

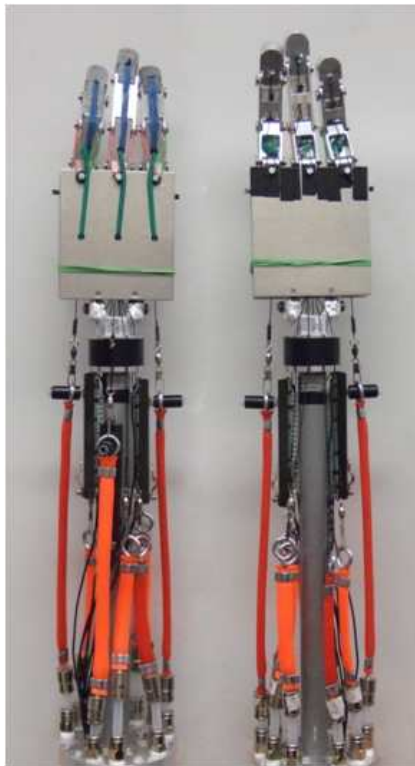
Benchmarking Efforts

P09029 – Robotic Hand Improvement

Past MSD Projects

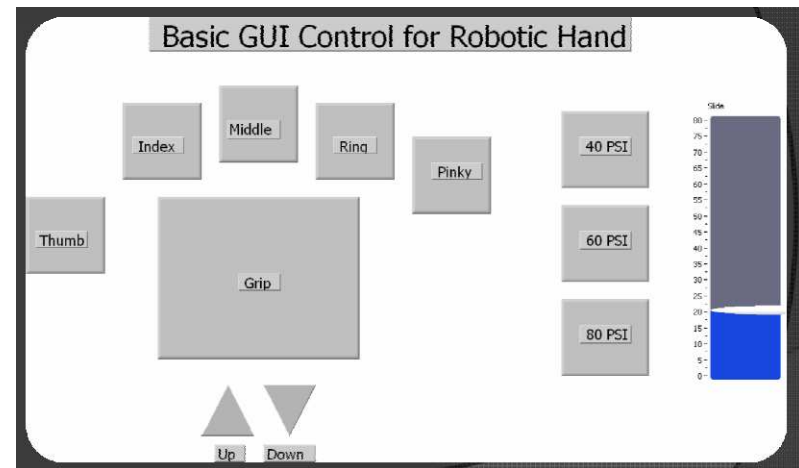
First Gen

- 10 lbs of force from air muscles



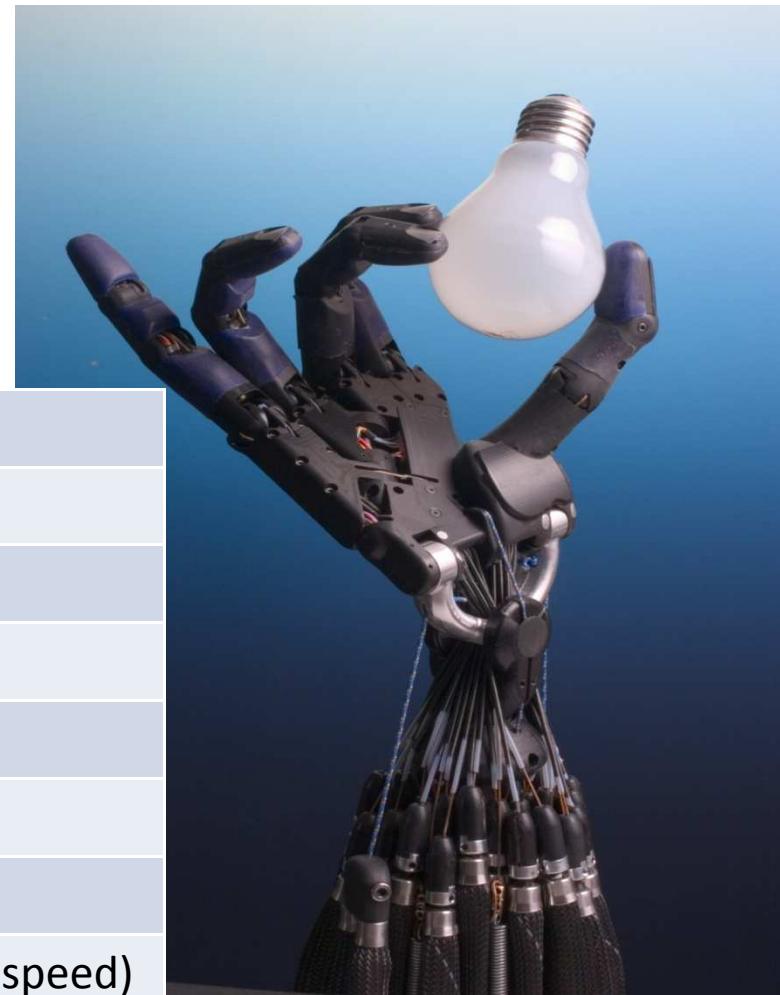
Second Gen

- Easy to use interface



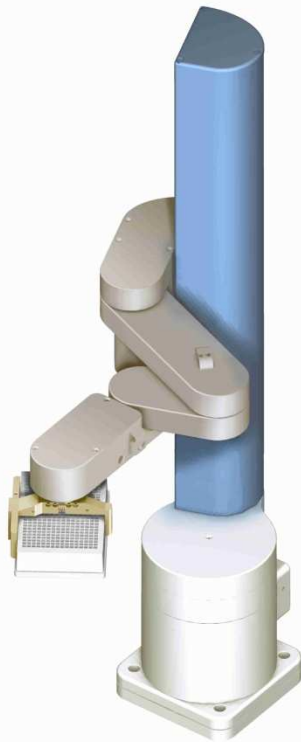
Shadow Robotics

- Most accurate robotic hand available
- Angular resolution of 0.2°



Number of muscles	
Valve	1A max @ 28V
Air consumption	0.015L per muscle
Compression	3.5 bar
Wrist Range (Up-Down)	45° up, 55° down
Wrist Range (Left-Right)	10° left, 30° right
Weight	3.9kg
Time to clench hand	0.20s (half of human speed)
Maximum Strength	225N at wrist

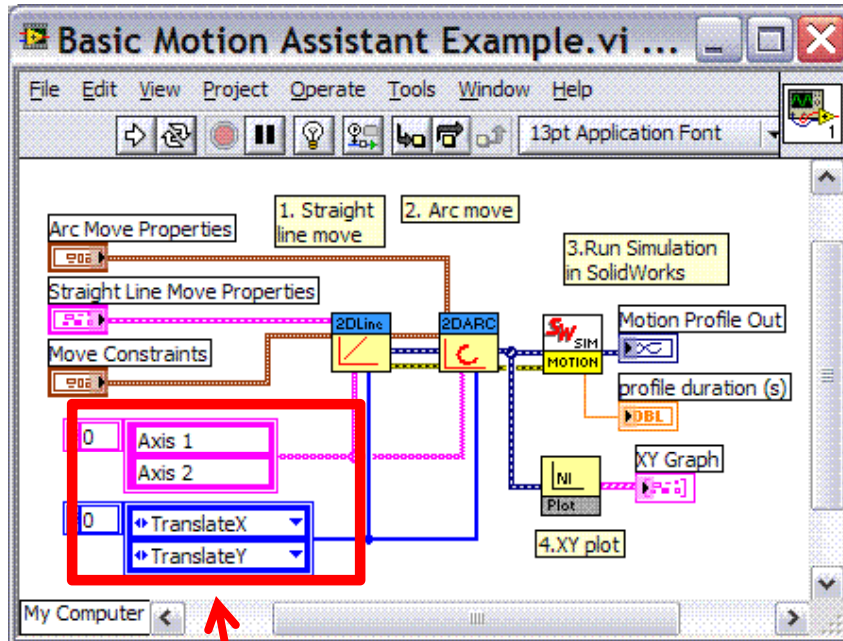
AB Controls: APIX



- Used for Pick and Place Operations
- Uses LabVIEW Interface

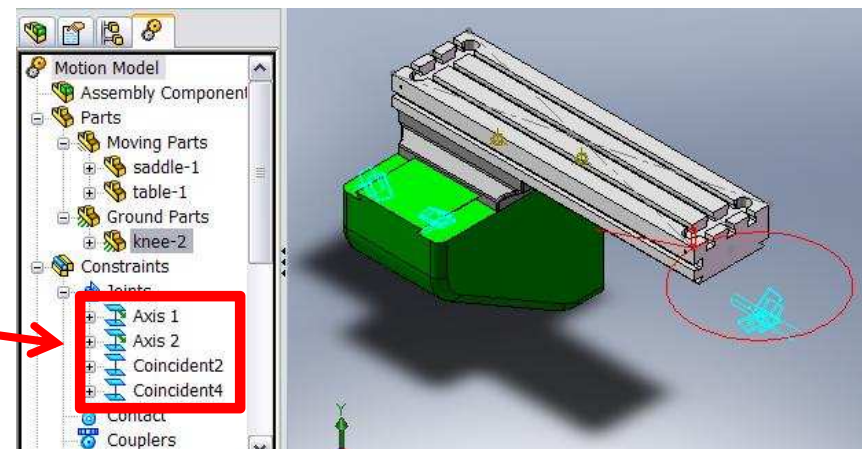
Axes	4
Max Payload	2kg (4.4lbs)
Repeatability - Extend	0.100mm (.004")
- Vertical	0.05mm (.002")

NI LabVIEW-SolidWorks Mechatronics Toolkit Example



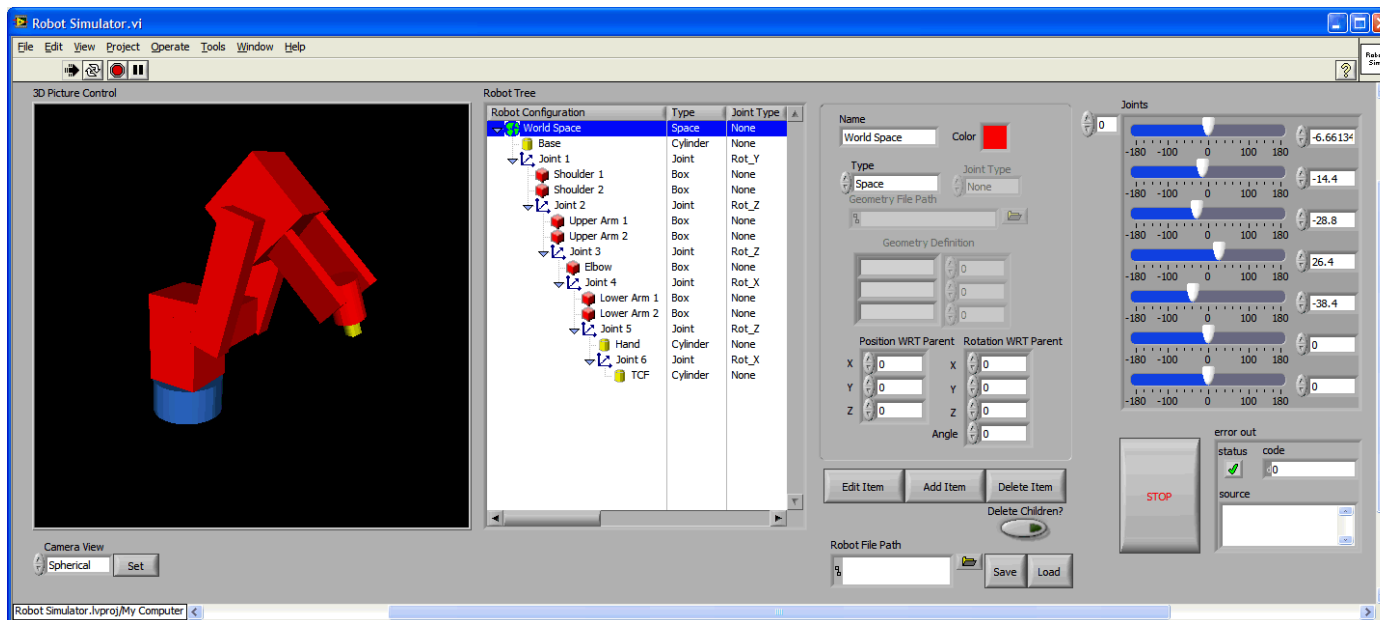
- Toolkit connects LabVIEW to SolidWorks to Simulate motion of prototype
- Allows for visualization, data collection, and analysis of “working model”

Matching Axes and Arcs



Robotics Simulation Utility

- Intricate and fleshed out LabVIEW interface
- Shows impact of movements on a “mini robot”
- Used to build and manipulate mini robots, not for real life applications



Da Vinci Surgical Robot

- Eventual adaptation for project
- Consists of Control and Robot Modules
- 4 arms
- 7 degrees of motion
- 90° of articulation



- Difficult to control – very unintuitive
- Requires at least 2 people
- Modules are bulky
- Not accurate to human motion

Sources

- <https://edge.rit.edu/content/P08023/public/Home>
- <https://edge.rit.edu/content/P08024/public/Home>
- <http://davincisurgery.com/>
- <http://www.shadowrobot.com/hand/techspec.shtml>
- <http://decibel.ni.com/content/docs/DOC-2430>
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