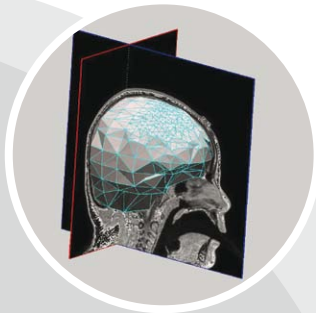




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assisted medical interventions

## ONGOING PROJECT **BRAIN-SHIFT COMPENSATION WITH BIOMECHANICAL MODELLING**



During a neurosurgical intervention, the brain soft tissues tend to collapse or to bulge. Our aim is to develop a biomechanical modelling technique to compensate for this so-called “intra-operative brain-shift”. First, a pre-operative MRI scan is used to locate the tumor area. Then, a pre-operative angiographic MRI image is taken on which the cerebral vascular tree structure can be identified.

During the intervention, Doppler ultrasound imaging is used to locate the intra-operative positions of the brain vessels. A non-linear registration between the pre-operative vascular tree and the intra-operative position of the same vessels yields a sparse 3D displacements field of the brain soft tissues. Finally a Finite Element biomechanical model of the brain is used to smooth and extrapolate this displacement field to the whole brain volume. The brain model is thus deformed in accordance with the observed brain-shift which, in turn, makes it possible to accurately locate during the intervention the tumor.

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