

ScanLook FAQs

Why did you build ScanLook?

We built ScanLook because the high-end systems were way too expensive and the low-end systems couldn't do survey grade work. We also wanted one investment for mobile and static scanning. Nothing we found was even close to meeting these requirements.

What is Snoopy?

Snoopy is ScanLook 2.0. Generally we consider it specifically to be the single Velodyne scanner solution with any INS. We use the term broadly in reference to ScanLook 2.0 rather than referring to 1.0 vs 2.0.

What is the difference between ScanLook 1.0 and 2.0?

1.0 was a single, self-contained unit that ran wireless or wired with all data stored on-board. You only needed a remote device to turn the system on, monitor it, and turn it off. It also contained a framework of software to control all of the sensors and the INS.

2.0 does away with the central hub and for the most part the controlling software. It is smaller, lighter, and more configurable (more INS options, more scanner options). It capitalizes on software re-use from each component integrated. This makes training more specific and less complicated. It brings everything we learned from 1.0 and scanning projects into an even better unit.

How is it that Snoopy is so small and the other systems are so big?

We call this lots of research and the drive to make a better system. Electronics change really, really fast. We try to keep up with the changes which mean our systems change rapidly as well. This is why it is very important to have a system that is highly configurable. We have achieved this goal with ScanLook 2.0.

Most of the systems were designed several years ago. Electronics were significantly different then. Today you can purchase a component the size of a match box that would have been the size of several shoe boxes just a short time ago.

Which may bring a question to mind. If you buy ScanLook and we come up with a new way of doing something we will make every effort to provide you an upgrade path at the least expense.

Why so many lasers?

We feel the optimum system is a single Velodyne and one FARO scanner (or Z+F). The Velodyne is super for assets and minimum shadowing and the other scanners are suited towards high accuracy, hard surface, thin point clouds. However, you can have 1 Velodyne and 2 FARO's, etc.

What is the Velodyne scanner?

The Velodyne is a time-of-flight (TOF) scanner with 32 lasers scanning 360 degrees in the HFOV and 40 degrees in the VFOV at mirror speeds up to 20 Hz and a data rate of 700 kHz. Because of the 360x40x32 laser system there is very little shadowing. This is the reason we love this little (1cm) scanner.

See <http://www.lidarusa.com/shadowing.php> for a good example.

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Why so many INS selections?

Honda, Toyota, GMC, Ford - same question. People have brand preference. We want to bring as many options to the users as possible. Their choice will depend upon past experience, geography, and purpose

What about mounting on an UAV?

Snoopy is geared towards UAV's. However, I think most UAV enthusiasts are not prepared for the price of any aerial LiDAR system. The entry point is well over \$30,000 not including the UAV.

Can you scan inside and outside?

Yes, we can scan inside in mobile mode. It's trickier than outside but it is very much achievable. Every day we get closer to even better solutions for inside scanning (e.g. Locata). We have scanned long tunnels with only an initial GPS lock before an extended scanning session.

What about using RTK?

We frowned on this option for some time. However, there are certain applications where this is a reasonable solution. In forensics and accident scene reconstruction, military, and mining this may be well suited. It could even be useful in some mapping applications. We support RTK solutions but are big proponents of post processed solutions.

What is PP?

PP is post processing. This is generally in reference to the trajectory solution. The alternative is the RTK solution. PP allows for much more control and refinement of the trajectory and consequently better point clouds. It involves NovAtel's Inertial Explorer (or equivalent), which is not at all cheap, and requires some training. Generally the better educated you are in mapping, cartography, surveying and geodesy, the better your results will be. In most cases it is not difficult.

What is a base station?

A base station is a GNSS ground station generally placed on a known point. Usually a base station will collect GPS and GLONASS (and maybe others) satellite signals during the scanning session. This is combined with the mobile satellite data connected to the scanner to generate a trajectory. In RTK mode this is usually a radio system with communication being done via modems over relatively short distances. In PP mode there is no communication between systems and everything is done in a post process step. PP can also use local CORS stations. RTK can utilize a local VRS or Omnistar solution.

What software is ScanLook compatible with?

Since ScanLook generates LAS, LAZ, and e57 files along with a variety of text formats (xyzirgbt) most programs can read ScanLook data. We haven't found a program we couldn't interface with yet in this respect.

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What about eye safety?

Eye safety is a direct function of the scanner. Only the FARO FOCUS 3D (120) was not Class 1 eye safe but even it was considered eye safe in practice. In mobile operation every scanner is even less likely to cause eye damage because it is almost impossible for the public to look directly into a moving laser beam. Basically, all ScanLook systems are eye safe (November 2013).

What comes with a system purchase?

With the advent of Snoopy we did away with the onboard computer and let the buyer use their favorite computer of choice. This might be a ruggedized tablet, ordinary laptop, or something else. At the moment it must run Windows.

The necessary cables leading up to the power supply are also part of the system. The power supply is left to the user and is usually a separate deep cell marine battery for larger systems or a small garden tractor battery (or even smaller) for the minimal Snoopy system.

A DMI (wheel meter) can be purchased separately but isn't really necessary.

The software necessary to generate a point cloud is also standard with each sale.

A limited warranty is also included. Training is separate.

What about hazardous areas?

Some scanners are classified safe for explosive areas. While we can use these systems we have not gone through similar classification with ScanLook. This doesn't mean it isn't possible, we just haven't done it. The scanner is the most "dangerous" part of the system in this respect so if it is safe, it should be possible to make the rest of the system safe. However, it may require some modifications and definitely some financing. In deep mine shafts this may be an issue.

How long does it take to learn how to scan?

We can train almost anybody how to do the simplest of things in just a few minutes. It's not much more complicated than using a camera. Learning what all the options are (if you ever need to change them) is another story - true for any electronic device (like my DVR player I can barely use). Our base stations are just as easy. Set up on the point, level the instrument, push the button and walk away. Scanning can be very easy. It is with Snoopy.

What doesn't come with a purchase?

The system does not include the power supply, computer, vehicle or driver! Now if we bump the price up a few hundred thousand dollars we can include at least a vehicle.

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What do you show in real-time while scanning?

Generally we show as little as possible. After you do one or two scans you know what the scanner is doing so it is a waste of time to watch scan data come in. Plus it is very distracting and we're trying to be "safe" as well. The most important thing to watch is the satellite constellation. If this is a worry though you should check it beforehand using something like this <http://www.trimble.com/GNSSPlanningOnline/>. Of course, if you're going under dense canopy, are in a canyon, or are surrounded by tall buildings you can expect poor GNSS coverage.

Can I scan a tunnel?

Scanning tunnels is a direct function of your INS (and adherence to very good procedures). The better the INS, the more likely you are to be able to successfully scan a tunnel. The INS is going to cost at least \$70,000 - this is just for the INS. You will also need control point registration software which is part of ScanLook (December 2014). The control registration has to be fully 3D, not just a Z correction.

How long does it take to get setup and scanning?

This is somewhat dependent upon the scanner and INS. Let's assume you are referring to Snoopy. In about 5 minutes the system can be initialized (the INS) and you can start scanning. You must first setup a base station, mount Snoopy to your vehicle, and provide power. This is all very quick (as in minutes) once you are organized.

How long afterwards before you have a point cloud?

If using RTK you can start generating a point cloud immediately after downloading data; otherwise you have to compute the trajectory first (10 to 30 minutes).

What about mapping coordinate systems?

Using NovAtel Inertial Explorer provides us with the capability to generate the point cloud directly into the mapping coordinate system and datum of choice. In RTK mode the data is generated in UTM and can be transformed using the tool of choice.

Of course, 3rd party software can always translate to additional coordinate systems as well (e.g. Global Mapper).

What vehicles/platforms will it work on?

We haven't had Snoopy on a go-cart, golf-cart, mini-bike, mo-ped, horse, camel, elephant, or balloon, but Snoopy has been on a car, truck, van, SUV, 4-wheeler, ATV, boat, railcar, hyrail, tractor, powered parachute, gyroplane, helicopter, and UAV. It can mount on almost any platform.

How fast can you drive during collection?

You cannot out run the INS even on a race car. As for the scanners, you cannot out run them either. Obviously, the faster you go, the greater the scanline separation will be. At 50mph with 100Hz mirror rate this puts each scanline at about 9 inches (23 cm). Trajectories at driving speed tend to be very smooth and predictable - this is good. The Velodyne mounted at 45 degrees and about 10 feet above the ground at 75mph provided several hundred points on a small parked car - enough to clearly identify the type of vehicle (points inside and out).

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Have you tried airborne scanning?

We have had Snoopy and ScanLook 1.0 airborne. Snoopy is well fit for a gyroplane. With the Velodyne you must stay below 70 meters to get ground coverage but you can travel at 50 to 80mph with no problem and lots of points on the ground. It will look like a mobile scan but with a better view angle. Check out our videos on our site.

As of December 2014 we have not had a demand for the FARO scanners airborne but it can be done quite easily.

What about rain, wet roads, snow, dust?

Rain and expensive electronics generally don't mix well. Each scanner has different IP ratings. The Velodyne is the most durable of those we currently service. Snoopy can be left in the rain - but he would rather be under cover. Wet roads are essentially invisible to laser scanners. Snow and dust are very visible and can cause what appears to be a lot of noise in the scan data.

Do I need two antennas?

To my understanding, you only need two antennas in a couple of situations. The first would be on a slow sea going vessel where you cannot go fast to do a good kinematic alignment and you cannot sit perfectly still for a static alignment.

Another situation would be if you purchased a really low-end system that kept its heading by using dual antennas. Lastly, you would need dual antennas when you have a really good salesman that insists you buy two.

Can you use my antenna?

If you own a survey grade GPS antenna it may be able to be used. However, the antenna costs anywhere from \$500 to \$1200 and is of no real consequence to the overall cost of the system. It's best to use the antenna we provide.

Why are some IMU's under \$20,000 and others are over \$100,000?

IMU technology varies greatly. There are three basic types (MEMs - small and durable, FOG & RLG - expensive and big). Cheap is under \$20,000 to \$30,000.

Anything much less than this (say \$5000) as of November 2013 it is probably not worth pursuing. Expensive is over \$100,000. There are a few systems in between - these can be pivotal and are generally the best price-performance purchases. The technology and volume drives the pricing. In any case, IMU's don't sell by the millions except in consumer grade electronics such as cell phones.

What point density can you collect per square meter?

This is a tough question. While it can be derived from manufactured specifications, it is often easier to collect real data in various conditions to get the answer you really need. Obviously the scanner data rate (700 kHz for Velodyne and 976 kHz for FARO) contributes to this greatly. Vehicle speed is also an important factor. Some scanners only collect at 36 to 72 kHz with slow mirror rates (20 Hz). Obviously with these slow rates to get comparable data to the aforementioned scanners the vehicle would have to be moving at walking speeds and probably make multiple passes.

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Can you use cameras?

Yes, we have an awesome camera system that can be purchased separately at any time. It is possible we can help you configure your camera with our system as well. Making the imagery useful is the bigger issue and is largely dependent upon the post processing software.

Can you generate panoramic images?

Yes, as of late 2014. We also have our own video player which uses geo-referencing and can be positioned by geographic coordinates. We have a special graphic package for this as well that comes with ScanLook.

Can you do thermal imaging?

Yes, but we have not yet done so. If you provide the camera, or pay for one, we will integrate it into the system. This is a "hot" topic but does it drive revenue?

What IMU's do you support?

We currently support almost any NovAtel INS. We also support the OxTS xNav family and think the xNav200 and xNav250 fill a particular void in the marketplace.

We also support the IXBlue ATLANS-C.

We are actively investigating other systems as well for a variety of applications.

Can you colorize?

Not yet from 360 streetview imagery (December 2014) but we are very close. Of course, anybody could use our video, create some stills, and overlay it on the point cloud just as has been done for years with static scanners.

What about the other systems?

We try to stay current with our comparison to other systems on our website. Please refer to www.lidarusa.com for the latest information we have. We do our best to provide an honest comparison, nothing more.

What scanners do you support?

Currently we support the Velodyne HD32, FARO FOCUS family, and Z+F scanners. We can most likely do others, particularly the Neptec OPAL. We think the Riegl systems would be easy to interface with as well but have not found the need to do so ourselves yet.

What about scanning a deep, underground, wet pipe system?

This is a tricky problem. There is no GPS available and no control points possible. The environment is rather harsh as well (damp, wet, humid, filthy). Sure, we could scan it but we could not guarantee the positioning accuracy. If there are known points of reference in the pipes they could be used for additional reference in computing the trajectory or adjusting the point cloud position. An alternate 2D system using only a linear reference system (wheel meter or equivalent) is possible.

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What is the cheapest point of entry?

Snoopy is the "cheapest" system you will find to mobilize your existing FARO or Z+F scanners. If you already own a FARO FOCUS you can definitely mobilize it for under \$100,000, the same for a Z+F scanner.

How many scanners can I have on a single system?

I would recommend at most three scanners. This could be 2 Velodyne's and 1 FARO or 1 Velodyne and 2 FARO's. We generally think two is very good. We pretty much use the Velodyne on every job - just in case...

What about finding street signs?

The Velodyne HD32 collects not only intensity data but retro-reflectivity data as well. This information can be used to help locate street signs (or at least those meeting the new US street sign standards of retro reflectivity).

Do I have to buy a wheel meter?

No, you do not have to buy a wheel meter. You can if you wish to do so. We think it's money better spent for you to do some scans first without the DMI and then test one if you think you need to improve your results. See if you can find a manufacturer who will loan you one for testing. This is very much a function of the types of areas you scan, the INS you use, and the results you require.

Why do some systems cost so much more?

If you paid a team of hard working engineers for several years worth of R&D, you'd want to recoup your costs too. Add in lots of marketing and sales cost with a low volume market place and expensive electronics and you have an expensive system.

We differ in that we are small team of very purposeful, targeted, and experienced professionals with low overhead and a minimal marketing and sales budget. Since we use the system ourselves we push hard every day to keep it current and make it the best

Can I mount the system backwards?

You can definitely mount the system backwards. Our first sale into Australia did this very thing to bring the scanning to the front of the vehicle to avoid scanning dust. A great deployment of our system.

Can you scan from a boat?

We can scan from a boat AND without bringing the car onto the boat. See much of our literature with Snoopy mounted on the windshield of our boat. Also see our site at <http://www.lidarusa.com/water.php>.

How often do I need to calibrate or maintenance ScanLook?

ScanLook itself does not require any re-calibration or maintenance. However, your scanner components may. If you need to send your FARO scanner in for maintenance then you will definitely need a new boresight computed. So you only need to do this as often as you do maintenance on your scanner head.