

Keeping a weather eye

by Fitzwilliam Scott

In the fast-paced and high-stakes world of ports and terminal operations, Tinamu is pioneering the realm of robotics and artificial intelligence (AI)-powered stockpile volumetric measurements. A spin-off from the Swiss Federal Institute of Technology in Zürich (ETH Zürich), the company has introduced a ground-breaking automation workflow that is changing how industries monitor stockpile inventory.

Traditionally, stockpile volume measurement has been a painstaking and error-prone manual task that has struggled to keep up with the fast-paced dynamics of the industry. The intricate process of handling cargo in ports and terminals necessitates numerous stages, from sampling and preparation to weighing and final verification — all susceptible to inaccuracies and inefficiencies.

Keeping accurate and up-to-date inventory records is a daily challenge. Weighbridges, conveyor scales, draught surveys, and the rest of the existing solutions have limitations and rarely deal effectively with the dynamics of ports, terminals, and warehouse operations.

Inspections cannot be done multiple times a week, the same holds for regular human-piloted drone missions, as both have a high incurred cost and long turnarounds to provide results. This means recency and confidence about the inventory are low, leading to logistical and operational inefficiencies. Plus, the lack of visibility leaves room for fraud.

Up from days down to hours

Tinamu's solution meant to change the game is an AI-powered autonomous drone system that captures high-resolution images of stockpiles, analyses the data, and delivers precise volumetric measurements to the user within a few hours.

Recently selected as one of the **TOP 100 Swiss Startups of 2023** (runner-up in the Robotics category), the company's technology combines autonomous indoor drone

navigation, cloud-based and AI-driven data processing, and a user-friendly platform to deliver periodic volume measurements of stockpiles with second to none precision.

As the drones gather data, the information is uploaded to the cloud, processed with AI, and then returned to the user via a web interface, visualised in easily digestible dashboards. These interfaces enable tracking of changes in material distribution, analysis of inventory trends over time, and provision of detailed inventory data for each stockpile surveyed, enhancing monitoring and logistics planning and maximising warehouse utilisation. Additionally, the technology enables early identification and resolution of discrepancies.

This innovation expands the limitations of traditional bulk inventory technology, like weighbridges and conveyor belts, and resolves issues associated with fixed sensors, including fine dust and blind spots.

Where traditional methods take days, Tinamu's system reduces this to hours. The platform ensures that from the moment the drones take flight, the collected data is swiftly processed and delivered to the client, maximising efficiency and reducing waiting time.

What the company has to offer stands out from other modern solutions due to its minimal capital expenditure during installation. Unlike alternative technologies such as laser imaging, detection and ranging, which necessitate the procurement and installation of numerous sensors and cables, Tinamu's system is devoid of any cumbersome physical installation processes. This efficiency elevates

its appeal to operators who want to apply a solution quickly, cost-effectively, and at scale.

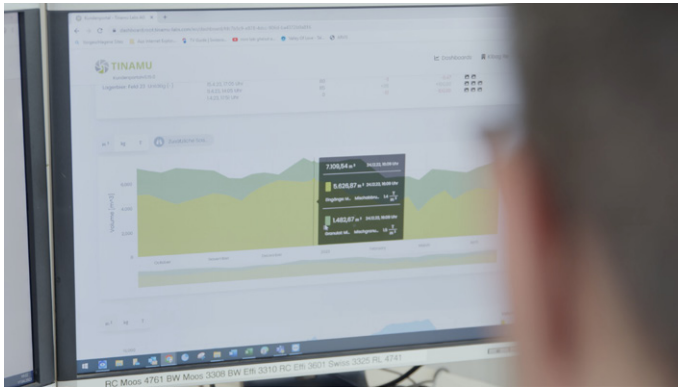
"I can't imagine our operations without it"

Customers have found that the ease of use, fast data turnaround, and increased accuracy of Tinamu's automated processes improve 24/7 visibility for end-to-end automatic monitoring and control over warehouse inventories. As a result, companies dealing with dry bulk cargo can leverage the solution to streamline their inventory management, enhance logistics planning, and increase operational efficiency.

KIBAG, one of Switzerland's largest building material leaders, is a case in point (**case video**). The company recycles a million tonnes of material each year to be transformed into gravel for construction. Consequently, it's highly dependent on reliable stock levels and needs to constantly monitor how much free space is available for storage; likewise, inventory for sale.

But like many in the industry, KIBAG was estimating these stockpile volumes visually, with reporting done manually in Excel. This procedure was both time-consuming and inaccurate, leading to planning and coordination issues that made the system totally unreliable.

Incorporating Tinamu's solutions into their operations led to a radical improvement in stockpile measurements and a significant boost in operational efficiency. Put simply, the technology inserted trust back into the system. "We push a button, the



drone automatically flies indoors, outdoors, and we get real-time stock data,” says Urs Fischer, Site Manager at KIBAG. “Now that we use Tinamu’s solution, I can’t imagine our operations without it,” he underscores.

Other prominent clients include global inspection companies, an international producer of minerals, and a recently signed deal with Axpo Tegra, Switzerland’s largest wood-fired power plant.

Tinamu also just signed in new clients and a pilot project with one of the world’s largest metal companies. As metals continue to be a vital resource for electrification efforts worldwide, the speed and accuracy of Tinamu’s system offer companies that ship and warehouse these materials a competitive advantage that can be deployed without a lengthy installation process.

Not only does the company’s technology deliver efficiency and accuracy, but it also contributes to a more sustainable world. By automating the process, human error, waste, and carbon emissions are significantly reduced, leading to better utilisation of resources and safer inspection methods.

Unlocking new possibilities

On 11 May 2023, Tinamu announced a technological partnership with the European drone manufacturer Parrot. This synergistic co-op provides a software layer to transform Parrot’s hardware into autonomous, self-navigating drones

capable of operating in challenging indoor environments, further amplifying the scope and impact of Tinamu’s solutions.

Seamlessly integrated into Tinamu’s indoor monitoring system, the Parrot ANAFI Ai’s robust features (such as 4G connectivity, reliable indoor mission execution, and obstacle avoidance) fit perfectly with Tinamu’s needs. The partnership unlocks new possibilities for service delivery thanks to the ability to upload custom autonomous missions. Tinamu’s proficiency in indoor autonomous flight sets it apart from competitors, and the company’s automation workflow now enables Parrot drones to provide reliable and precise measurements at the push of a button without the need for a pilot.

Tinamu’s innovative approach provides substantial relief for industries frequently constrained by personnel shortages. Beyond the advantages of accuracy, reliability, and error elimination, this highly advanced solution frees up inventory managers to allocate more time to qualitative and strategic activities, thereby enriching the overall operational ecosystem.

The company anticipates improvement in service delivery, enhancing safety, speed, and accuracy, which will substantially improve customer experience. Parrot also echoes these sentiments, marking automation as the future for scaling professional drone usage.

Pushing the boundaries

With an operational footprint in several European countries, including Switzerland, Belgium and France, Tinamu is rapidly expanding its reach. The company continually enhances its platform, keeping it ready for technological advancements and adapting to the industry’s changing needs. And its solution works for all types of dry bulk, including minerals, metals, grains, fertilisers, and aggregates.

Tinamu’s vision is to use autonomous drones as flexible sensors, capturing and automatically processing information in the field. Based on its existing volume measurement solution and platform, the company foresees the addition of new sensors and monitoring capabilities. By creating a new way to do periodic stockpile monitoring, Tinamu is pushing the boundaries of the supply chain for the better.



TINAMU

Tinamu, an ETH Zürich’s spin-off, develops a turnkey solution for drone-based inspection automation that consists of a dashboard that visualises relevant information, analytics software running on a secured cloud, and the drone system connected to a communication network. Real-time insights are directly delivered to the asset owners. Fly to tinamu.com to discover more.