Team Uses LiDAR Puck to Win First Round of Oil & Gas Robotics Challenge

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A team representing French engineering school ESIGELEC have advanced to the next level of an ongoing global robotics competition after defeating teams from Japan, Austria, Spain, and Switzerland.

The ARGOS Challenge, which encompasses three rounds over a three-year period, was created to promote the development of new autonomous robots capable of providing technical maintenance and surveillance on oil and gas sites. To advance in the ongoing competition, ESIGELEC's 'Vikings' team created a robot featuring Velodyne's VLP-16 3D real time LiDAR Puck. More specifically, the team created a "six DDL Monte Carlo Localization (MCL) based on VLP-16 measurements, with an absolute position error less than three centimeter and an orientation error less than 0.3 degrees at 20 hertz," Velodyne LiDAR said in a press release announcing the advancement.

For the first round mission each team's robot was required to conduct and pass automatic inspection tasks under the conditions that it would face had the creation been used on an oil or gas site. The robots had to move past a series of control points so that they could evaluate the gauges used to monitor pressure sensors. They also needed to pass the controls points so that they could decipher whether the floodgates were open or closed. A 20-centemeter-high (nearly 8 inches) obstacle course had to be passed by the robot so that it could enter or exit the platform. Each robot was greeted with a number of other obstacles that hadn't been announced to the teams prior to the competition. The ESIGELEC team's robot completed the first mission in less than four minutes, despite the fact that teams had been allotted 20 minutes to finish the round.

To decide which of the teams would advance, the judges graded the groups on how they addressed safety requirements, data collection, human machine interface (HMI), and mobility and navigation, during the mission.

The ESIGELEC team ascribed much of its success to the use of the Velodyne technology.

"Clearly, our localization method based on VLP-16 measurements has been a key factor in our success," said Xavier Savatier, Head of the Instrumentation, IT & Systems Department at ESIGELEC. "What stands out about the VLP-16 is its light weight and size, and its 360 degree field of view, which helped its integration on the mobile Vikings robot. The sensor's 3D laser scan strongly reduces the perceptual aliasing problem, which is an issue since there's so much symmetry in the outdoor site."

According to Velodyne, robots will eventually have the ability to conduct inspection tasks, detect anomalies, and provide assistance in emergency situations on offshore oil and gas drilling sites. To perform these tasks, precise localization will be necessitated—no easy task considering all of the pipes open space that are present on the sites. That is why Velodyne believes the ARGOS Challenge was an ideal venue for demonstrating what robots equipped with LiDAR sensors can accomplish.

"Over the duration of the challenge, robots will attempt vital tasks in simulated offshore or onshore platforms, with total autonomy and under the most extreme

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conditions," said Wolfgang Juchmann, Velodyne's director of sales and product management in North America. "Those are precisely the conditions for which we developed our multi-channel 3D LiDAR sensors."

The second round of the ARGOS Challenge will take place in March. For that level the competing machines will be tasked with recognizing abnormal sounds associated with troubles such as gas leaks or cavitation bubbles inside pipes. Each robot will also look for fire extinguishers and a number of unnamed obstacles. Each robot will be forced to go up and down flights of stairs.

For more information on the ARGOS Challenge, click here.

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