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APPLICATION NOTE

Client: **University of Wisconsin** | Location: **Madison, WI**
Industry: **Event Planning** | Year: **2017**

Maverick: Cross Country Lidar

Introduction

When the best collegiate runners take their marks at the 2018 NCAA Cross Country Championships in Wisconsin, the course will be as familiar as their favorite training routes. Most will have experienced every twist and turn by watching a photo-realistic 3D flythrough of the course onscreen, and some may even get the chance to train on computerized treadmills that adjust their pitch to precisely match real terrain changes they see on the monitor in front of them.

That's the plan in the works at Mandli Communications, a Fitchburg, Wisconsin, technology company specializing in the collection and application of 3D data with a focus on transportation applications. Mandli has teamed with the nearby University of Wisconsin and other partners to improve the way elite and recreational athletes train for running, cycling, and rowing competitions.

Challenge

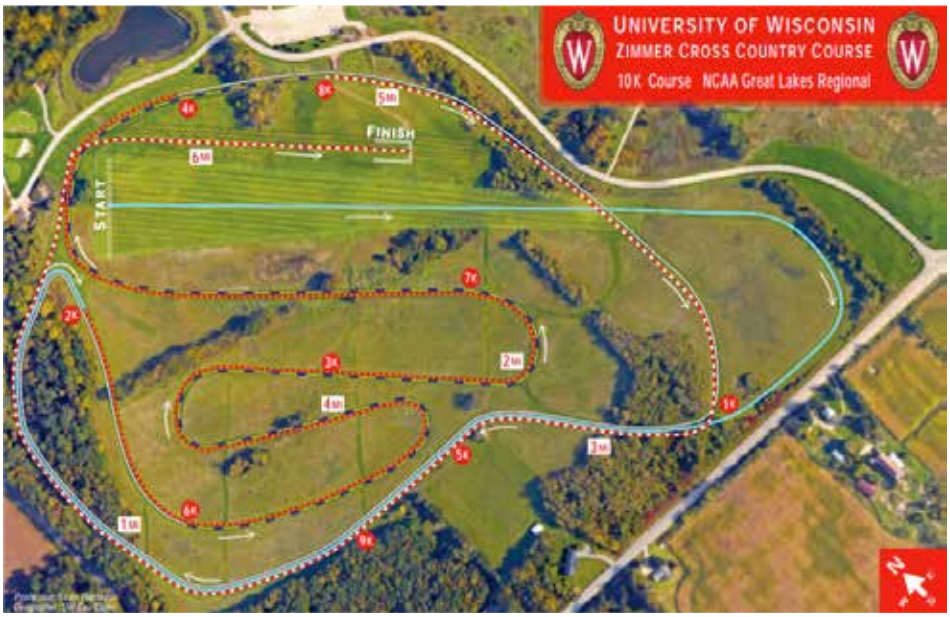
Mapping a cross-country venue serves two purposes. First, the route selected for a race must be accurately measured to ensure it meets official specifications set down by the NCAA. Secondly, race organizers rely on site maps to determine where to place team tents, first-aid stations, viewing stands, and refreshment booths.

"Most courses are now surveyed with total stations to capture precise measurements and terrain data," said John Caya, Mandli Director of Business Development. "Cameras are used to take pictures for logistical purposes." This mapping process is extremely time-consuming.

The simulated 3D environment could be the next big thing in athletic training, Caya explained. Not only does it satisfy course measurement and logistics needs, but an immersive interactive simulation allows athletes to train more realistically for a specific event and route, as well. But while major events like the Boston Marathon and Tour de France might have the money for this kind of mapping, the technology has been out of reach for most others.

Mandli saw the 2018 Cross Country Championships as an opportunity to prove that 3D mapping is economically and practically accessible to end users like colleges and universities. After presenting the idea to the Wisconsin athletic department, Mandli rolled out the new Maverick mobile mapping system for a high-profile demonstration.

» Maverick's portability allows it to be easily mounted atop a variety of vehicles, including golf carts. Less than an hour was needed for installation and surveying.



» Map of the cross country course collected by Maverick operators. Maverick's detailed lidar data confirmed that the course met official specifications.

Maverick Solution

Mandli mounted the Maverick to the roof of a golf cart. By switching on the unit, the operator activated its internal WiFi capability which connected the device to an iPad. No software downloaded to the tablet. The operator controlled the entire data-collection process from the iPad.

The operator then drove the cross-country course capturing the image and elevation data. Only one pass around each loop was needed since the unit collects 360-degree coverage. During collection, the captured images were displayed on the iPad screen in real time along with details of the lidar and GPS data quality. This enabled the operator to ensure data was being collected at the desired specifications.

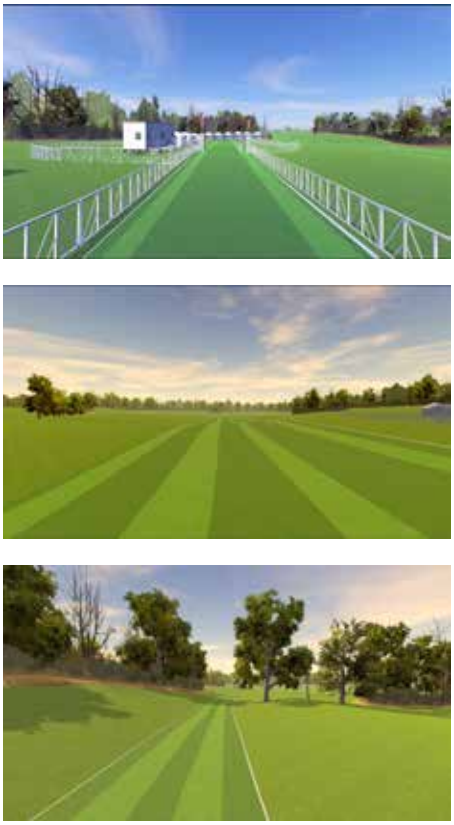
The total time required to mount the unit, set it up for mapping, and then drive the course was about an hour. Although an experienced Mandli technician performed the data collection, no particular geospatial training or background was needed for this phase of the project.

Results

Maverick came bundled with the Optech Distillery data processing software. Once the field work was completed, Mandli obtained differential correction data from a local NOAA Continuously Operating Reference Station (CORS) to post-process the onboard GPS data in Distillery running on a workstation.

The same software used the location information to register the lidar datasets to create a point cloud of the course, which was then georeferenced and overlaid with the color imagery. The resulting photo-realistic 3D point cloud had a relative accuracy of ±2 cm and an absolute accuracy of 1 meter.

Mandli then exported the processed and colorized 3D point cloud into its own workflow for customized data enhancement requested by the end user. Working primarily in their own Roadview Workstation software, Mandli extracted survey points, break lines, and 3D vectors delineating important logistical areas on the course from the Maverick point cloud. Additionally, the firm measured elevation grade changes and tagged distances in the point cloud to show where the 1K, 2K, and other markers would be located during the race.



» Realistic 3D fly-through created from Maverick-collected data by Floating Point FX.

To create the 3D fly-through, Mandli teamed with Floating Point FX, a nearby Madison company specializing in generating realistic simulations for government applications, as well as video games and movies. This firm further processed the colorized point cloud by taking the elevation mesh and cleaning it up to generate a realistic 3D model.

The two companies recorded several short fly throughs of the cross-country course for the university to use in promoting the upcoming event and planning the layout of facilities. These run on any standard computer and have been posted on the web and incorporated into PowerPoint presentations.

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