

# **Development of a Tactile Sensor Based on Biologically Inspired Edge Encoding**

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## **Abstract**

Here we present a novel biologically inspired tactile sensor based on the structure of the human fingertip. Unlike previous biologically inspired sensors, it is based on new theories of the functional morphology of the fingertip skin features and the Meissner's Corpuscles mechanoreceptors pervading them, particularly in the encoding of tactile edge information. Through mimicking the layered macro-structure of fingertip skin the sensor is highly conformable and very sensitive, as well as a strong and practical gripping tool. The tactile sensor is composed of a thin flexible rubber skin with structural details emulating those of the glabrous epidermis. This encases a clear, highly compliant polymer melt blend with similar mechanical properties to the dermis and subcutaneous fat. A camera is used to track markers on the internal structural details of the rubber skin enabling remote, detailed, direct and sensitive detection of surface deflections. Initial results presented here show the design to be a very capable, highly sensitive sensor as well as a very practical, affordable and scalable robotic fingertip.