Rethinking Medical Robot Design with Additive Manufacturing

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Extending the use of magnetic resonance imaging (MRI) from diagnosis to image guidance during surgery is motivated by the large number of surgical candidates suffering neurological diseases—more than 2 million patients in the United States. However, MRI guidance is rarely used because the tightly confined space inside the MRI scanner deters adequate clinician access to the patient. Thus, a compact, non-magnetic robot is needed in order to do the surgery inside the scanner. This presentation summarizes recent advances in the design, manufacture, and validation of an MRI-compatible surgical robot. I emphasize how the integration of additive manufacturing and biological inspiration can aid in robot design innovation, harnessing powder-based fusion technology to create low-cost flexible fluidic actuators. These pneumatic robots could translate to advances in medicine in the form of disposable devices in surgeries as well as customized assistive devices for rehabilitation.

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