

REMOVING PEOPLE FROM:

- STERILE ENVIRONMENTS
- AREAS THAT ARE HAZARDOUS TO PEOPLE

UTILIZING ROBOT TELEMANIPULATION

BILL RUSITZKY

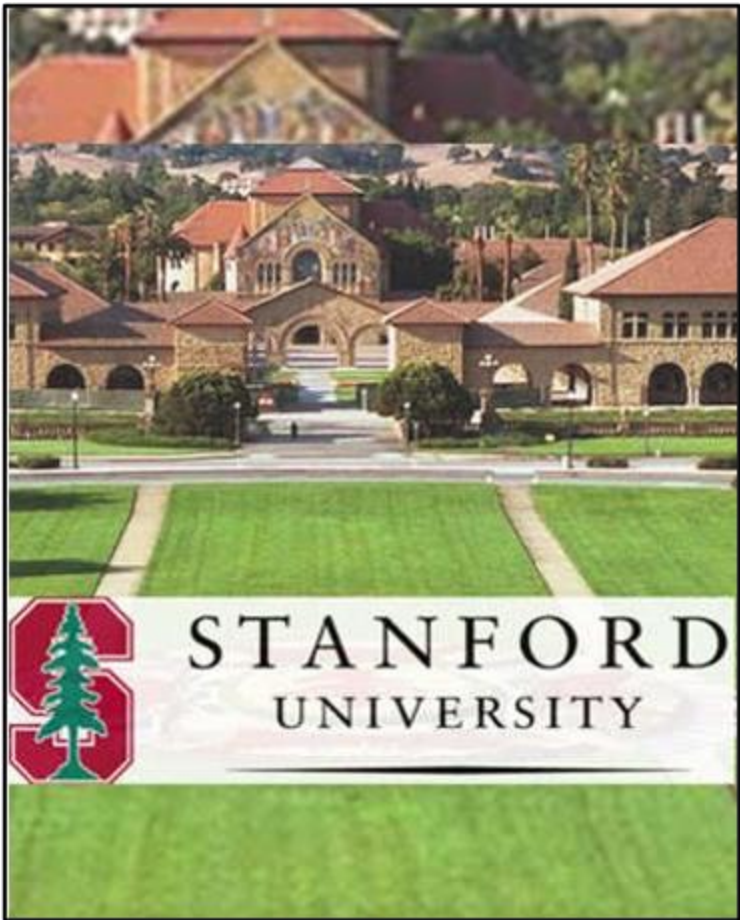


RAYA 2024 Finalist Event



Who is SRI

Independent nonprofit R&D institute Deep Roots in Silicon Valley



Founded in 1946
1,500 people
\$500 M USD Annual Rev



4,000 Patents
Spun out 70+ companies



SRI's Robot Telemanipulation Background

Founders of Robotic Surgery



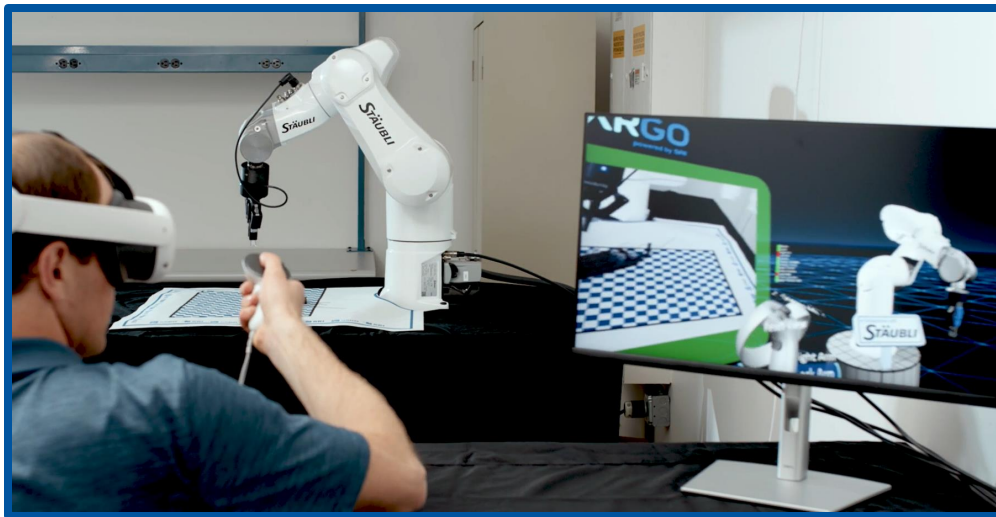
Bomb Disposal Mining



XRGo – Robot Telemanipulation Software



XRGO
powered by SRI®



“We expect that robot telemanipulation will play a vital role in ensuring precision, efficiency, and safety in pharmaceutical manufacturing. By **allowing people to manage issues without requiring proximity to the process**, this technology would help aligning with the new EU GMP Annex 1 revision through contamination risk mitigation, in addition to decreasing operational costs.”

Pfizer Jean-Maxime Guay
Senior Mrg, Manufacturing Intelligence



Value of Telemanipulation

Remove People:

- Create contamination
- The environment is hazardous

Highly Flexible

- Remotely manage tasks that are too challenging or expensive to automate
- Integrated with standard robots designed for pharma sterile manf

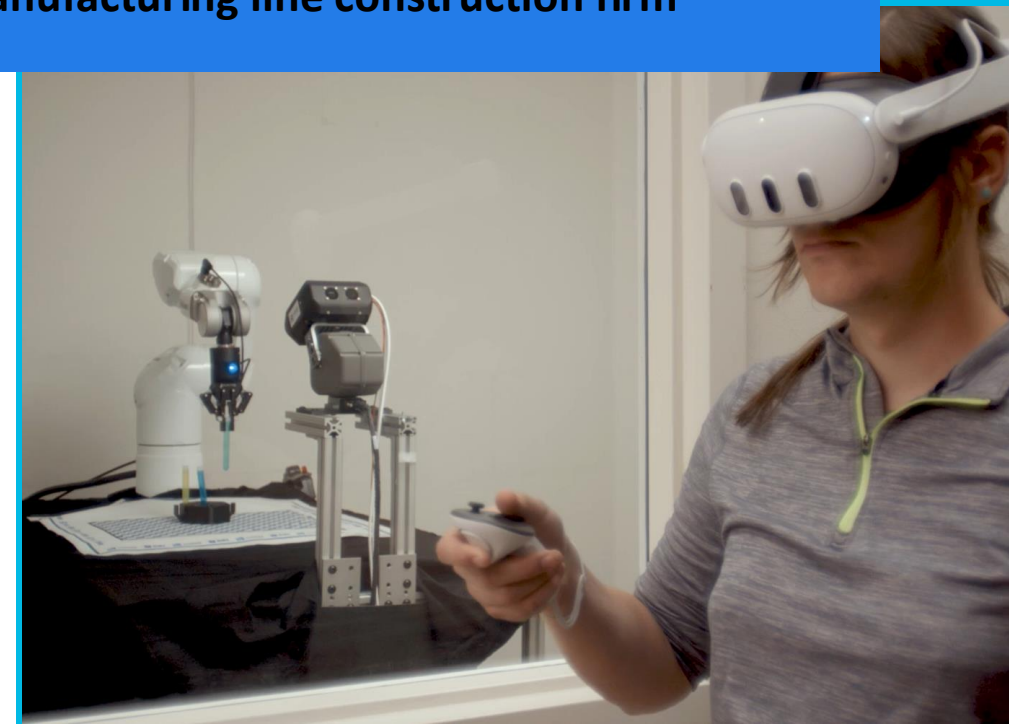
Typical Use Cases

- Repair
 - Slipped hoses, jammed machines
- Resolve
 - Broken glass, misaligned parts
- Maintenance – Replace filters

“Our vision is to be able to make a sterile pharmaceutical manufacturing line with limited need to put a person inside the sterile environment.

SRI Telemanipulation solution enables that vision to become reality.”

Pharma manufacturing line construction firm



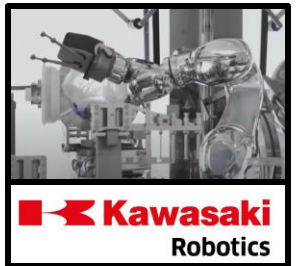
Industrial Robot Integration – Designed for Pharma

STÄUBLI

ROBOTICS



DENSO
robotics



Value of Telemanipulation

People in these areas increase costs

- Destruction of exposed pharmaceuticals
- It takes times to gown people
- Radio Pharma – Exposure increases risks
- Intervention costs \$50K-\$1M / incident

Allows more diverse workforce

Allows future manf lines to be re-designed



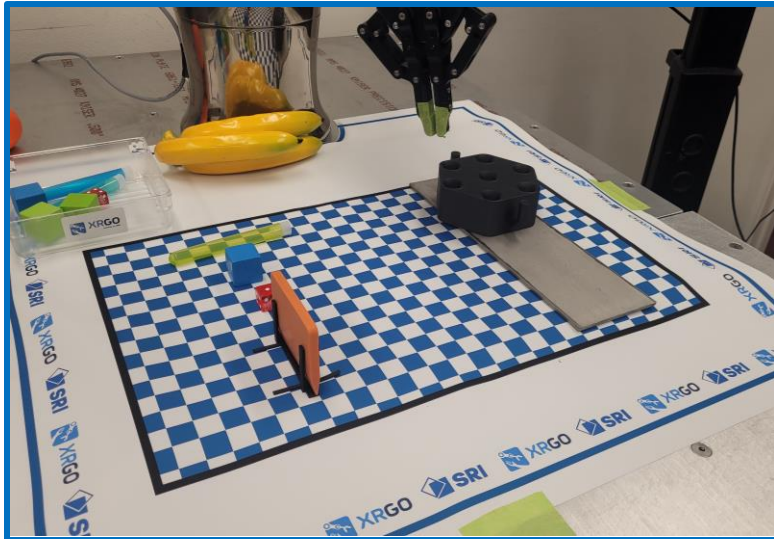
VIDEO DEMO



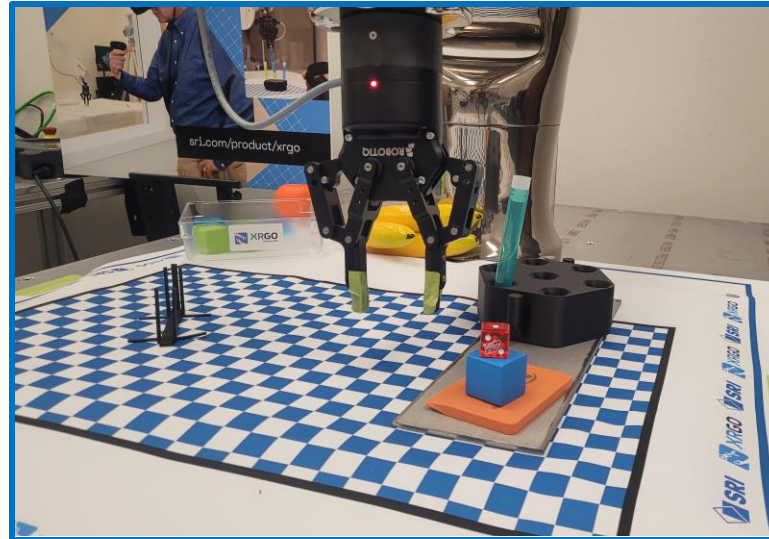
<https://www.youtube.com/watch?v=PRcAMLEzhuk>

Robot Telemanipulation Value of 3D Stereo Vision

3D vision 69% faster
More accurate telemanipulation



Starting Position



Ending Position



Camera View

Ready Today

System

- XRGo Software
- Laptop
- 3D Camera
- Foot Pedals
- VR Headset

- Connects to Staubli or Denso Robot arm



XRGo SRI International

XRGo Proof of Concept Product Robot Telemanipulation for Pharma Manufacturing

XRGO Overview

XRGo provides a telematipulation solution designed to test and develop processes for removing people from various pharmaceutical manufacturing processes allowing the process to be done remotely via telematipulation software designed to work with 3rd party robot arms.

The high-level uses cases are: repairs such as picking up broken glass, replacing filters, and reattaching hoses. Etc. Specific use cases can be discussed to determine the best solution.

The XRGo software and hardware will allow individuals to control robot arms by viewing the operating environment via a 3D stereoscopic camera into a VR headset, as seen in this video - [SRI's telematipulation software integrated with Staubli robot arm.](#)

The XRGo POC Product provides a turn-key solution for telematipulation Proof of Concept [POC] testing that includes XRGo software and hardware as well as a table to mount the intergrated robot arm. The product includes the following:

SRI International

ident, nonprofit research institute, headquartered in Menlo Park, California. SRI's mission is to support the development of technology for the benefit of society. We create solutions for a safer, healthier, and more sustainable future. We collaborate across technical and scientific disciplines to develop groundbreaking products and technologies and bring them to the marketplace. Learn more at www.sri.com.

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Training
SRI can provide on-sight training to do the initial configuration and training.

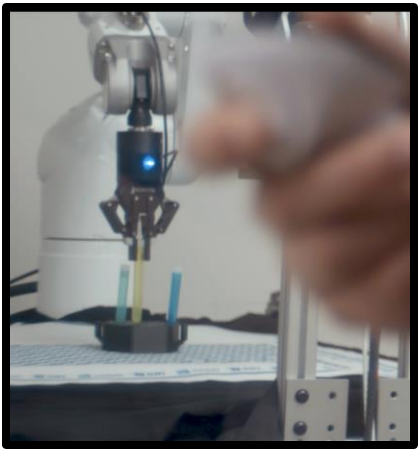
SRI Team Lead:
Bill Rusitzky
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Summery XRGoTelemanipulation Software

- **Designed to provide high dexterity teleop performance**
- **In production today**
- **Intuitive man-machine interface**
 - Enabling remote manipulation of complex tasks
- **Immersive 3D viewing transports user to the task**
- **Motion Constraints – Speed and Location**
- **Data Recording**
 - Video as well as actual positioning
 - Training - VR interface & immersive 3D simulation
- **Software designed to work with 3rd party robot arms**
 - Easily integrated to ROS based robots





XRGO

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Robot Telemanipulation will do for Pharma Manufacturing what Robot Surgery did for medical procedures



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