Underwater robot with a sense of touch

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The applications are numerous. Underwater robots with tactile capability can maintain offshore drilling rigs or collect sediment samples. The researchers hope that in future the sensor will be able to distinguish between the current and an obstacle. © DFKI Bremen

(PhysOrg.com) -- Maintenance of offshore drilling rigs or underwater cables, taking samples of sediment - underwater robots perform a variety of deep-sea tasks. Research scientists now aim to equip robots with tactile capability so that they can orientate themselves better under the sea.

The robot dives into the sea, swims to the submerged cable and carries out the necessary repairs, but the person controlling the robot does not

have an easy task. It is pitch dark and the robot's lamp does not help much. What's more, the current keeps pulling the robot away from where it needs to carry out the work.

In future, the robot could find its own way. A sensor will endow it with a sense of touch and help it to detect its undersea environment autonomously.

"One component in this tactile capability is a strain gauge," says Marcus Maiwald, project manager at the Fraunhofer Institute for Manufacturing Technology and Applied Materials Research IFAM in Bremen. Together with his Fraunhofer colleagues and staff at the German Research Center for Artificial Intelligence DFKI, Bremen Laboratory, he has developed the model of an underwater robot with a sense of touch. "If the robot encounters an obstacle, the strain gauge is distorted and the electrical resistance changes. The special feature of our strain gauge is that it is not glued but printed on - which means we can apply the sensor to curved surfaces of the robot."

The single printed strip is just a few ten micrometers wide, i.e. about half the width of a human hair. As a result, the strain gauges can be applied close to each other and the robot can identify precisely where it is touching an obstacle. The sensor is protected from the salt water by encapsulation.

To produce the strain gauges, the research scientists atomize a solution with nanoparticles to create an aerosol. A software system guides the aerosol stream to the right position. Focusing gas shrouds the beam and ensures that it does not fan out. At the Sensor and Test trade show from May 26 to 28 in Nuremberg, the research scientists are presenting an octopus-shaped underwater robot which is fitted with a printed sensor.

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