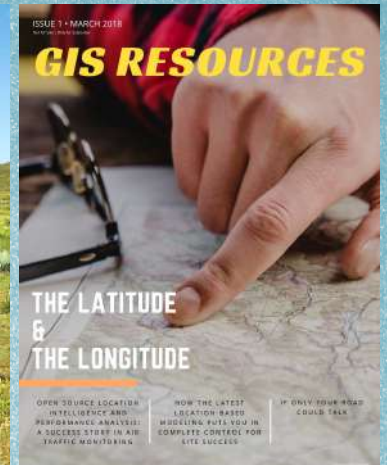
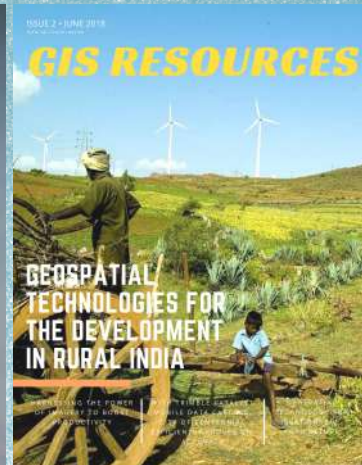
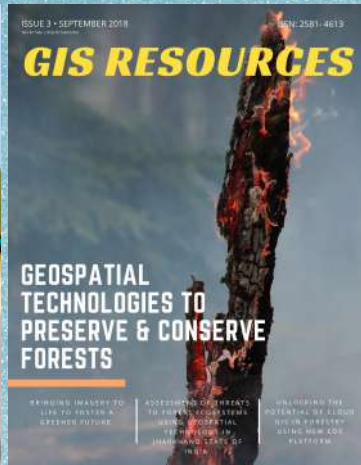
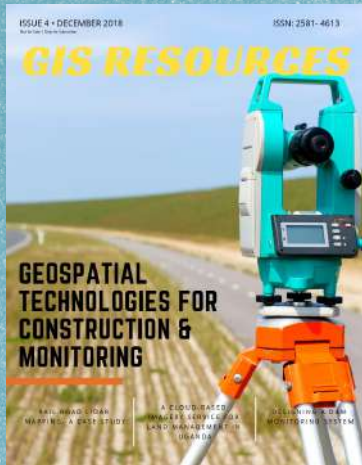
Leica Geosystems Introduces

TerrainMapper-2

Leica Geosystems has introduced the Leica TerrainMapper-2, the latest solution in the company's hybrid sensor road map that integrates LiDAR and image capture technology in airborne sensors and allows users to collect more data per flight. TerrainMapper-2 is a high-performance linear-mode LiDAR system with two integrated Leica MFC150 nadir cameras (RGB & NIR) featuring Leica Geosystems' unique mechanical forward motion compensation (FMC) that allows image capture in low-light conditions.

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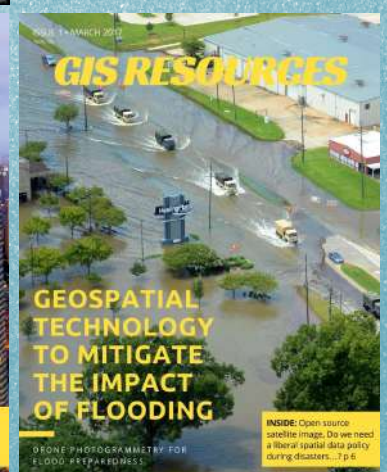
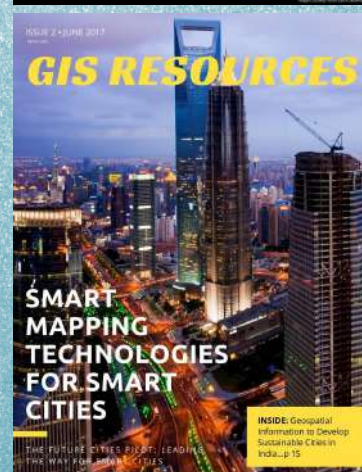
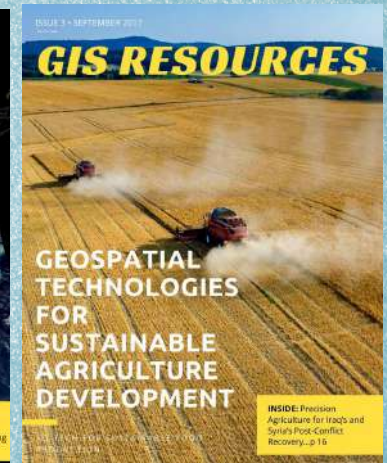
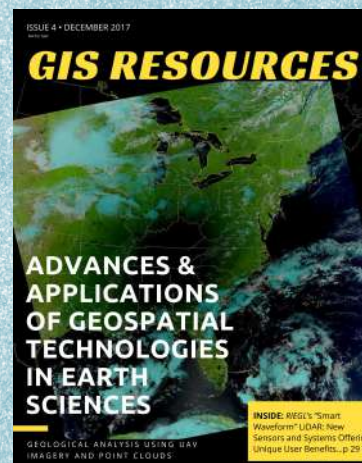
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