

A terrestrial LiDAR image taken by Geomog at St-Georges de Beauce, in Quebec, Canada. Point Cloud processed in VisionLiDAR.

# LiDAR Technology: Future of Land Surveying

**E**xperts based throughout Quebec offer their opinion regarding the use of a new technology that is revolutionising land surveying, LiDAR.

LiDAR, also known as Light Detection and Ranging which allows terrestrial, airborne, or mobile scanning, and provides detailed digital terrain models and also records landscapes in

3D. Surveys generate data that can be analyzed in software like VisionLiDAR.

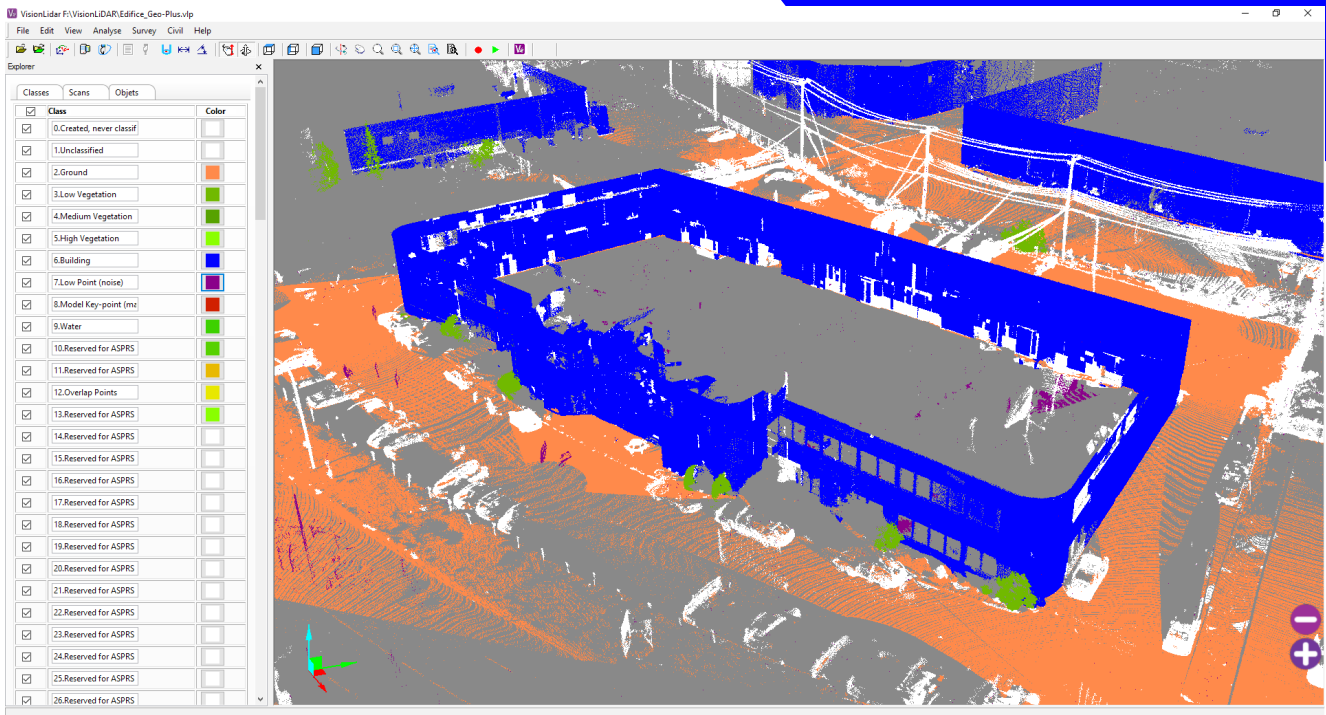
LiDAR technology facilitates the measurement of a high density of points covering wide areas. By using it, natural interpretation becomes less ambiguous because of the accuracy of the data, thereby reducing costs compared to a traditional survey type. “Today, scanners are sold for \$35,000 (CAD) while, 5

years ago, we bought ours for more than \$130,000 (CAD)”, said an astonished Alexandre Gagne, President of Geomog, a firm specialized in surveying.

Vital Roy, land surveyor, says that there are “a lot of people who can acquire this kind of device, but surveyors have a great advantage in the positioning. Especially to analyze and talk about the results of a major survey after working into the point cloud. Acquiring a point cloud is one thing, but learning how to analyze the results, that’s another story”, he says.

BY MARIE SCULTORE





A terrestrial LiDAR image taken by Geo-Plus in Laval, Quebec, 10 000 points/m<sup>2</sup>. Point Cloud processed in VisionLiDAR.

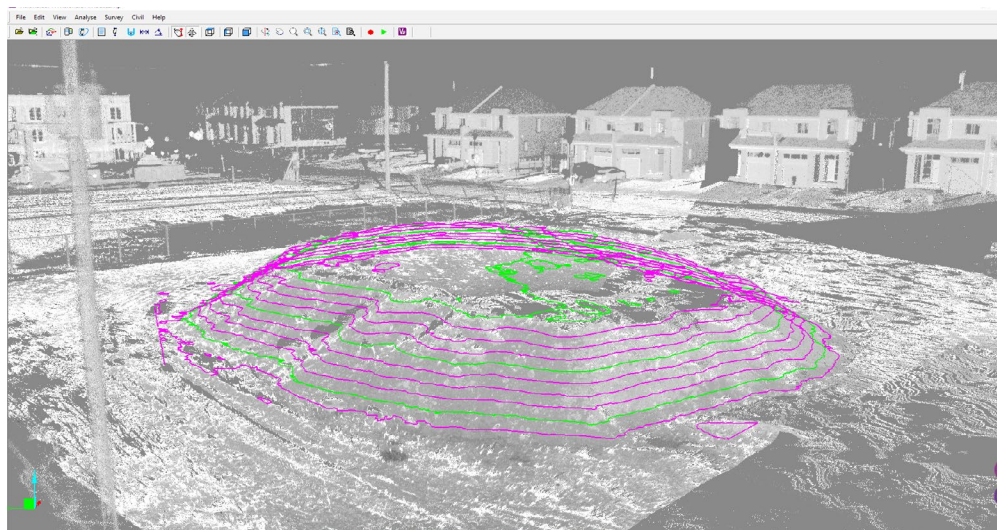
When deciding whether or not to use LiDAR technology, it's good to think about the adjustment period to associate the digitization based on LiDAR to the interpretation in the field. Moreover, the education of the teams, the use of software to handle many points like VisionLiDAR, and always being informed of the latest technological improvement, to facilitate the development of firms and the market.

"In 20 years, it has evolved so much that it is now possible to generate over one million points per second within 5 mm accuracy", adds Alexandre Gagne. Mr. Gagne mainly handles LiDAR data in civil engineering. However, he said that the technology can be used by both engineers and land surveyors. "Several tools are used depending on the projects. With VisionLiDAR, we automatically classify points to classes such as ground or building and pick points, allowing us

to inventory items such as streetlights, sidewalks, and even remove items that should not be there. So we work less outside, more in our office, and instead of

measuring points traditionally, we do it with our mouse in VisionLiDAR," he says.

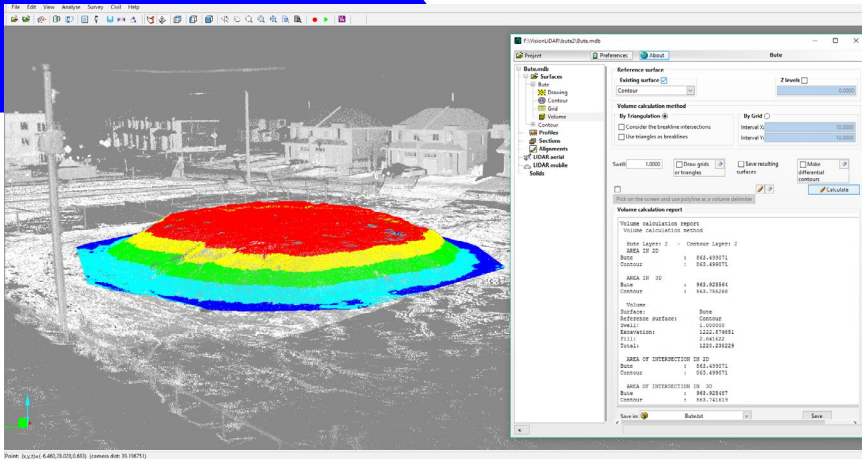
Reaping the results and analyzing them is also the role of Topo 3D, a



A terrestrial LiDAR image taken by Geo-Plus in Laval, Quebec, 10 000 points/m<sup>2</sup>. Point Cloud processed in VisionLiDAR.







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LiDAR software will also continue to evolve. Therefore, VisionLiDAR already offers automatic objects detection, and automatic virtual surveying. Thanks to these features, vectorization becomes much easier. What is the purpose of Geo-Plus today? Democratize the use of point clouds to use LiDAR technology intelligently and efficiently.

In fact, with VisionLiDAR, it becomes really easy to create 3D representations of existing structures. Now, view and work with the collected data is facilitated into the Point Cloud files. Also, the drawing procedure is becoming faster by working from a real image and referencing object or inserting points into the image.

While using a powerful LiDAR processing software, it becomes possible to work on your picked points previously selected directly on your 2D or 3D drawing. You can also change the appearance or the characteristics of your points by using this method.

The point clouds are created from raw data, which were scanned and represent real objects such as buildings, forests,

vehicles, etc. VisionLiDAR can also change the look of your point cloud using classification. This feature will improve your work performance and facilitate your understanding of the point cloud.

The user can change the points density in your cloud by managing the visual rendering of your point cloud and removing noise and unnecessary objects.

By applying a display by color the user can automatically categorize the objects and assign a color. This feature allows to choose between RGB (Red Green Blue) colors, or view the point cloud by normal, intensity, or elevation.

In VisionLiDAR, the user can export objects from the point cloud by detecting them automatically or manually. Other features are also available, like creating contour lines, removing the center line of a cylindrical object, extracting a 2D geometry in a cloud segment.

VisionLiDAR also performs standard editing operations by allowing the user to edit the standard setting of the point cloud. Then, the user can cut, paste, move, rotate, remove, or scale the point cloud. It's also possible to change the

general settings of the point cloud like changing the colors of the classes.

Today, LiDAR technology is helping scientists from different domains to improve their work. It's the case for archeologists in Cambodia, where Damian Evans, archeologist, is using LiDAR technology to map 2,230 km<sup>2</sup> using LiDAR mapping technology. Evans's project started in 2012 and his goal was to measure every square meter of the chosen area to discover temples buried in the massive city of Phnom Penh.

Previously, in 1970, LiDAR technology was first developed to assist space explorations. Initially used by Apollo 15 to map the surface of the moon, LiDAR technology evolved to become a high-precision technology that can be mounted on a helicopter or on a plane.

Nowadays, with these discoveries, LiDAR technology helps geologists to prevent natural disasters, archeologists to find ancient civilizations, astronauts map other planets, or land surveyors improve their work and security. LiDAR may help find other answers in the future, but for now, it could be the clue to understand how our environment is changing by analyzing the ground of our planet.

And tomorrow, point clouds images will become even more amazing and realistic than they already are today. ■

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**Marie Scultore** is a French journalist from Marseille, France, established in Montreal, Canada since 2011. After she graduated from University of Montreal in communications, journalism, and editing, Marie collaborated with the Huffington Post, mtl-mix.com, and Radio Shalom Montreal where she presented the news program in 2014. She is currently working as technical writer for Geo-Plus Inc. and is specialized in publishing articles related to geomatics.