

Scalable, Biomimetic Sensory Solutions for Dexterous Robotics Hands

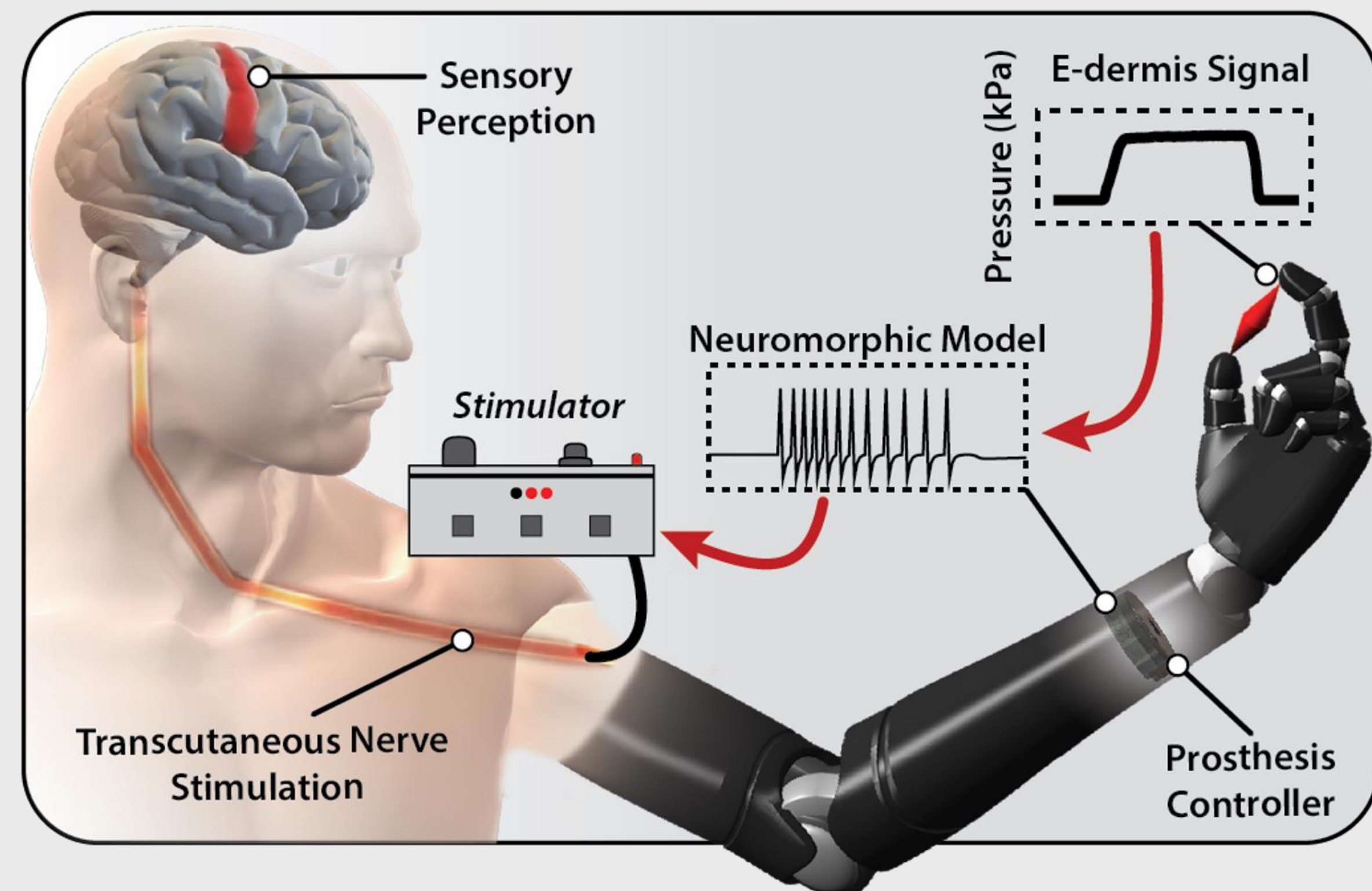
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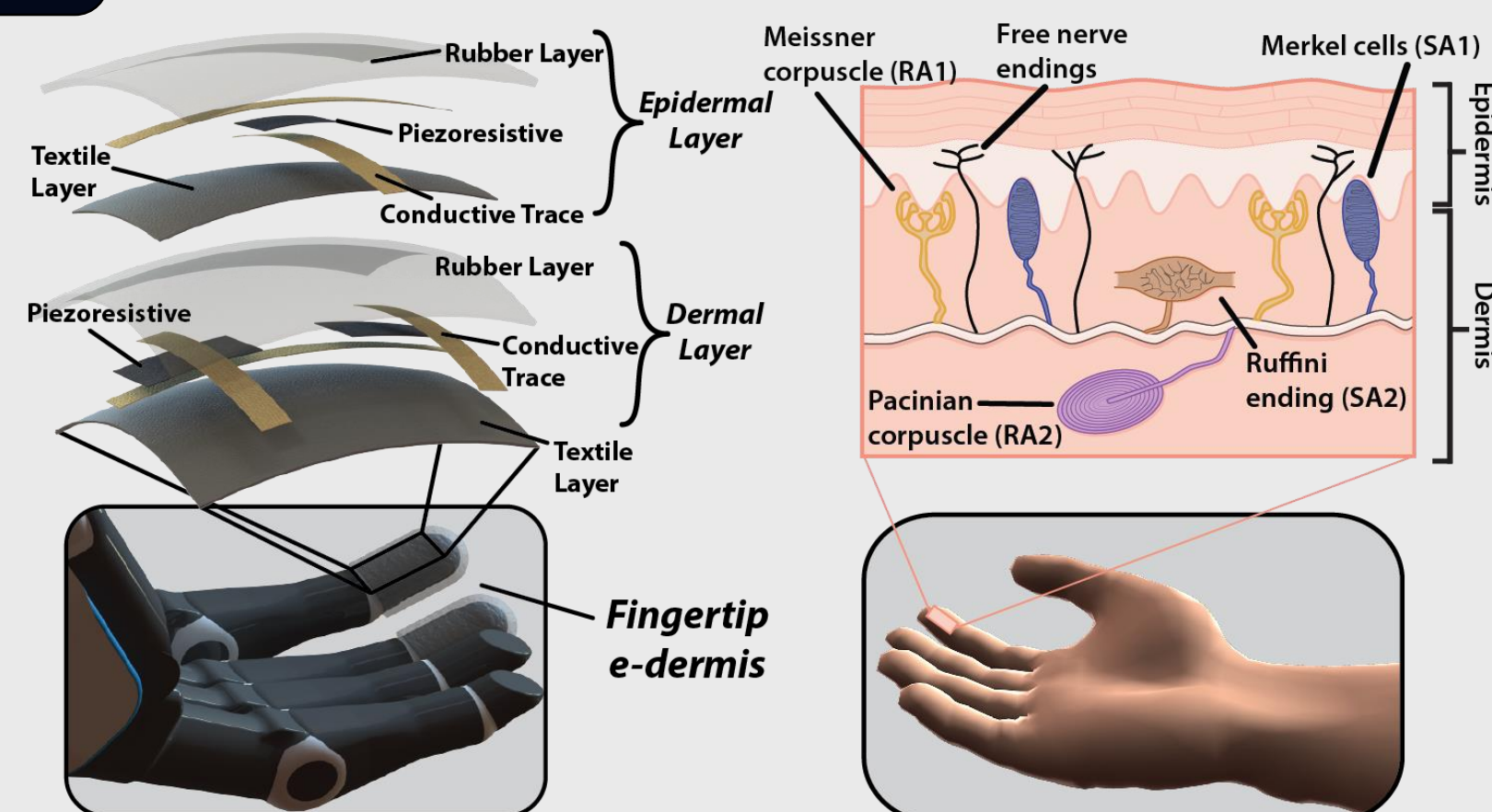
SUMMARY

Our central focus is to provide enhanced tactile sensory perception through sensor-enabled dexterous robotic hands. We have three goals: 1) *model mechanoreceptors and develop algorithms for neural encoding* 2) *create flexible and conformable soft robotic hands* and 3) *design scalable sensing solutions*.



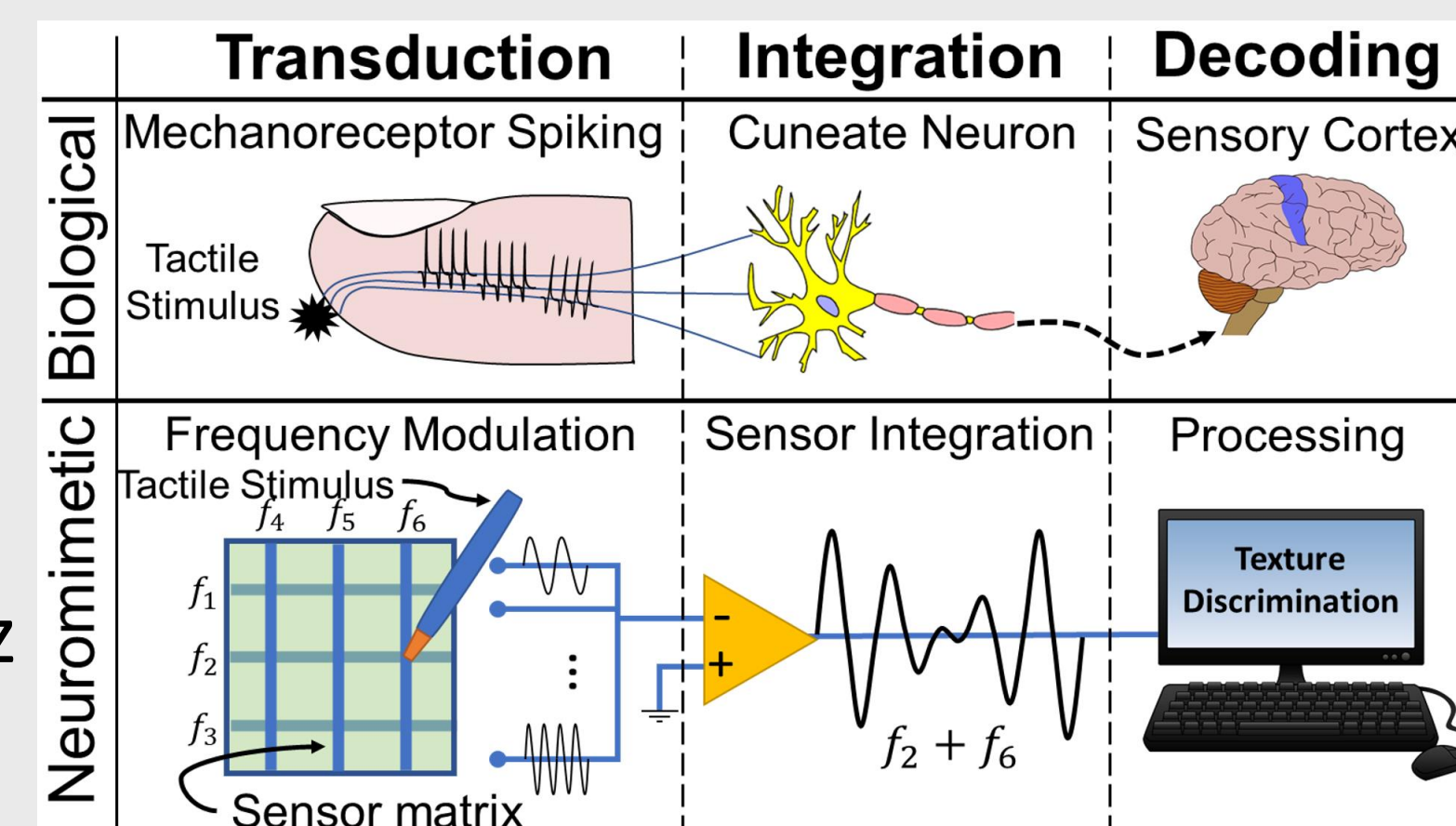
SOLUTION

- Flexible, multilayered electronic skin
- Biomimetic artificial receptors for tactile sensing



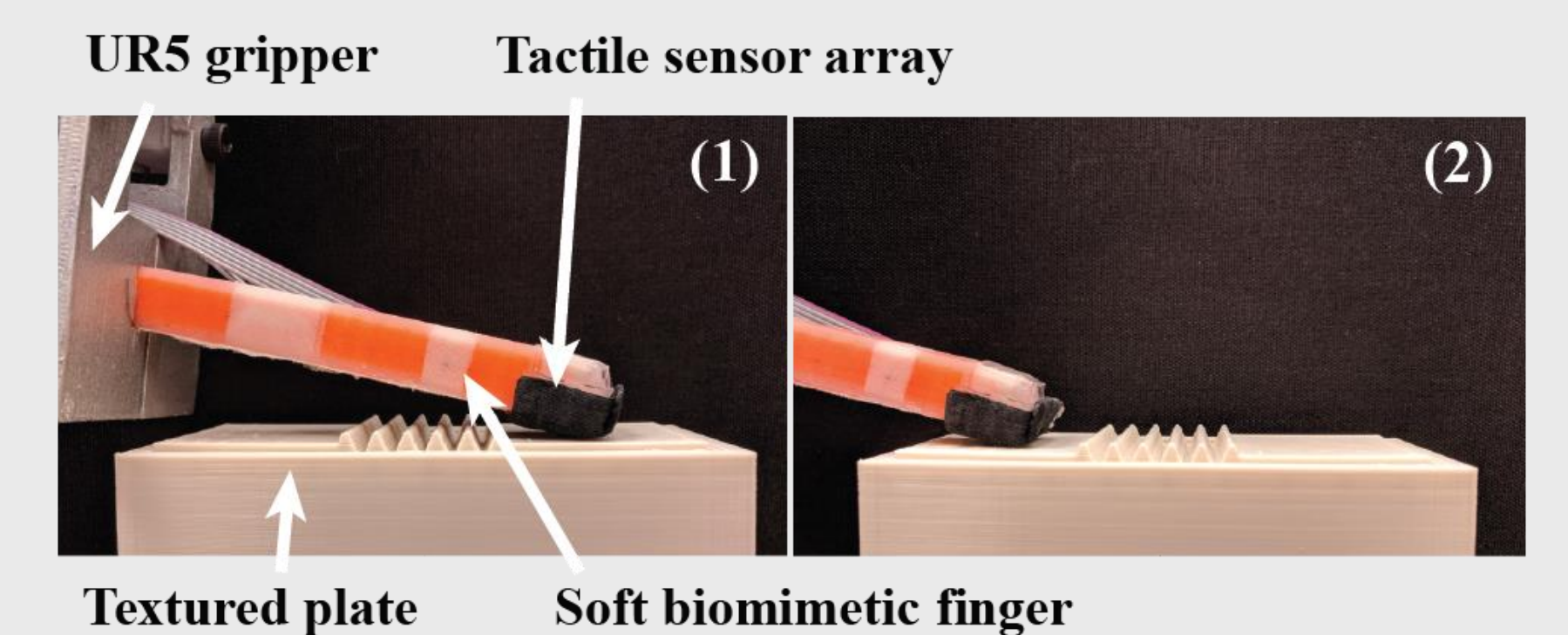
- Asynchronous, frequency multiplexed tactile sensor arrays
- Single wire transduction with kHz temporal resolution

- Pneumatically actuated soft biomimetic finger with integrated flexible tactile sensor for texture discrimination

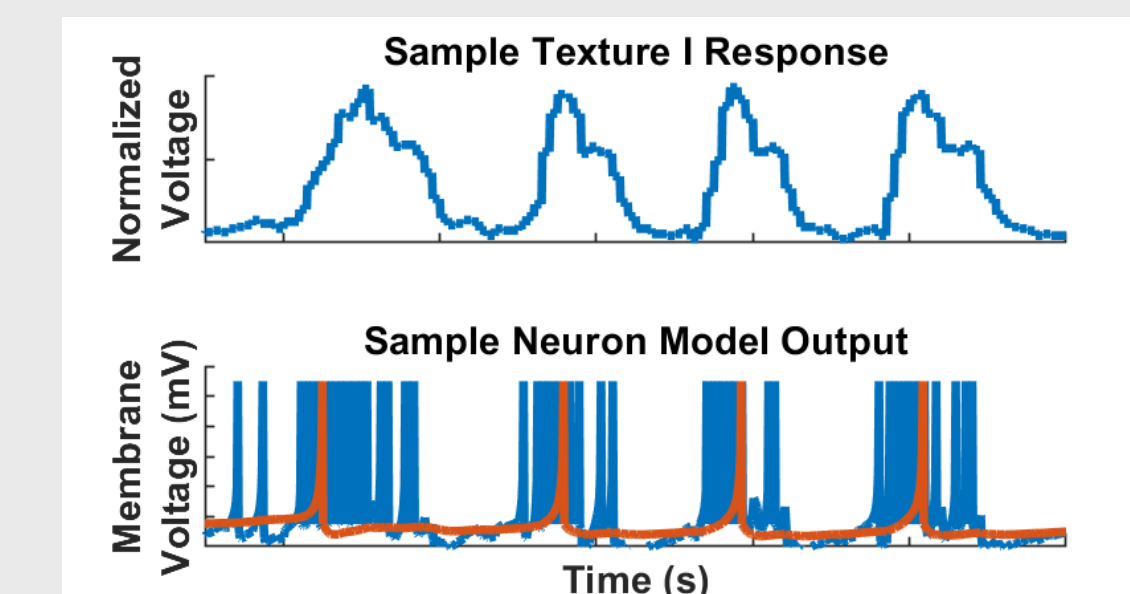


RESULTS

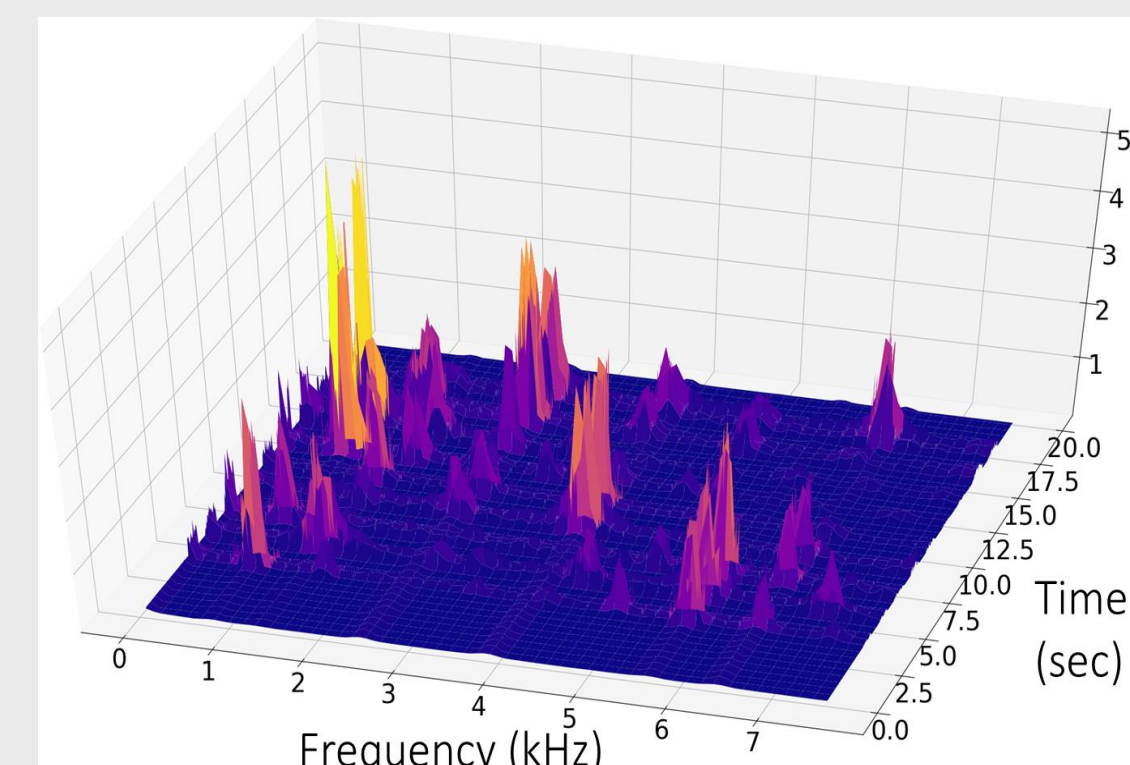
- Compliant palpation of the tactile environment



- Neuromorphic encoding and stimulation for object detection

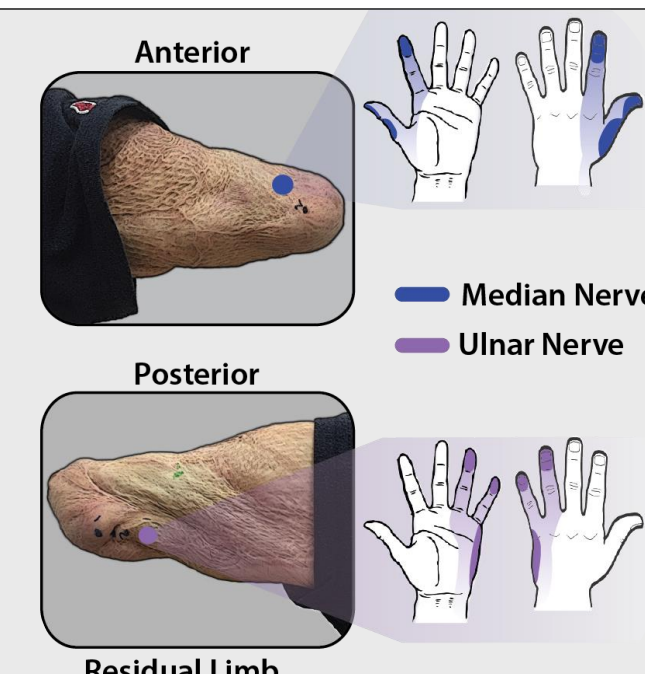


- Spectral analysis of frequency multiplexed sensor array for texture discrimination



IMPACT

- Natural tactile sensory feedback for upper limb amputees for more natural touch, texture, shape, and object recognition



- Foundation for multisensory skin and sensory perception in autonomous sensorized robots and human interactions



- Educational impact through Neural Prostheses course for undergrads and student training for local high school students and REUs

REFERENCES

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