

A new generation of MEMS in medicine to assist, enhance and expand human sensory perceptions

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The human body is equipped with various general senses: we can smell, hear, taste, touch, see and sense temperature as well as ourselves (proprioception). These senses are of extraordinary value but we cannot change them even if this proves to be a disadvantage in our modern times. However, we can assist, enhance and expand these senses via microelectromechanical systems (MEMS). Current MEMS cover the range of the human sensory system, and additionally provide data about signals that are too weak for the human sensory system (in terms of signal strength) and signal types that are not covered by the human sensory system. In our interdisciplinary, biophysics-based approach existing MEMS sensor designs are modified and adapted (to keep costs at bay), via biomimetic knowledge transfer of outstanding sensory perception in 'best practice' organisms (e.g. thermoreception, UV sensing, electromagnetic sense). The MEMS are then linked to the human body (mainly ex corpore to avoid ethics conflicts), to assist, enhance and expand human sensory perception (artificial eyes, magnetic sense for facilitated orientation, etc.). Examples of created products comprise sensors that vibrate when a blind person approaches a kerb stone edge, devices that allow divers better orientation under water (echolocation, ultrasound), special glasses that allow vision in the ultraviolet range, vibrating devices on the steering wheel that inform car drivers of low fuel level, enhanced hearing capabilities (ultrasound, infrasound) and electromagnetic senses.