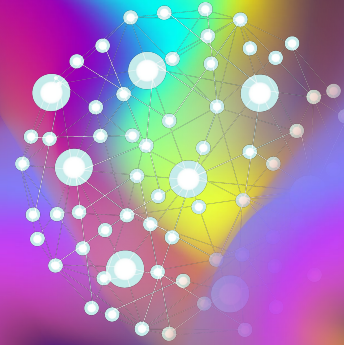# Simulating How the Human Body Responds to **Haptic Feedback**

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01 Current issues

Disconnected Simulations

Disconnection between physical and neurological simulations

Metaverse Experience

Need of more realistic and immersive interactions with entities within the Metaverse

Visual Haptic Rendering

Teleconferencing application that captures haptic information through synthetic visual data

" How can we prototype **haptic experiences** in a virtual environment to better inform the fabrication of physical devices? "

03 Our Solution

Experiment Setup

Use Finite Element Analysis to combine afferent simulations with a physically realistic model of the hand
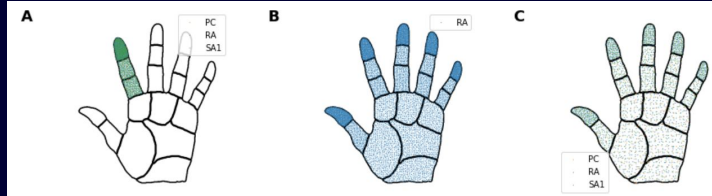
Data Collection

Sample a variety of different textures (eg. granite, marble, rubber)
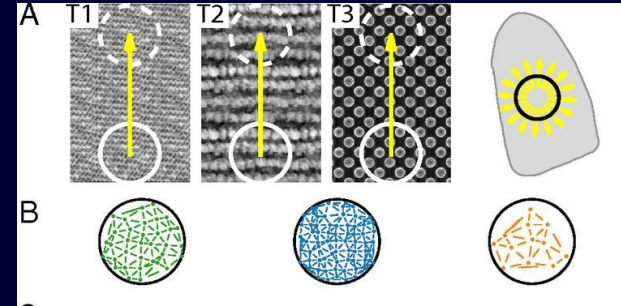
Validation

Run the simulation to obtain afferent responses, and use ML to validate their accuracy through % correct guesses
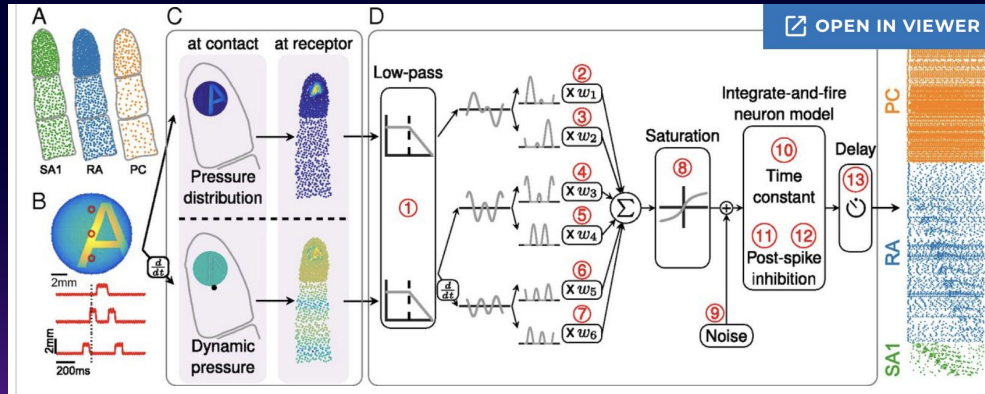
04 TouchSim Tool

▲ Figure 1: Localization and Density of Afferent Population on a Coordinate System

▲ Figure 3: Example of extracting motion direction from the responses of populations of afferents (validation purpose)

◄ Figure 2: Use of integrate-and-fire (IF) neuron model to create responses of individual afferents to the stimulus in different signal information (PC, SA1, RA), which can be used to perform validation tasks by ML models

- PC: pacinian corpuscles
- SA1: slow adapting type 1
- RA: rapidly adapting

Thanks for Listening!

Floor is open to questions

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