Insertable Stereoscopic 3D Imaging Device with Pan and Tilt

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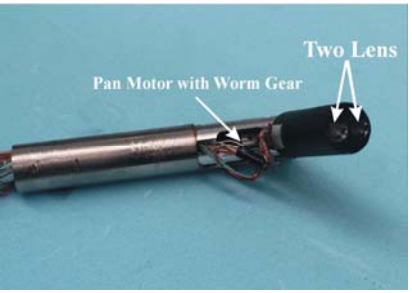
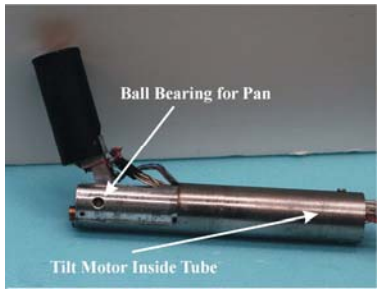
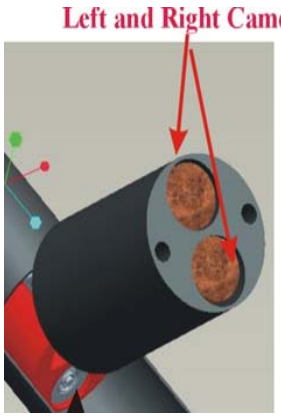
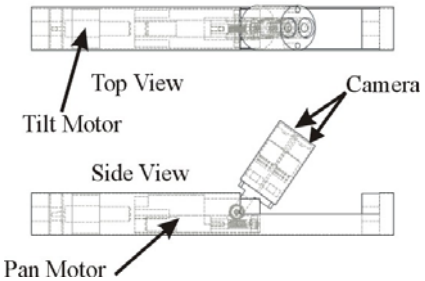
Overview

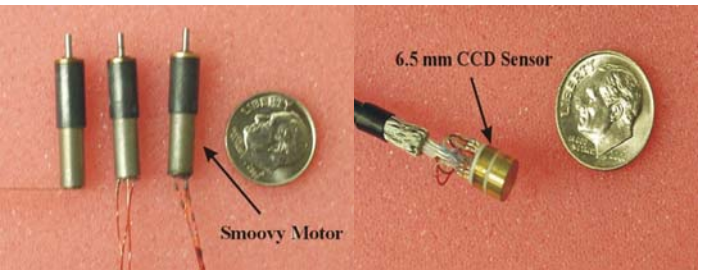
- Fully insertable binocular camera platform
- Platform affixed to abdominal wall
- Supports single port and NOTES surgery
- 15mm diameter, Pan/Tilt axes
- Full 3-D depth perception from stereo output







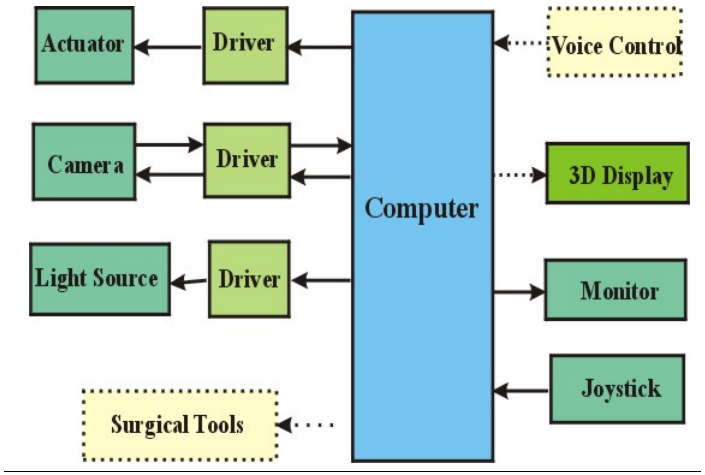




Servo motors and camera head

Software

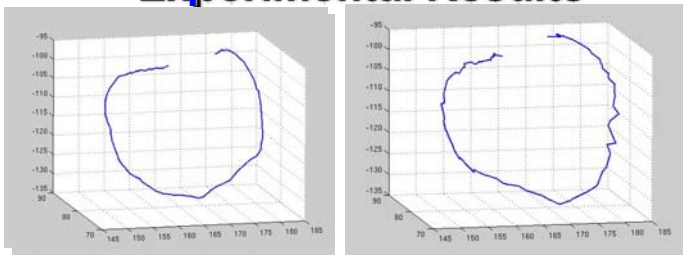
- Intuitive, Simple Joystick Control
- Position/Velocity control of axes
- Real-Time Image Processing:
  - Digital Zoom
  - Image rotation/stabilization
  - Picture-in-Picture
  - Visual Servoing/Tracking
  - 3D stereo display output
- Voice control



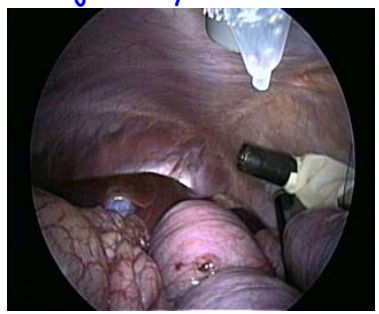
Tracking

- Real-time autonomous tracking of instruments/organs
- Manual seed, updated at 30 Hz
- Cameras keep target tin center of FOV
- Can recover target after occlusion

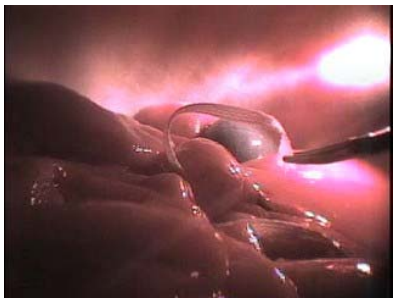
Experimental Results

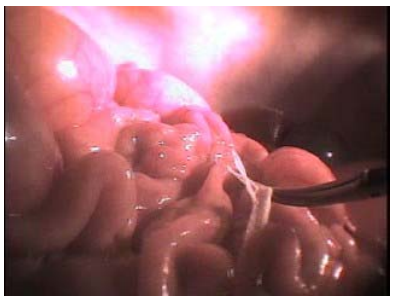


Tracking: Left: 3-D ground truth trajectory
Right: Recovered Trajectory from Stereo



Device inside abdomen





Sample Images