**Robotic bronchoscopy for diagnosis of suspected lung cancer**

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**Supplemental Digital Content 2**

**The patient-side system, controller rack and operator console**

The patient-side system (see Figure, Supplemental Digital Content 1) includes two robot arms, both bronchoscope and sheath instrument device manipulators (IDMs) and required electronics. The patient-side system is used to transmit physician controls to the endoscope. The two robot arms move synchronously (in a virtual rail) in space to control the endoscope insertion and relative motions between sheath and bronchoscope.

The controller rack houses the electronic systems required to provide power and four computers required to operate the robotic system. One of the four computers processes the frames from the micro camera at the tip of the endoscope and outputs video streams on the operator console. The cart is comprised of two smaller carts, the system controller cart, and the arm controller cart.

The operator console is a mobile workstation that can be positioned anywhere in the room. It allows the operator to perform the bronchoscopic procedure remotely while sitting at the operator console. The console includes an endoscopy controller that allows the operator to control various aspects of the system during a procedure. On the endoscope controller, two inputs are used to drive and articulate the endoscope while additional buttons are used to control irrigation and aspiration. For the purpose of this study, an off the shelf gaming controller was used. Two 21-inch monitors, integrated into the operator console, display real time video captured from the endoscope camera supplemented with information on the status of the robotic system.