Promotor: Ellen Roels

Title: Directional friction surfaces inspired by biological microstructures

Description:

In nature, many organisms have surface structures that enable direction-dependent control over friction. For example, snakes use overlapping scales to generate high friction in one direction while enabling smooth forward motion in another. Similarly, sharks use micoscopic indents to reduce drag and enhance swimming efficiency. Studying and mimicking these biological strategies can inspire new materials with (tunable) directional friction, which can be useful for applications in robotic grippers, wearable robotics, or locomotion.

The goal of this thesis is to design and fabricate soft surfaces that exhibit direction-dependent friction properties. You will study how the geometric parameters influence friction and fabricate your designs using 3D printing or silicone moulding.

For this thesis, you will first start with a literature study. Based on this, you will create a design for a (tunable) directional friction surface, for which you will do a parametric study in simulation to see the influence of various geometrical parameters. With this knowledge, you will fabricate several of your designs and verify their properties experimentally.

Prerequisite

There are no prerequisites, but prior finite element simulation experience can be useful.

Contact person

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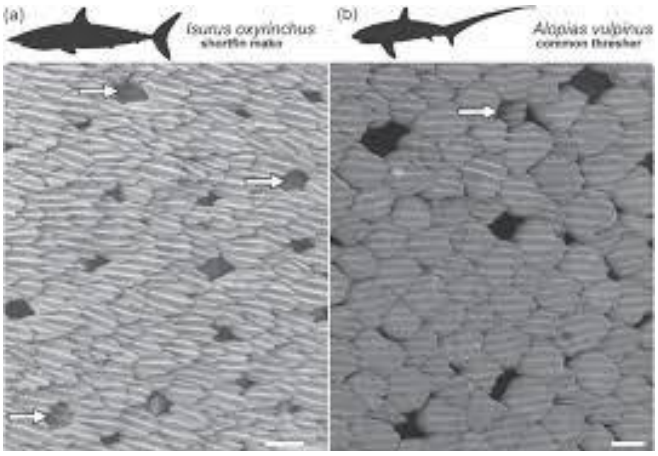

Close-up of the surface structure of shark skin.