**Fluid Power Advancements**
The medical environment requires compact, integrated fluid power systems that are clean, and sterilizable.

**Conceptual sketches of preliminary integrated fluid power ideas enabled by multi-material rapid prototyping**

**Relationship to CCEFP strategy**
- Fluid power in new industries (neuroscience, medicine)
- Small-scale, compact, integrated fluid power devices
- Fluid power devices that work intimately with humans

**Test Bed**
- Brings a new (zero construction cost, zero maintenance) Test bed to the center: MRI scanners (3 at Vanderbilt and one at Georgia Tech)

**Collaborators**

**Goals**
- Enable real-time MRI image feedback during surgery to enhance accuracy and reduce invasiveness.
- Enable real-time functional MRI mapping of brain activity during rehabilitation to adaptively improve therapy.

**Motivation**
- Fluid power (pneumatics or hydraulics is the only technology that can work in high magnetic fields during imaging)
- MRI provides excellent soft tissue differentiation
- MRI thermal imaging is possible to monitor thermal therapy

**Challenges**
- Must use components unable to be affected by magnetic fields
- Components must not affect image quality
- System must be compact and easy to use
- Must be clean and sterilizable

**Achievements**
- Prototype construction underway
- Have observed surgeries and identified potential candidate procedures
- Line dynamics test bed constructed and
- Preliminary controllers implemented.
- Have tested various rapid prototyping materials for MRI compatibility.