Somatosensation is a collective term for sensory signals from the body.

nociceptor cells are different from normal mechano- and thermoreceptor cells in that they signal when these sensations reach a damaging level. I am leaving out chemosensitive neurons for simplicity.

The light touch and deep pressure sensors desensitize quickly. That’s the reason why we stop feeling our clothes. The sustained pressure sensors, in contrast, do not desensitize. They tell us about the position of our limbs and subserve our ability to feel fine detailed surface patterns.

Mechanoreceptor cells in the skin respond to pressure and vibration by opening sodium channels. These cells fire action potentials to send their signals into the spinal cord and/or the medulla oblongata.
Thermoreceptors

Two types of temperature-sensitive cells: warm and cold.

either temperature itself or certain substances open thermoreceptive channels and allow the flow of sodium and calcium ions into the thermoreceptive cell.
Nociceptors can cause chronic pain if damaged. (A) In the normal state, if a nociceptor is activated by a noxious stimulus, the neuron transmits the information to the brain and creates a painful sensation. (B) If the nociceptor is damaged, it can start firing randomly, signaling to the brain causing a phantom pain known as neuropathic pain.

The two-point threshold is the minimum distance at which two stimuli are just perceptible as separate...
Receptive fields covering the fingers are small. Cells responding to the palm have larger receptive fields. Cells responsive to touch of the forearm have yet larger receptive fields.

Recall that there are two complementary types of visual responses produced in the retina: on-center and off-center responses.

The receptive field of a neuron in the somatosensory thalamus or primary cortical somatosensory areas receptive field comparisons for different somatosensory receptive field types.

Outline
- Fire and spice: pressure, temperature and noxious stimuli
- Touch fields: size and organization
- The homunculus: wiring of somatosensory system
- Fooling touch with vision: behavioral therapy for phantom limb pain
Nociceptive and touch systems are processed in parallel.

There is no feedback in the somatosensory system, like the visual system, and unlike the auditory system.

Primary somatic sensory cortex (Area S1)

Areas 3b and 1 receive input from the skin.

Areas 3a and 2 receive input from muscles and joints.

here is rat-unculus
The naked mole rat

34% of the body map is devoted to the teeth; the somatosensory cortex is relatively big and covers what is typically a visual cortex.

Star-nose mole

The nose scans the environment with fast, frequent movements (13x/s). It takes as short as 50 ms for the star-nose mole to identify and eat a prey. It is by far the fastest and most efficient predator on earth!

Large cortical representation for the 'nose' within S1

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Phantom limb syndrome

The mirror box: visual therapy for phantom limb pain

http://www.youtube.com/watch?v=gc3CmS8_vUI&feature=related