

Pupil and BLK2GO Raise the Standard for Accurate Valuations of Real Estate

By Christopher Dollard | 11/09/2020

The mission: to transform global real estate, using industry-defining technology to document the world's interiors at a level of accuracy and consistency not seen before; to help provide greater transparency, more accurate valuations, and more efficient transactions; and to contribute towards building a greener industry.

“We believe the way people transact, occupy and engage with the built world can be completely overhauled and updated. And we’re making it happen through the application of accurate spatial datasets.”

This is an ambitious mission statement, and one that Pupil, a spatial data company based in London, proves one property at a time through its innovative technology and data capturing capabilities. Although it only officially launched Spec, its residential property marketing brand, in June 2019, Pupil itself is the result of five years of market research, product development and testing. It is currently the leading virtual tour provider in London for residential properties, and the international potential of the business is vast.

As well as convenience and efficiency for consumers, Pupil designed these tours to replace initial physical viewings with virtual ones, which reduces traffic and carbon emissions as fewer people travel to view unsuitable properties. And it's working. Pupil's virtual tours are viewed thousands of times a day by potential home buyers from all over the world. The tours are based on accurate 3D data from laser scanners, which also means that properties are properly measured and valued for transactions.



James D. Marshall

So, what's the next step in Pupil's journey and how can this wealth of property data be utilized?

“We want to create a digital twin of the built world,” said James D. Marshall, Founder and CEO of Pupil. “This will bring a wide variety of benefits, from increasingly accurate property valuations to more accurate mortgage and insurance quotes. Real estate is the most valuable asset class on the planet, and we know that the Leica BLK series of scanners democratized access to reality capture tools. We want to further that democratization by using those tools for every single property, whether residential or commercial, to improve the way they are transacted.”

Digitally documenting real estate at the speed of light

Oliver Breach, founder, chairman, and COO of PupilPupil's journey towards improving the transaction of properties through better and more accurate data is a complex one, but they did their homework. “During our initial market research, we found alarming inaccuracies in the existing measurements and floor plans,” said Oliver Breach, Founder and Chairman of Pupil. “We produced a comprehensive study which highlighted how widespread this problem is. It means that valuations of residential property, particularly in populous cities where space is at a premium, are being based on almost exclusively unreliable data. The use of more sophisticated laser scanning, coupled with Pupil's industry defining technology, to measure every property will drastically improve the quality, consistency and transparency of data informing property markets worldwide.”



Oliver Breach

The BLK360 added an all-in-one imaging LiDAR system to Pupil's capture ecosystem, and the data gained from it helped to establish, grow and refine the Spec product offering to real estate agents and property owners. It provides far more accurate measurements and a quicker process of capturing.



David Mullett

David Mullett, Founder and Chief Design Officer, expands on this. “We identified the BLK360 as the hardware we needed to launch our product to the market, but we always knew that the key to achieving our mission at scale would be a device that could improve our efficiency and deliver the captures at speed. That is what made the BLK2GO so exciting.”

If the BLK360 helped Spec take off, the BLK2GO is really pushing the limits of speed and accuracy. Pupil is one of the first and largest adopters of the BLK2GO, which is a huge leap forward in reducing the time spent on each capture when using the handheld scanner. Compared to traditional survey and as-built firms that could take weeks to create models and floor plans, Pupil's capture process of a property now takes mere minutes. At a cost of less than £100 for a typical property in London, its algorithms deliver the end product within 24 hours to the customer.

The BLK2GO is a significant step forward for Spec, and the transition is a natural one that enables scalability going forward. “We have a massive challenge to map the built world,” Oliver said, “but the speed we've gained is a game changer.”

For residential real estate, Spec's premise is simple: it provides professional photographs, a virtual tour and a “Spec Verified” floor plan for each property, all from one visit from a Digital Surveyor. Spec offers this at a lower cost than traditional providers, but its accuracy, technology and processes are really what set it apart from the competition. Once the capture is complete, AI algorithms in the cloud automatically generate precise dimensional data and a digital twin. This provides real estate agents and property owners with the most accurate possible documentation of a property.

Spec Verified floor plans start with gathering millions of raw data points from the property with the laser scanner. These data points are then run through Pupil's AI system in the cloud to produce a floor plan with an accuracy of 99% of a property's true size—a significant >improvement on traditional techniques that produce inconsistent and inaccurate measurements. In addition, Spec provides high-resolution virtual tours of properties which enable house hunters to take a digital walkthrough of a potential home from the comfort of their sofa.

“Our vision has always been to become the industry standard for property measurement globally,” James added. “The BLK2GO's efficiency combined with our business model makes realizing this vision possible.”

Digital Surveyors on electric mopeds capture London's properties with the BLK2GO

To see just how much the BLK2GO has sped up Pupil's entire process, we checked in with Abdul Rouf, one of Spec's Digital Surveyors, who has been with the company for two years and seen first-hand the various stages of the company's development. He is part of a rapidly expanding team that travels all around London on electric mopeds to capture properties.

“Our routes between each property are optimized and planned in advance to make sure we are as efficient as possible. Using mopeds makes it much quicker,” Abdul said, explaining how his entire hardware setup fits in a regular sized backpack.

“We arrive at the property, assemble our camera to capture the photospheres and reference photos, and then we scan for measurements.” He can be in and out of the capture of an 800 square foot apartment within 30 minutes with all the necessary scans, photos, and data. But with the BLK2GO, he can scan the entire apartment within about 5 minutes, leaving him about 25 minutes to do the rest of his work. “That data is then uploaded to the cloud remotely via Pupil's proprietary Vertex app,” Abdul said, “where Pupil's machine learning algorithms take over.”

What about people who might live in the apartment when Abdul comes to scan? “Sometimes they're curious about the processes,” he said, “such as why we need to open all the cupboards when we're scanning, so we have to explain that's how we get the most accurate data possible.” This underpins the work that Spec does with the BLK2GO: capturing every dimension of a property through millions of points of measurement.

Abdul typically has five jobs per day, and when you consider the number of digital surveyors Pupil sends into the world every day to capture data, that's a lot of data about a lot of properties. This process enables Pupil to fully document a property's interior and supply a massive level of information about it, the precision of which will change how properties are valued and transacted around the world.

The speed at which properties can now be captured is a huge boost to the business. “It is just insane,” Abdul said, smiling. “With tripod-based scanners, it might take an hour, hour and a half to scan a whole house. With a BLK2GO, I can scan the same house in about 10 to 15 minutes. This significantly increases the volume of captures we can take on now that we have this device. And we will soon be moving to six, seven, and even eight per day.”

Pupil collating the vast quantities of data needed to improve machine learning

With Pupil's mission and surveying work in mind, we wanted to know more about an integral part of laser scanning: the data and how it is used. We spoke to Divia Bhatnagar, Director of Technology at Pupil.

“What the BLK2GO does for us is provide data transparency through exact measurements that we can deliver to the property industry at scale,” Divia said, and brought up a simple comparison.

“Imagine buying a car. You know everything about the car before you buy it, right? You even get a user manual that tells you everything, inside and out,” she said, noting that buying a home is much more of a life-changing purchase.

“But think about a property,” Divia said. “How much do you really know about the entire structure and space of an apartment or house before you buy it? Using LiDAR and the BLK2GO helps Spec unlock those missing data insights about these properties. So, the spec for a car is the manual, and we are providing the Spec for properties with our data insights.”



One of the most important factors for Divia and her team is the quantity and variance of the data collected, as this helps to develop Pupil's machine learning models. While much of Pupil's data has been focused on 2- and 3-bedroom apartments so far, capturing larger properties of varying shapes and sizes is necessary and highly informative.

“The BLK2GO is wonderful because of the speed it adds without losing the accuracy of the BLK360,” Divia said. Pupil's workflow was able to adapt right away to the BLK2GO given the accuracy requirements, but the ability to capture so many more properties per day gives Pupil another advantage.

“We need large amounts and variances of data to feed into our machine learning models,” Divia said, “so being able to capture huge houses as well as smaller apartments in a much shorter time frame will really speed up this process.”

The variance in structures captured is important for one of Pupil's key projects: computer vision. The engineering team gets raw BLK2GO point clouds that are usually single datasets (not multiple scans needing registration). This helps Divia's team work faster towards producing measurements and models that are Spec Verified, the standard that consumers deserve. The different types and sizes of raw point clouds help Pupil's machine learning models build computer vision.

“Think about biological vision,” Divia said. “You walk into a room and you can already classify everything in that room. You know a chair is a chair, a window is a window, and you know different types of chairs and windows, and this happens very quickly.” Divia explained that it is a huge project for computers to fully understand a spatial environment, one that her team has secured two highly competitive UK government grants to help them achieve. “This process, and the hardware we use, helps us to progress into having groundbreaking computer vision to understand these spatial relations and to achieve scene understanding.”

Divia explained two components of scene understanding: semantic segmentation and instance level segmentation. “Semantic segmentation is understanding chairs in a room, so we can classify what they are. Instance level is classifying the difference between two chairs.” All of that contributes to scene understanding, a vital functionality for Pupil.

“The data gained from the BLK2GO is key because we feed that into our machine learning models and algorithms so the computers can understand different types of similar objects, and the more data we feed it, the quicker the machines learn. We're advancing towards having a computer understand everything in a room and know its associated position to unlock a lot of insights about a space.”