

Perception Modeling for Sensory Substitution in Medical Applications

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While Sensory Substitution is commonly understood in the context of cognitive neurosciences as a substitution of visual input by other typically tactile or acoustic sensations, this can be generalized to any other sensing modality. The goal is the analysis of the abstract domain representation of a given "robotic sensor" and synthesis of similar observability properties from other physical sensors. Examples can be here: a force sensor substitution built from a video camera observing physical stretches of a rubber membrane or a measurement of blood flow in veins from Doppler acoustic properties measured with an ultrasound probe. Examples of such sensors in medical applications will be presented.

The research results provide new tools for novel sensor development in medical robotics. The expected impact is to increase the modularity aspect in the sensor configuration, where one sensing modality can be replaced by another based on costs, desired accuracy, and availability of physical sensors.

This helps to increase the overall system availability in case of sensor failures and provide a framework to find temporary substitutions. At the same time, the quality of the new configuration can be calculated from the analysis of the approximation of the original sensor characteristics with the substitution system.



主催: 東京大学グローバルCOEプログラム「機械システム・イノベーション国際拠点」
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