

Potential Applications for

Simultaneously Powering and Controlling Many Actuators with a Clinical MRI Scanner

We are developing tetherless surgical robots using Magnetic Resonance Imaging (MRI) systems to power, control, and image robots under the guidance and control of a surgeon. MRI systems are widespread and provide high quality soft tissue images without using dangerous radiation. The same magnetic fields that can image through a patient's body can also be harnessed to apply forces on small steel ball-bearings. Our research finds ways to use these forces to power *actuators*—individual motors—by caging the steel balls in wheels attached to axles. Gears on the axles can transmit power to a range of devices. This paper presents a method to power and control *multiple* actuators at the same time. Being able to control multiple actuators gives the surgeon more dexterity. If none of the axles are parallel, our method guarantees the different actuators can be made to move at the desired speeds or to desired final positions.