

## Gard Farstad Elgenes

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**From:** Gard Farstad Elgenes  
**Sent:** 11 . oktober 2016 17:27  
**To:** [REDACTED]  
**Cc:** 'Eleni Kelasidi'; Henrik Kilvær  
**Subject:** Quote for force/torque sensor - NTNU

Dear Sir or Madam,

In conjunction with a university research project at NTNU in Norway, we have developed a setup for experimental validation of fluid parameters for an underwater snake robot. We are now looking for a force/torque sensor that we can mount on the implemented structure in order to measure force and torque applied in 3-axis.

I therefore enquire a quote from you for a sensor that meets the following specifications:

**About:**

Our robot is highly flexible due to a large number of identical motorized joint modules. The cross section of the robot is about 80 mm x 80 mm and it will operate about 2-3 meters under the water surface. We would like to mount the robot or some of the modules on a rod and submerge it in the water during our testing(*see figure*). This means that it is not required for the sensor to be waterproof. In addition, since the modules of the robot are quite small (80 mm x 80 mm x 90 mm) we are not expecting too huge forces.

**Mounting:**

We have machining and 3D printing resources at our lab, so we are able to develop a compact mounting for the sensor.

**Measurement requirements:**

Resolution  $F_X/F_Y \leq 0.2N$

Measuring Range  $F_X/F_Y \geq \pm 25N$

Measuring Range  $F_Z \geq \pm 50N$

Measuring Range  $T_X/T_Y/T_Z \geq \pm 10Nm$

Where  $F_X/F_Y/F_Z$  are force measurements in X,Y and Z direction and  $T_X/T_Y$  are torque measurements around X and Y. The requirements are only estimates, so if you can offer a sensor with specification within reasonable proximity of these, please do not exclude it.

**Measurement reading:**

Since we want to use this in different experiments, we would prefer if the signals from the sensor are easy to decode. Alternatively, if you offer any additional hardware/software for data logging please include this in the offer.

**Delivery:**

It is planned to do the experiments this semester, so if you can include the earliest possible delivery date we would be grateful.

Please let us know if you need more information regarding this enquiry. Thank you for your kind assistance!

Best regards,

Gard Elgenes and Henrik Kilvær

Department of Cybernetics, Norwegian University of Science and Technology(NTNU)