

Applications of **RIEGL** Laser Instruments

Problem: A study of various sensors, for strictly robotics needs (terrain modelling, obstacle detection) or scientific needs in Antarctica within the Franco-Italian project "Concordia" in collaboration with Carnegie Mellon University.

Solution: A laser rangefinder mounted on the stereo camera mast is used by the navigation system to detect obstacles in the robot's path. It scans several meters in front of the robot to find features that the stereo cameras may miss.



The Robot system called NOMAD on its way through the antarctic.



The photos were kindly made available by the "Robotics and Artificial Intelligence" group LAAS-CNRS (Toulouse / France) and the French Polar Institute.

Advantages:

- ✓ High temperature range and high accuracy
- ✓ Narrow measuring beam
- ✓ Continuous measurement with high data updating rate
- ✓ RS232/RS422 data interface
- ✓ Unsophisticated and reliable

Performance:

- LD90-3100HS
- ✗ Maximum range 150 m
- ✗ Accuracy 2 cm

Alternative Approach:

- ☞ Terrain modelling by the 3D Imaging Sensor LMS-Z210
- ☞ Laser Profile Measuring System LPM-2K or LPM-VHS

(Continued on the next page)

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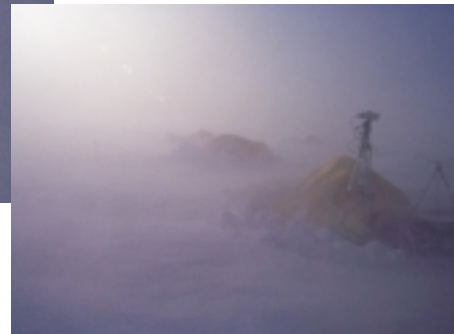
The Robot:

Nomand is a four wheel robot designed to traverse planetary analogous terrain. Fully deployed, it is 2.4 x 2.4 x 2.4 meters, and it weighs 725 kg. It can travel up to 50 centimeters per second - with the help of a gasoline generator - and has the capability

to traverse over large obstacles. In this case the Nomand will use studded tires for friction on Antarctic ice, and determine its locations using GPS. Finally, Nomand serves as a sensing and computing platform that allows effective remote science to be performed.



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The statement of Mr. Nicolas Vandapel / LAAS concerning the reliability of the RIEGL laser:

"I operated your laser in very bad weather conditions, the 7 of november specifically (-25°C, speed >15 knots, with blowing snow) and everything was right related to the laser hardware"

For more information visit the webpages of LAAS-CNRS

["http://www.laas.fr/~vandapel/antarctica/index.html"](http://www.laas.fr/~vandapel/antarctica/index.html) and of the French Polar Institute

["http://www.frc.ri.cmu.edu/projects/meteorobot/Expedition98/Expedition98.html"](http://www.frc.ri.cmu.edu/projects/meteorobot/Expedition98/Expedition98.html).