
Press Releases



April 9, 2015
JAMSTEC

Utilize Around View Monitor (AVM) Technology for Unmanned Vehicles toward Highly-Efficient Subsea Operations ~Joint Development with Nissan and Topy Industries to Realize Drastic Improvement in Underwater Operation Efficiency~

Overview

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC: Asahiko Taira, President) has launched production of an element engineering test machine based on a joint agreement with Nissan Motor Co., Ltd. (President: Carlos Ghosn) and Topy Industries, Ltd. (President: Yasuo Fujii) concluded on December 1st, 2014. Adopting the Nissan's Around View Monitor (AVM)^{*1}, the machine will be developed with Topy Industries Ltd. (President: Yasuo Fujii). It constitutes an essential technology for development of highly efficient subsea operations in the "Next-generation Technology for Ocean Resources Exploration (Zipangu in the Ocean Plan)" as part of the "Cross-ministerial Strategic Innovation Promotion Program (SIP)^{*2}" led by the Cabinet Office.

Japan's exclusive economic zone (EEZ) is the sixth largest areas in the world, which is also known as an area for high potential marine mineral resources including submarine hydrothermal deposits. Nevertheless, technologies for carting out efficient research covering these vast areas are yet to be developed. In addressing the "Next-generation Technologies for Ocean Resources Exploration," JAMSTEC has been trying to develop highly efficient systems that can be added to its existing remotely operated vehicles (ROVs) for subsea operations. As part of this effort, JAMSTEC partnered with Topy Industries, one of the top manufacturers of robot crawlers in Japan ([figure 1](#)) to develop crawlers necessary for multi-coring systems. Crawler systems allow us to collect research samples in stable conditions even when subsea surfaces are rugged or flaccid. On the other hand, when the ROV is operated at a control room on the vessel, it is necessary to watch multiple camera images at the same time. In addition, the exiting narrow view cameras can't capture rough surfaces of the seafloor around the crawlers.

To solve this issue, JAMSTEC have been examining utilization of the Nissan's AVM technology with three-dimensional image processing functions ([figure 2](#)). By combing the technology with sensors that accurately measure distance between the vehicle and obstacles, it will become possible to capture real-time images as if it is watched by a bird's eyes from above ([figure 3](#)). Operators on the vessel then will be able to obtain real-time view of seafloor. It will drastically enhance efficiency in underwater operations.

After developing necessary technologies with field testing, JAMSTEC aims to put this technology into practice for ocean resource exploration by 2018. Such technologies developed jointly with private sectors are easily transferred to them. It is expected to be utilized for ocean resource exploration widely in Japan at an early stage.

Because of close locations of headquarters and research centers in Kanagawa, JAMSTEC and Nissan have often undertaken joint development programs. Also, Topy Industries has often been working together with JAMSTEC for technology development. JAMSTEC will continue to promote joint development by partnering with private sectors.

***1 Cross-ministerial Strategic Innovation Promotion Program (SIP)**

In 2014, it was newly established with a 5-year plan. The Council for Science, Technology and Innovation (CSTI) takes initiatives in management across government ministries and existing fields, aiming to achieve scientific technology innovation. In the "Next-generation Ocean Resources Research Technology (Zipangu in the Ocean Plan)," which is one of the ten issues set for the program, JAMSTEC is responsible for carrying out scientific research on ocean resource genesis, development of ocean resource exploration technology and ecosystem research with its long-term monitoring technology. These technologies will plan to be transferred to private sectors.

***2 Around View Monitor (AVM) technology**

In this system, a virtual birds-eye view is provided appropriate vehicle maneuvering information with drivers for assisting easy parking. In 2007, it was first marketed by Nissan Motor Co., Ltd. Its technology is continuing to be evolving, including the newly introduced Moving Object Detection technology in 2011.

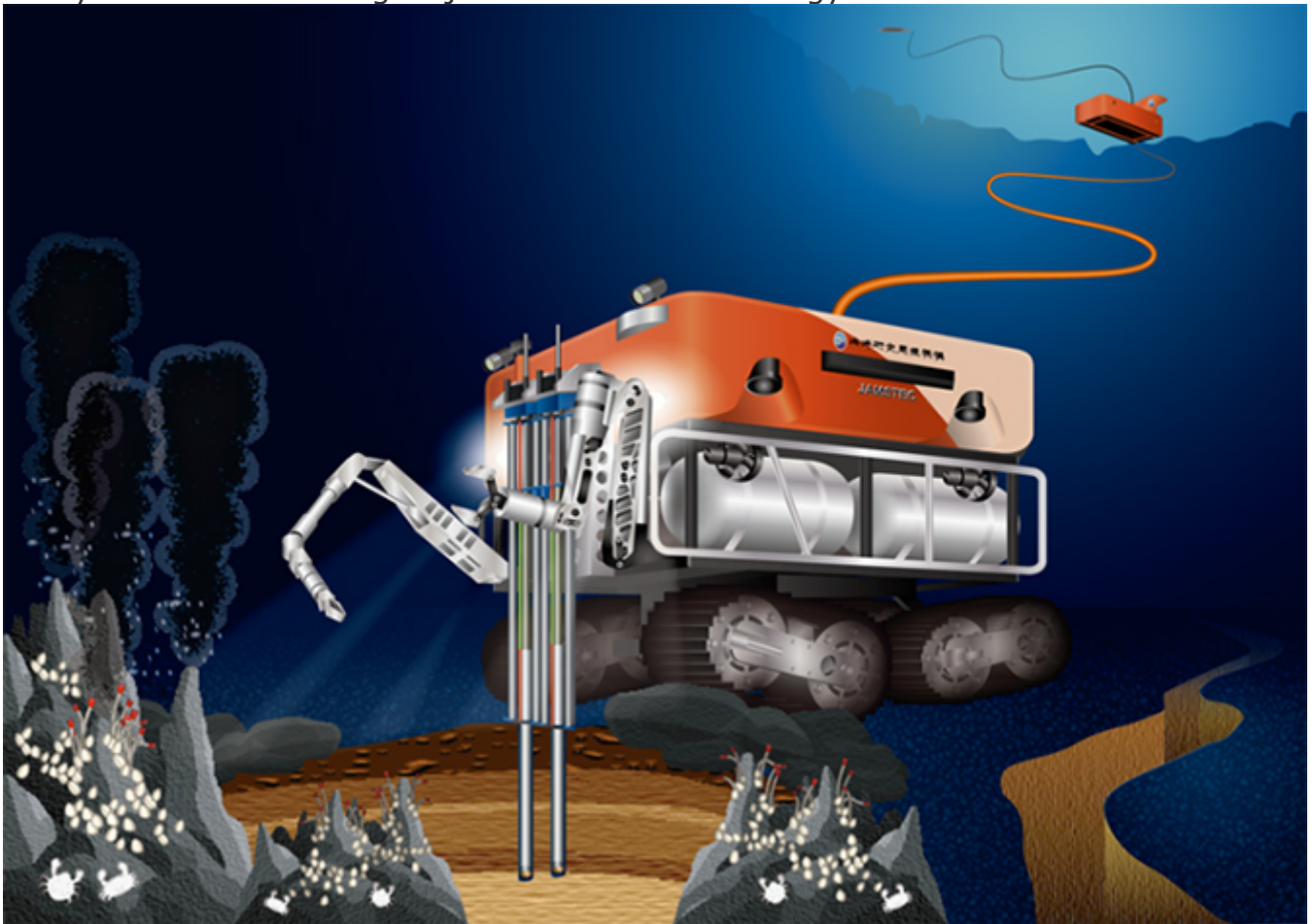


Figure 1: An image of the ROV with highly-efficient subsea operation systems. It will collect core samples across vast areas, which are used for researches on mineral deposits and chemical substances contained in minerals under ocean floor. The system aims to allow private sectors to introduce it easily when they enter resource research fields.



Figure 2: Test equipment of the ROV camera image system. To carry out test, equipment using the AVM technology processing information from four cameras and four laser rangefinders (above) were installed on the small ROV with a flipper type crawler system (from middle to bottom).

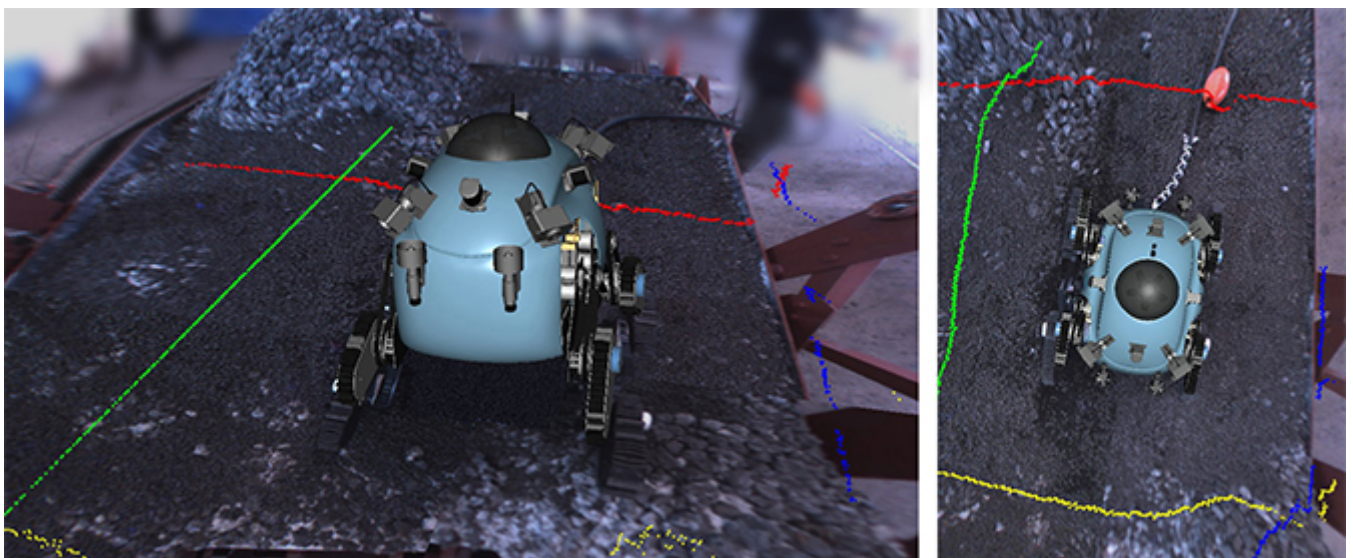


Figure 3: Around view images displayed on the test machine monitor. The left image looks that the image is taken from a camera in the front, however, it is actually captured real-time by cameras installed on ROV. Here, the ROV is shown with a CG image because it does not capture itself. A test machine installed the AVM system is

there, moving on the ocean floor on simulation. The red, green, yellow and blue lines show the scanning results of the surrounding by a laser rangefinder, displaying various surfaces from rugged to flacid ones. The view can be instantly switched to other views as shown in the right image.

[Release from NISSAN]

[Nissan AVM tech to go underwater for deep sea exploration - Nissan's Around View Monitor \(AVM\) technology, a building block of its autonomous drive technology, will help remotely operated vehicles \(ROVs\) search for natural resources in the Earth's oceans –](#)

Nissan AVM tech goes underwater for deep sea exploration (Video)

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