



INTRODUCTION TO ROBOTICS

(Kinematics, Dynamics, and Design)

SESSION # 4:

APPLICATIONS OF ROBOTICS

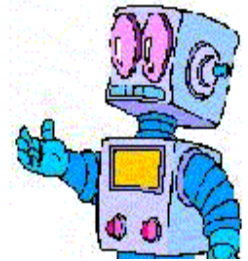
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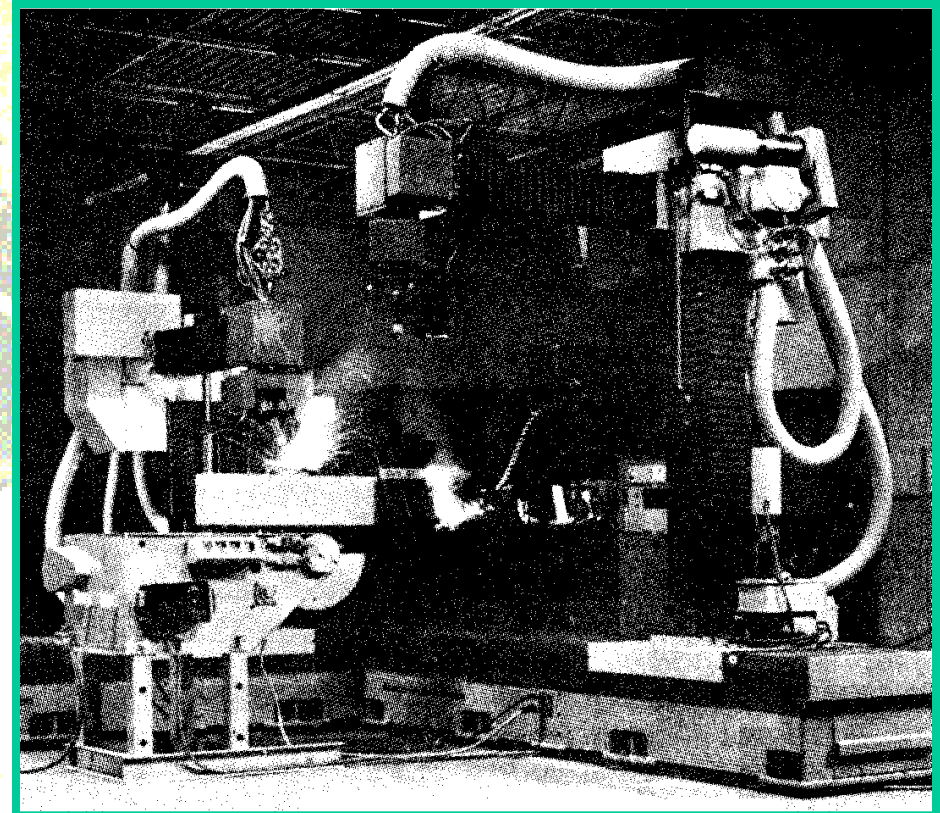
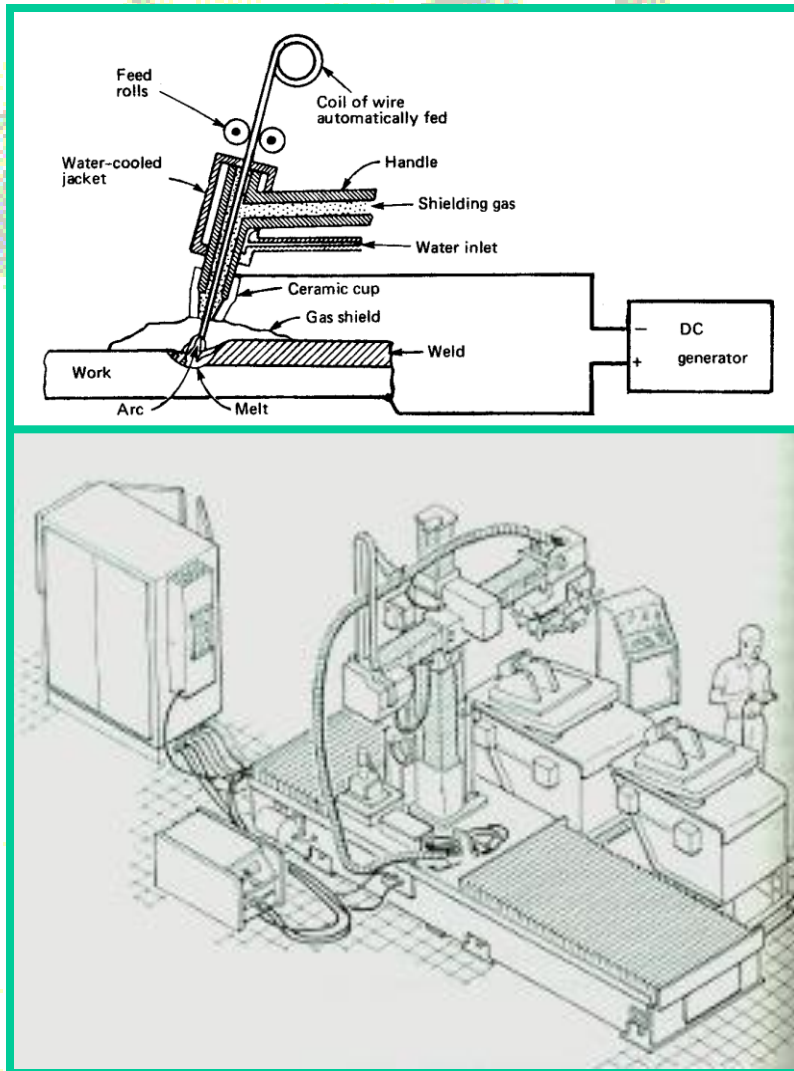
Homepage: <http://meghdari.sharif.edu>



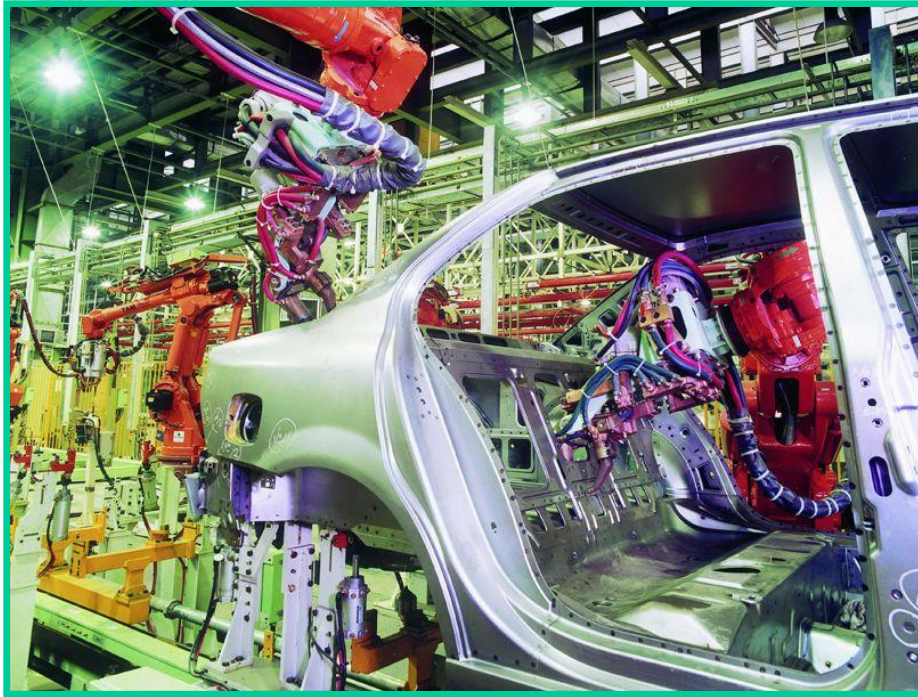
Robotics in Automobile Industry (i.e Welding, Painting, Cutting, etc.)



An Automated Arc Welding Operation



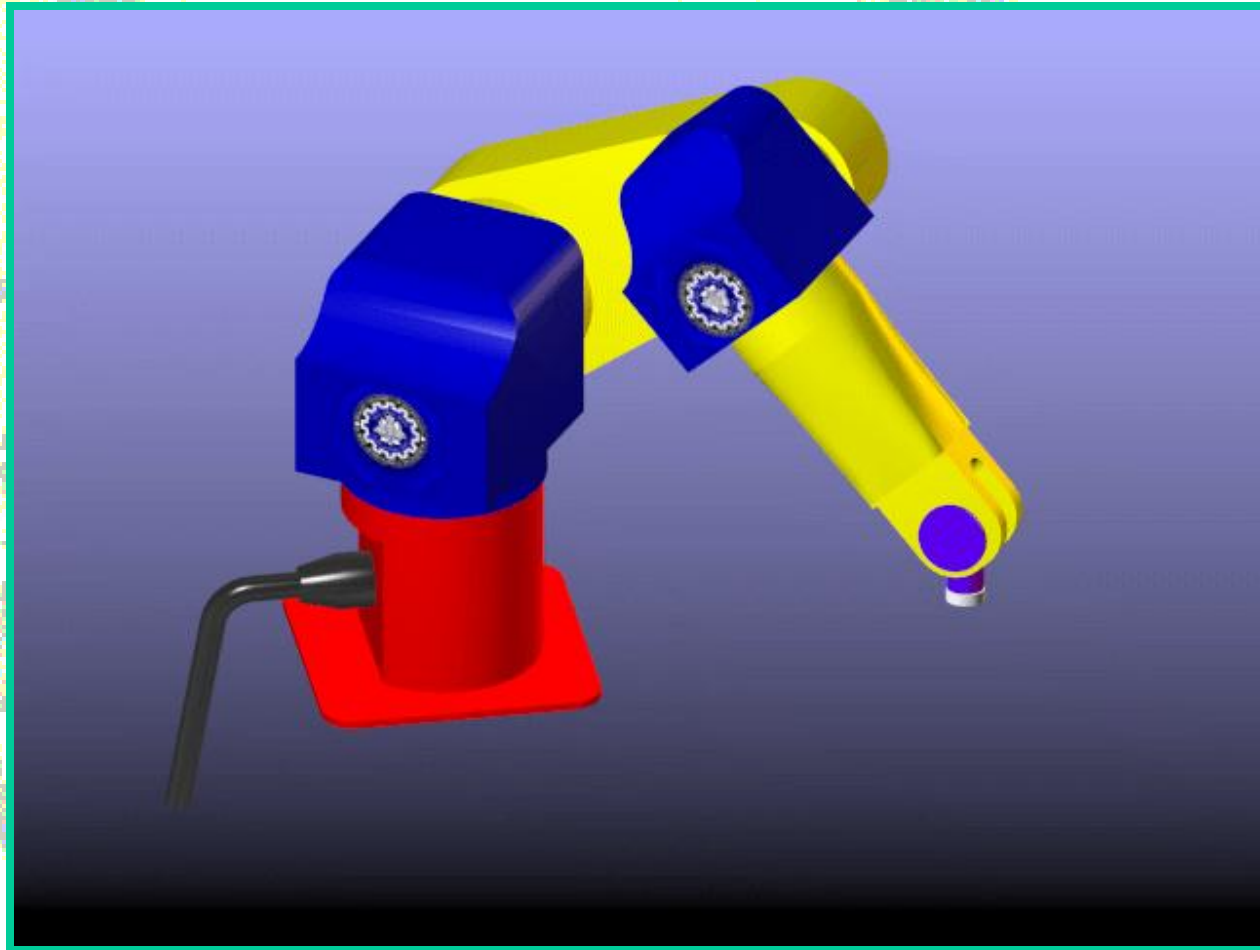
An Automated Auto Body Spot Welding Operation Line



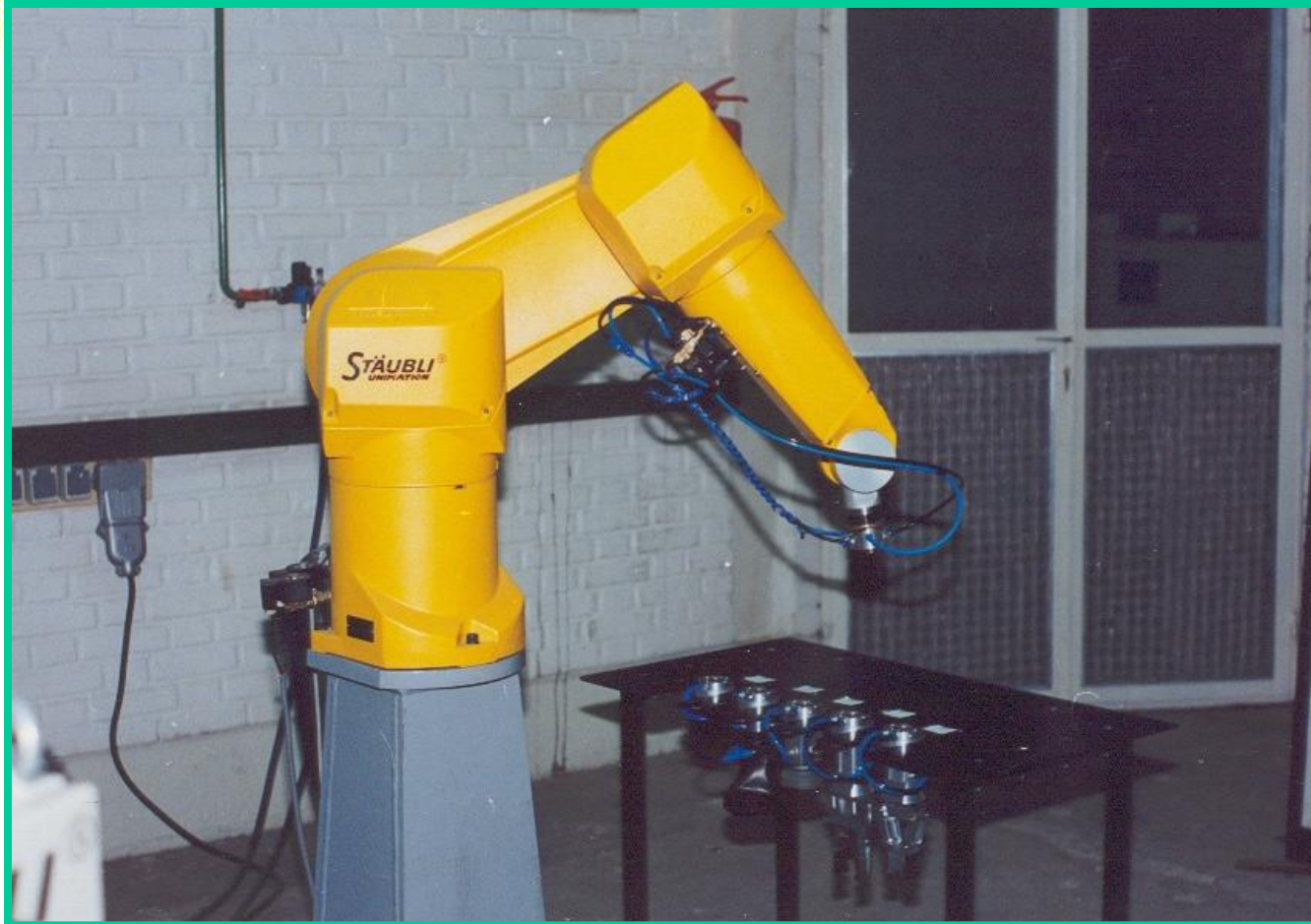
An Automated TIG (Tungsten Inert Gas) Welding Operation



A Glimpse of Robotic Applications in Automobile Industry



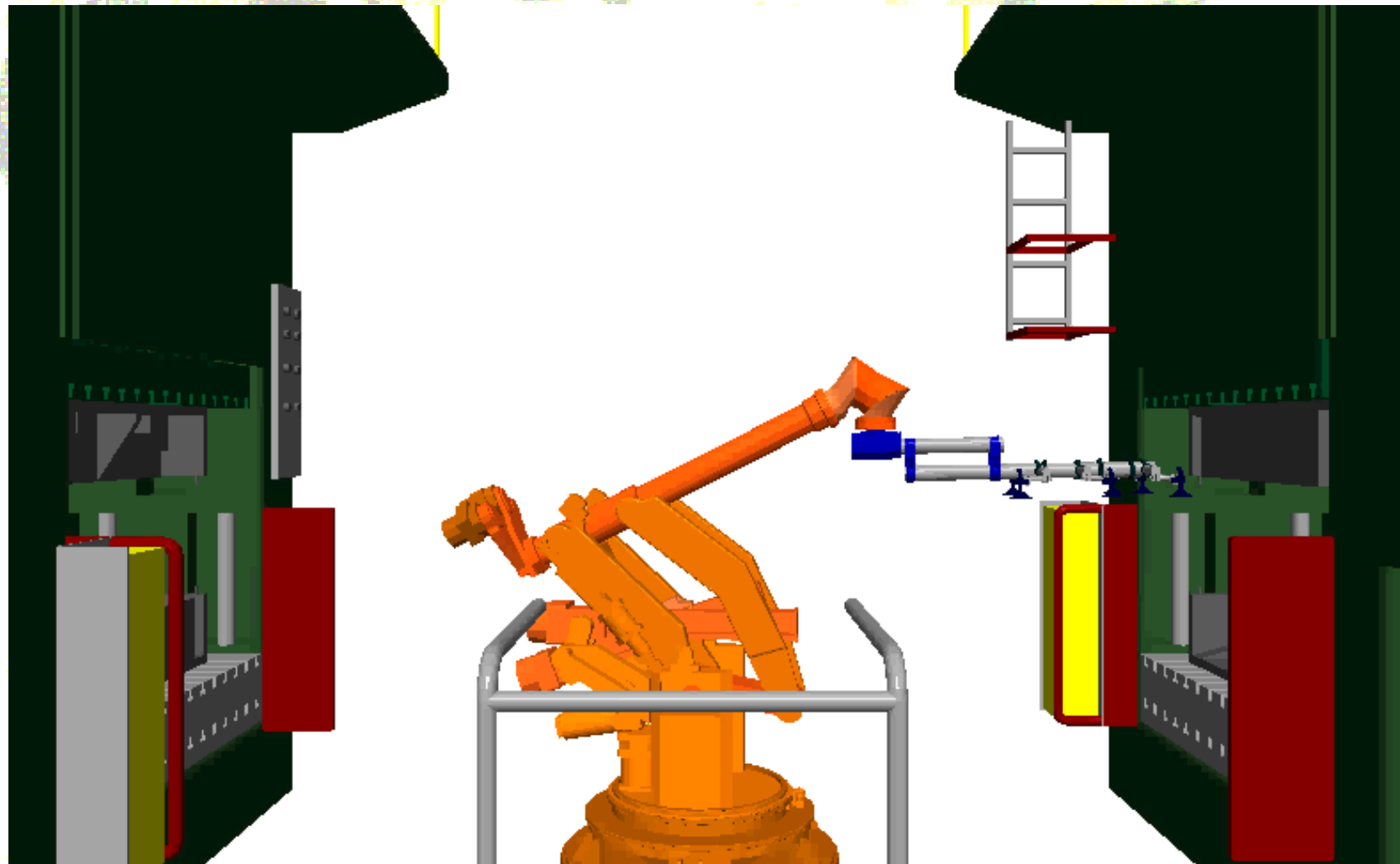
Advanced Manufacturing Research Center



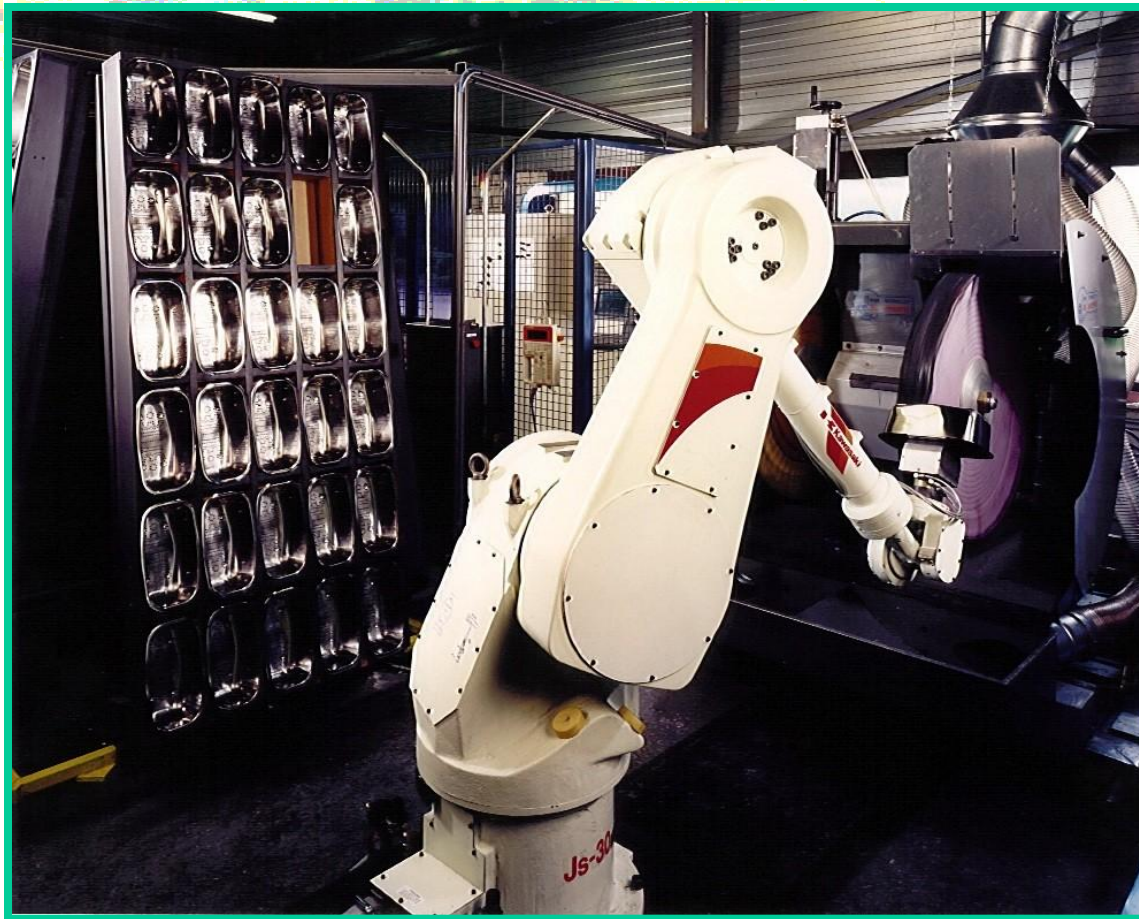
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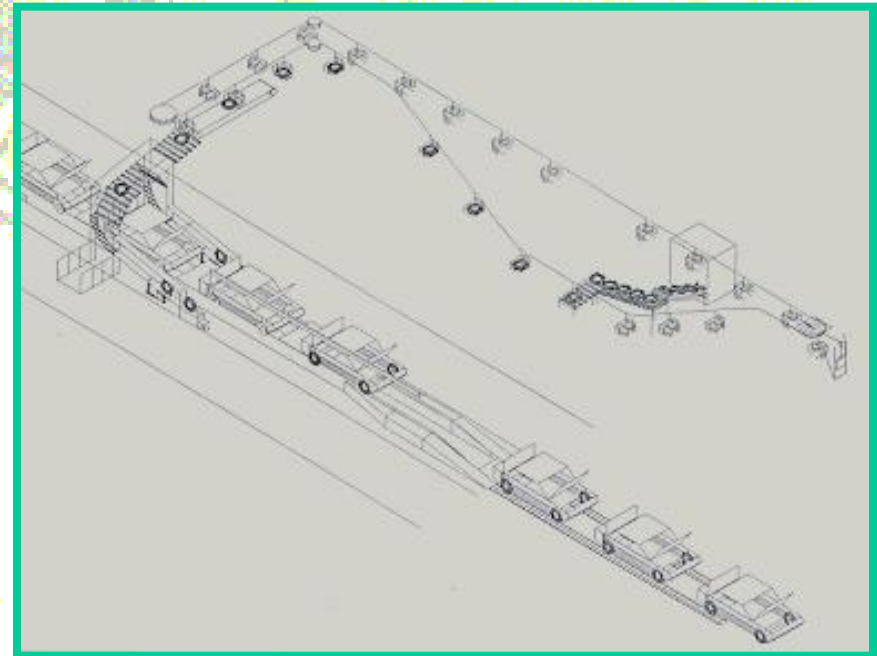
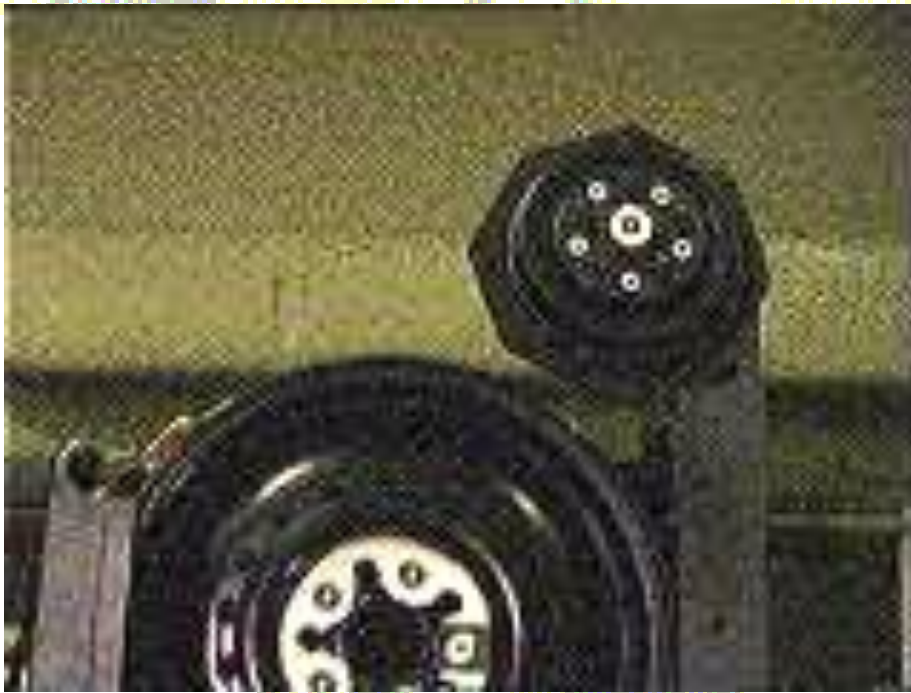
A Robotic System Assisting a Press



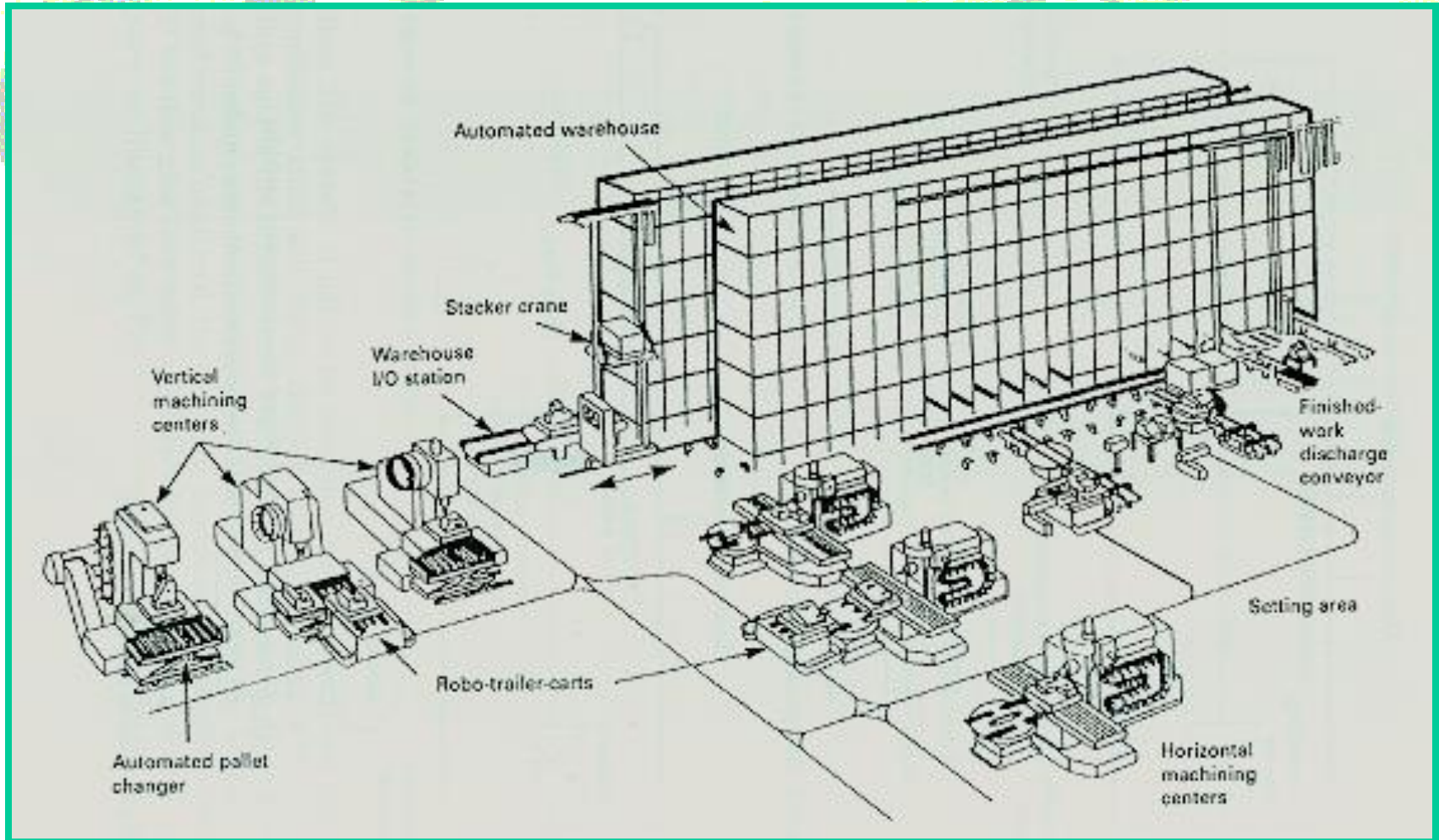
An Automated Steel/Brass Parts Polishing Operation



An Automated Vehicle Wheel Mounting Operation



A Fully Automated Factory Equipped with an Automated Warehouse





Robotics Applications in Food Industries

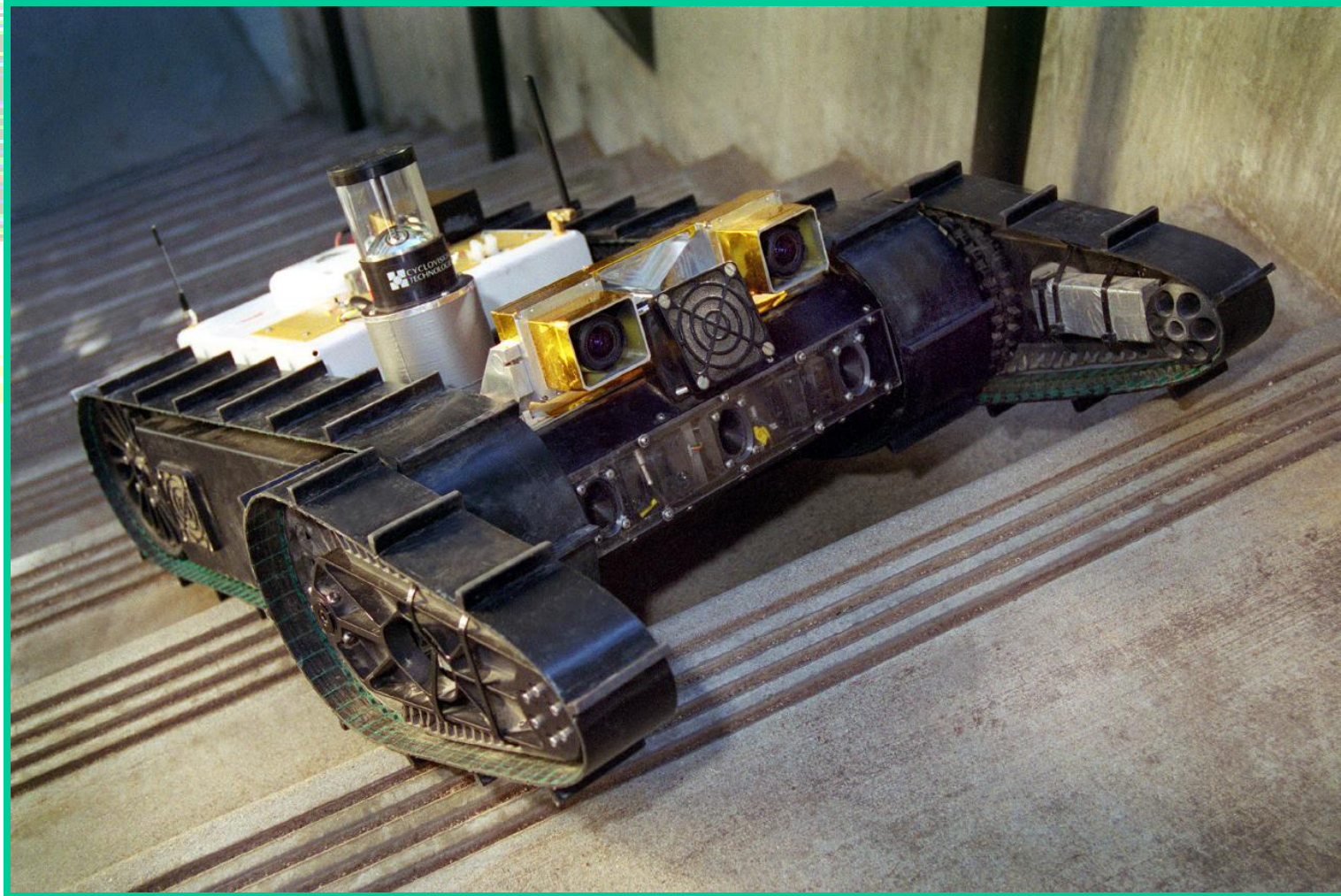
**(i.e. Packaging, Sorting, Filling,
and Cooking Operations, etc.)**



A Robotic Arm Arranging Chocolates in Boxes



Applications in Military & Defense Industries (i.e Combat Robots, etc.)



The Military Robots (Surveillance Operations)



The Military Robots

(Surveillance Operations in Unstructured Environments)



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دانشگاه صنعتی شریف

شبیه سازی و ساخت یک روبات کوهستان

Simulation and Fabrication of a Mountain Robot

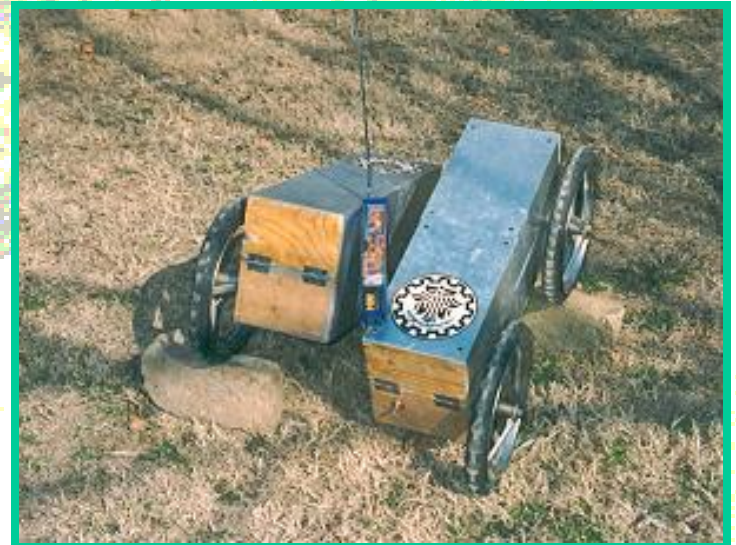
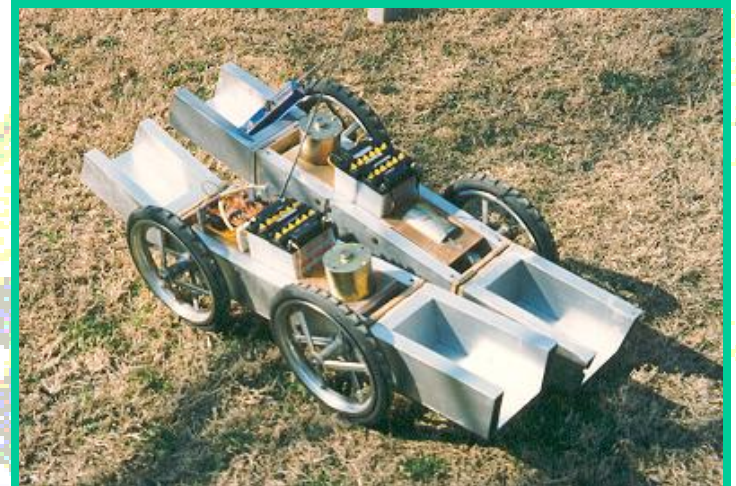
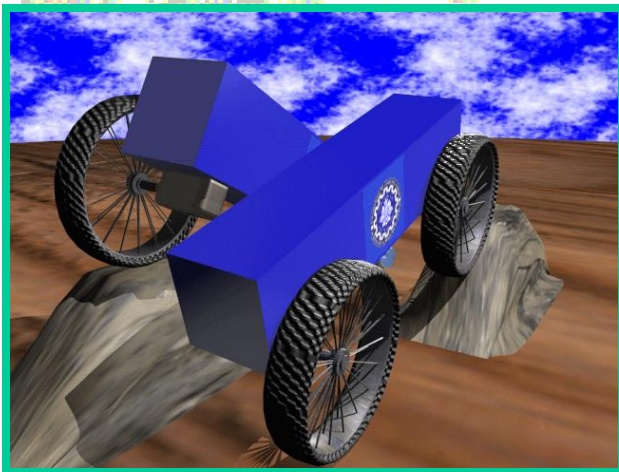


The Mountain-Terrain Robot

Mobile Robots/Manipulators (Meghdari-Nasiraei, 1995)

Advantages:

- Extended workspace.
- Applicable to various environments.
- Ability to go over obstacles in rough terrain.



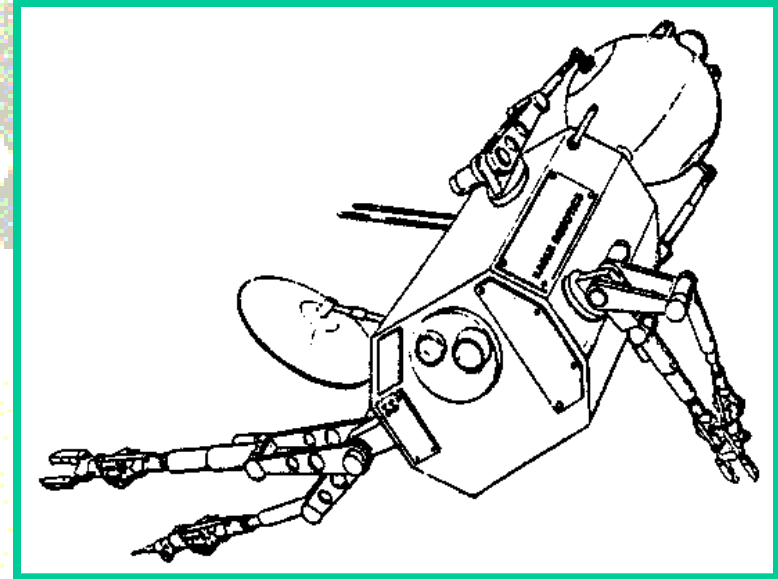
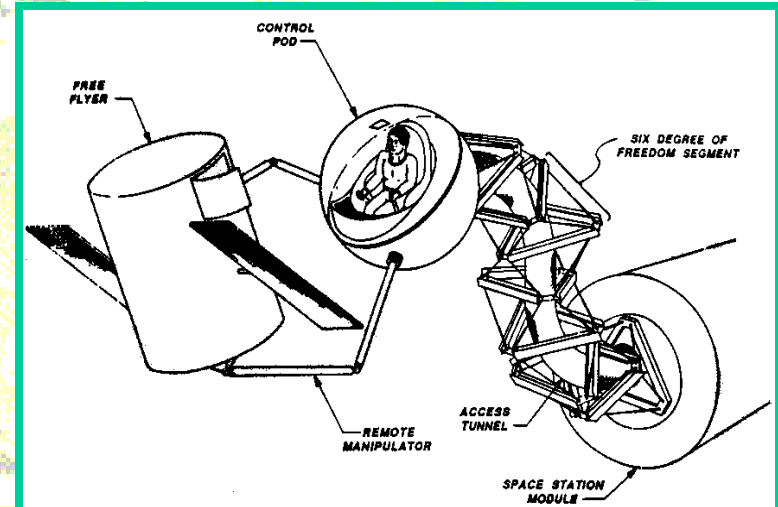
Robotics Applications in Space

Personal Occupied Woven Envelope Robot (POWER)

Consists of a huge flexible, hollow manipulator arm with numerous actuators. The operator rides in control cabin at the free end of the arm.

Kader Astrobot with Propulsion Unit

A state-of-the-art telerobot with remote manipulators of high dexterity for space exploration.



4-Legged Robots in Mountains

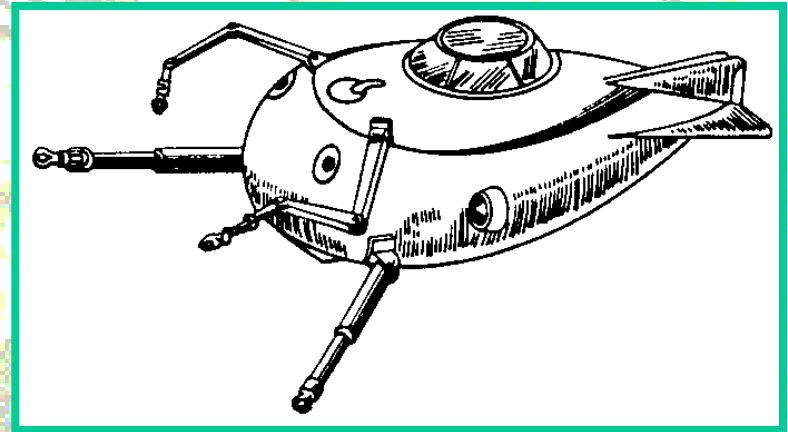


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Robotics Applications in Sea/Ocean

Information & Manipulation Underwater Robotics Systems

- Remotely Operated Vehicles (ROV)
- Robotic Underwater Vehicles (RUV)



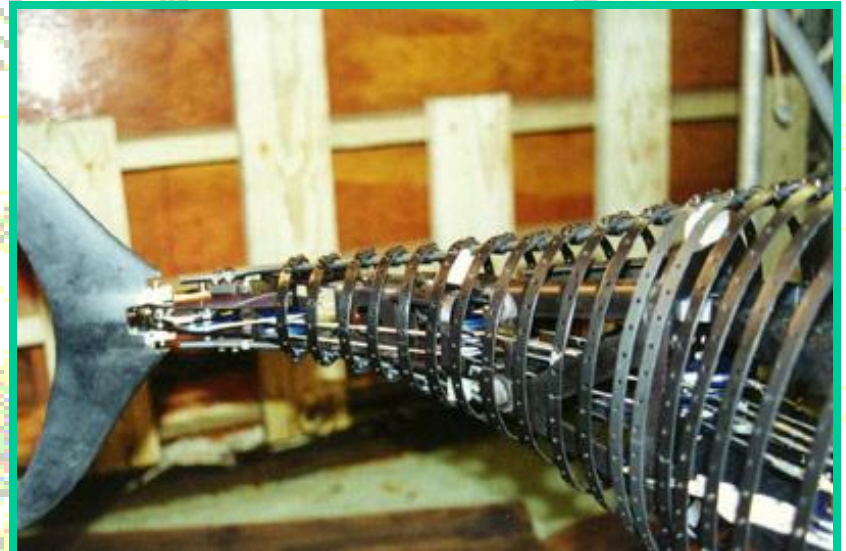
They are applied for:

- work in ocean bottom to serve oil and gas installations.
- Exploration in other unconventional and hostile environments where human life is directly jeopardized (i.e. mine sweeping operations, spying operations, etc.)
- Exploration of marine plants and animals for medical purposes.



Robotics Applications in Sea/Ocean

Searching and Surveillance Operations (i.e. searching for remains of a crashed airplane/black boxes)



Robotics Applications in Sea/Ocean

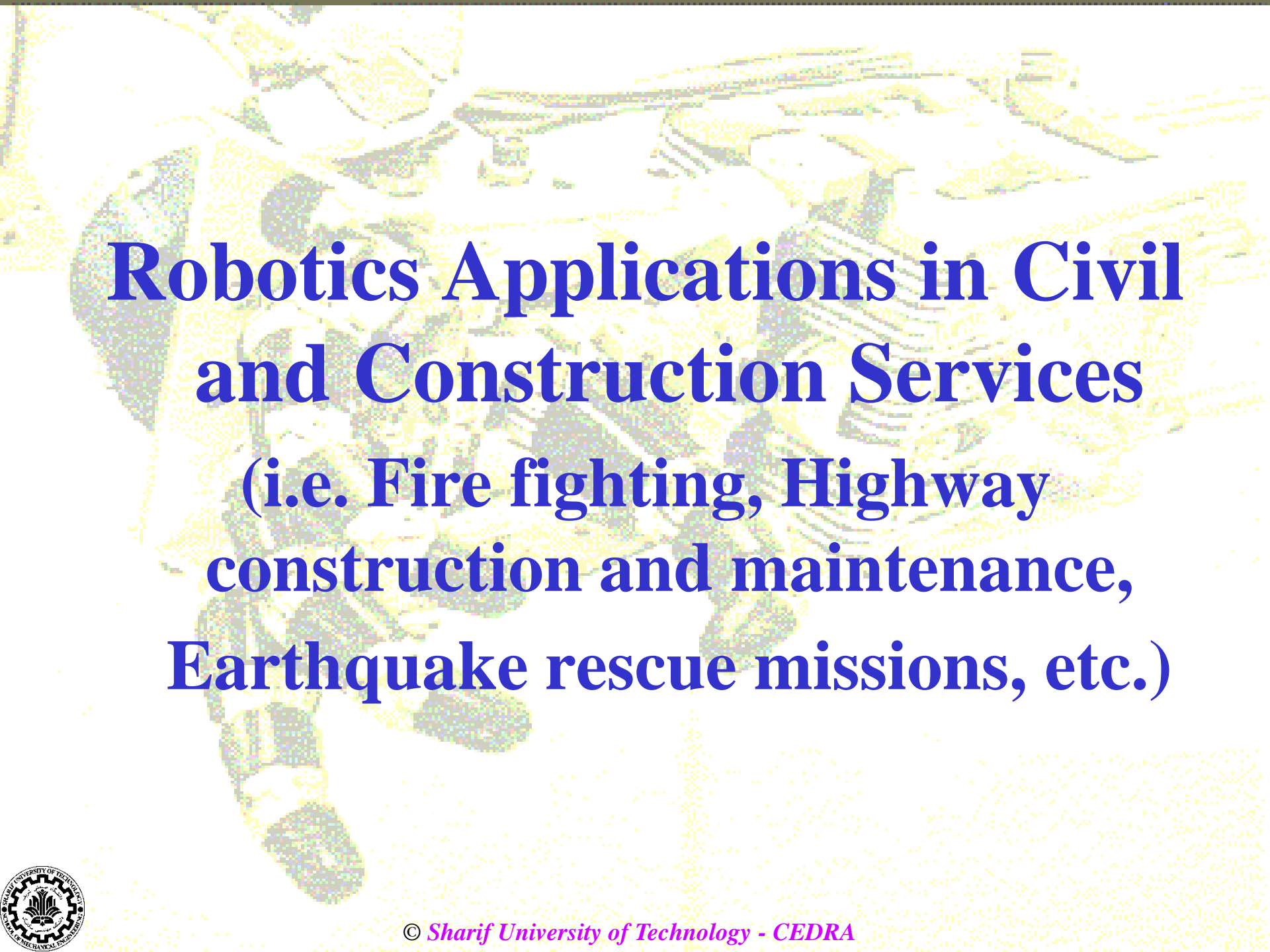


Robotics Applications in Sea/Ocean



ROV2.MOV

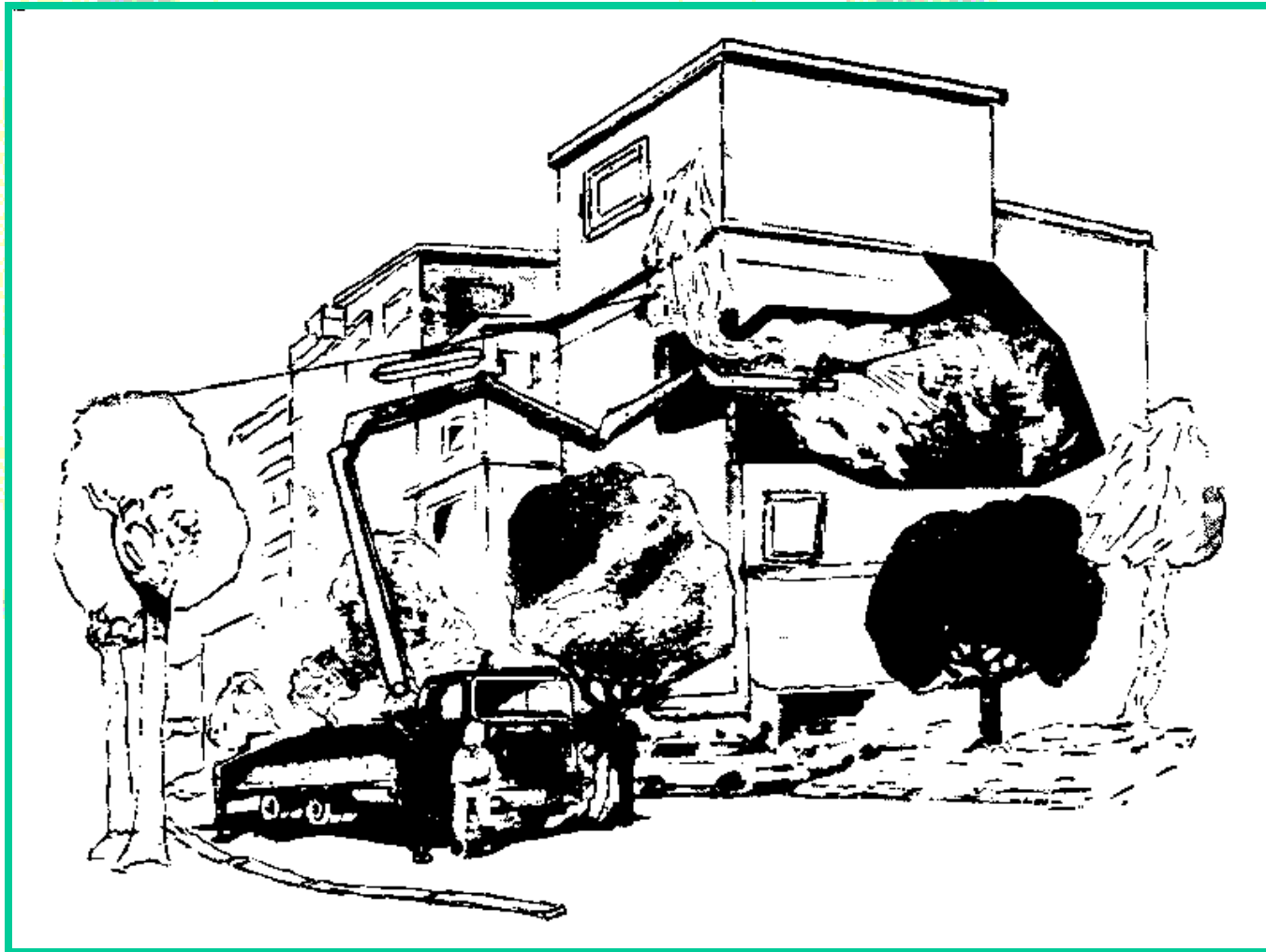




Robotics Applications in Civil and Construction Services (i.e. Fire fighting, Highway construction and maintenance, Earthquake rescue missions, etc.)



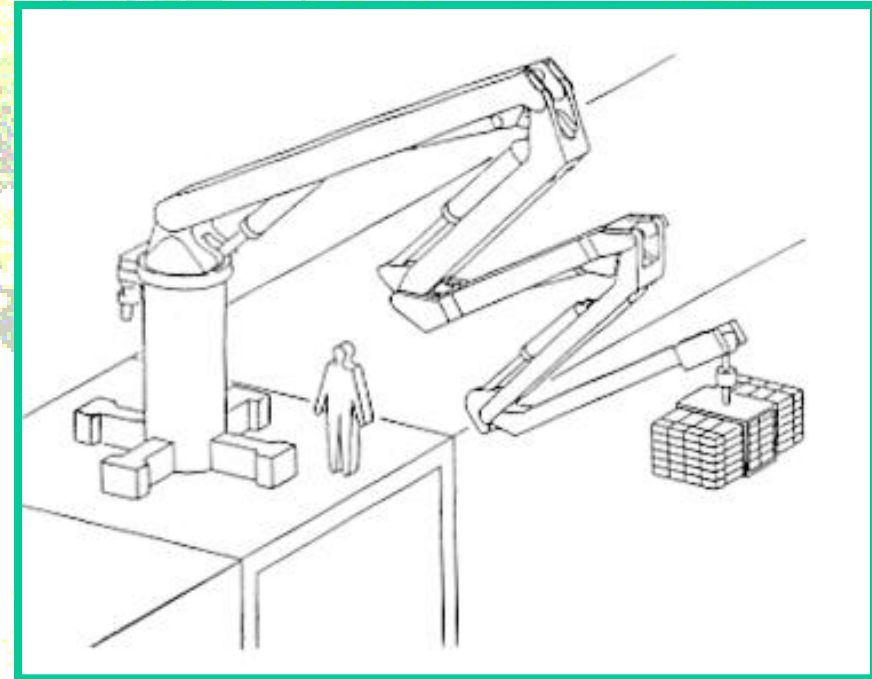
Mobile Tele-Robotics Systems Assisting in Fire-Fighting



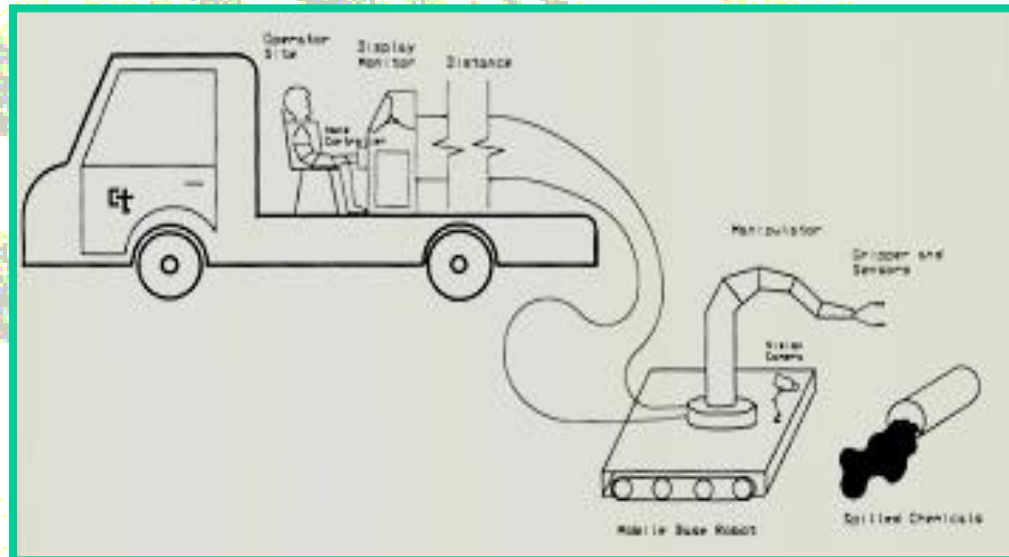
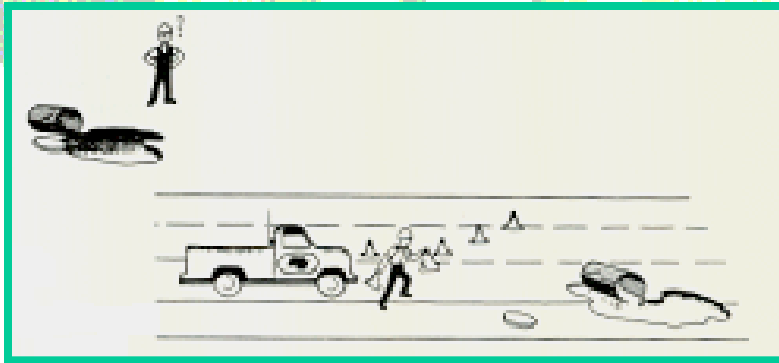
Mobile Tele-Robotics Systems Assisting in Construction and Earthquake Clean-up



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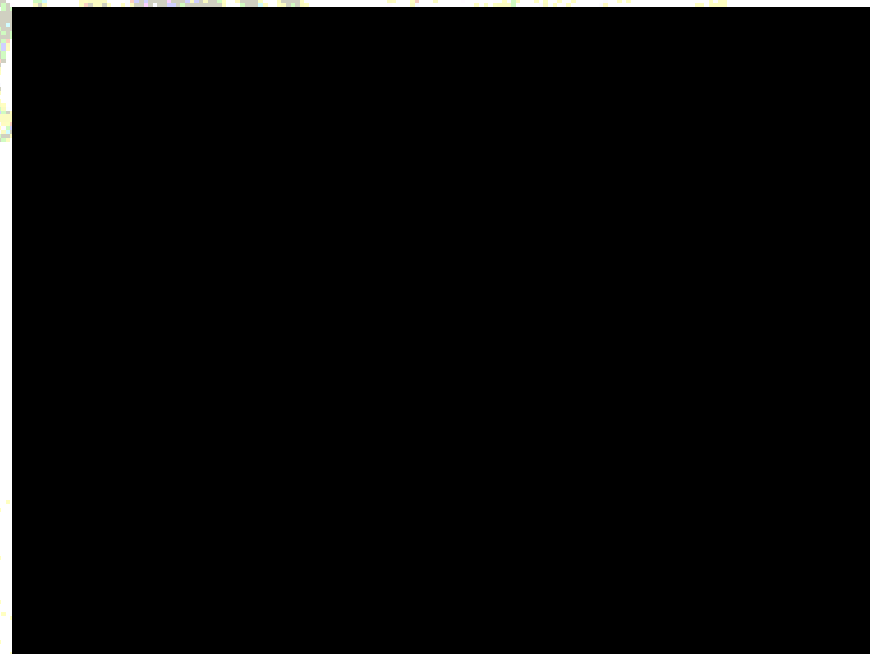
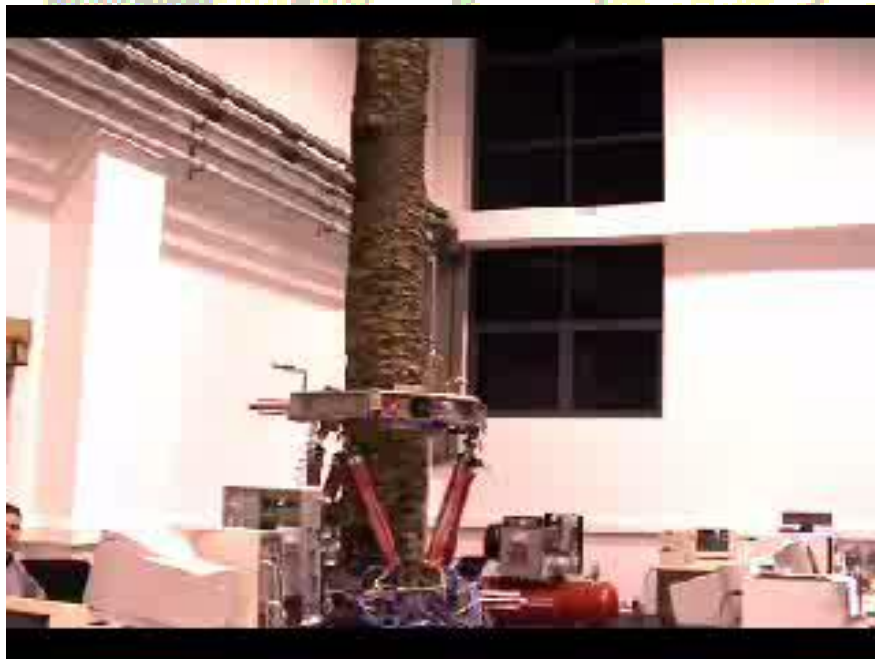
Mobile Tele-Robotics Systems Assisting in Environmental Clean-up of Toxic Chemicals



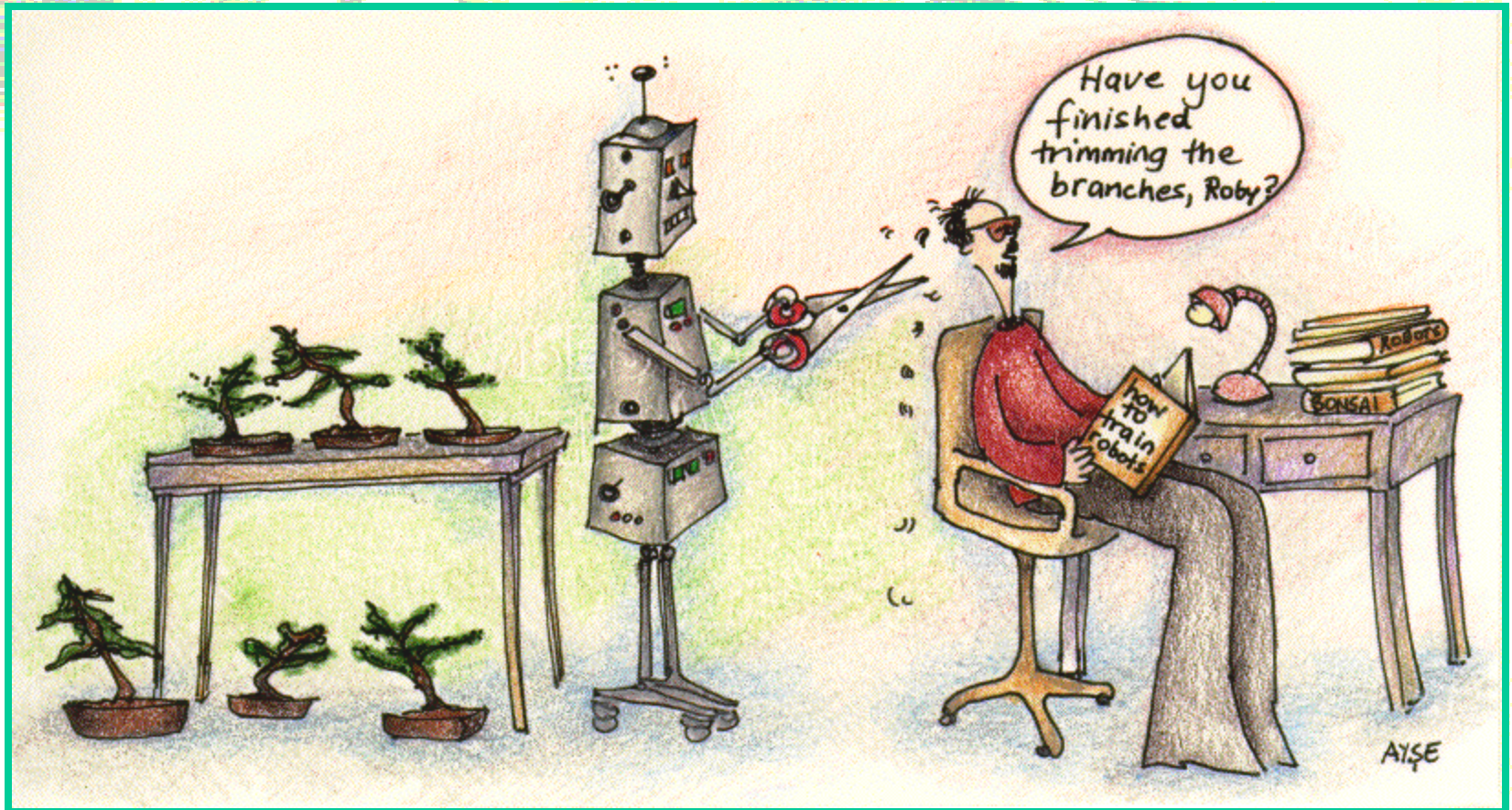
Robotics Systems in Shoe Industries



Column Climbing Robot



Robotics Applications in Agriculture and Gardening (i.e Cutting trees, Picking fruits, etc.)

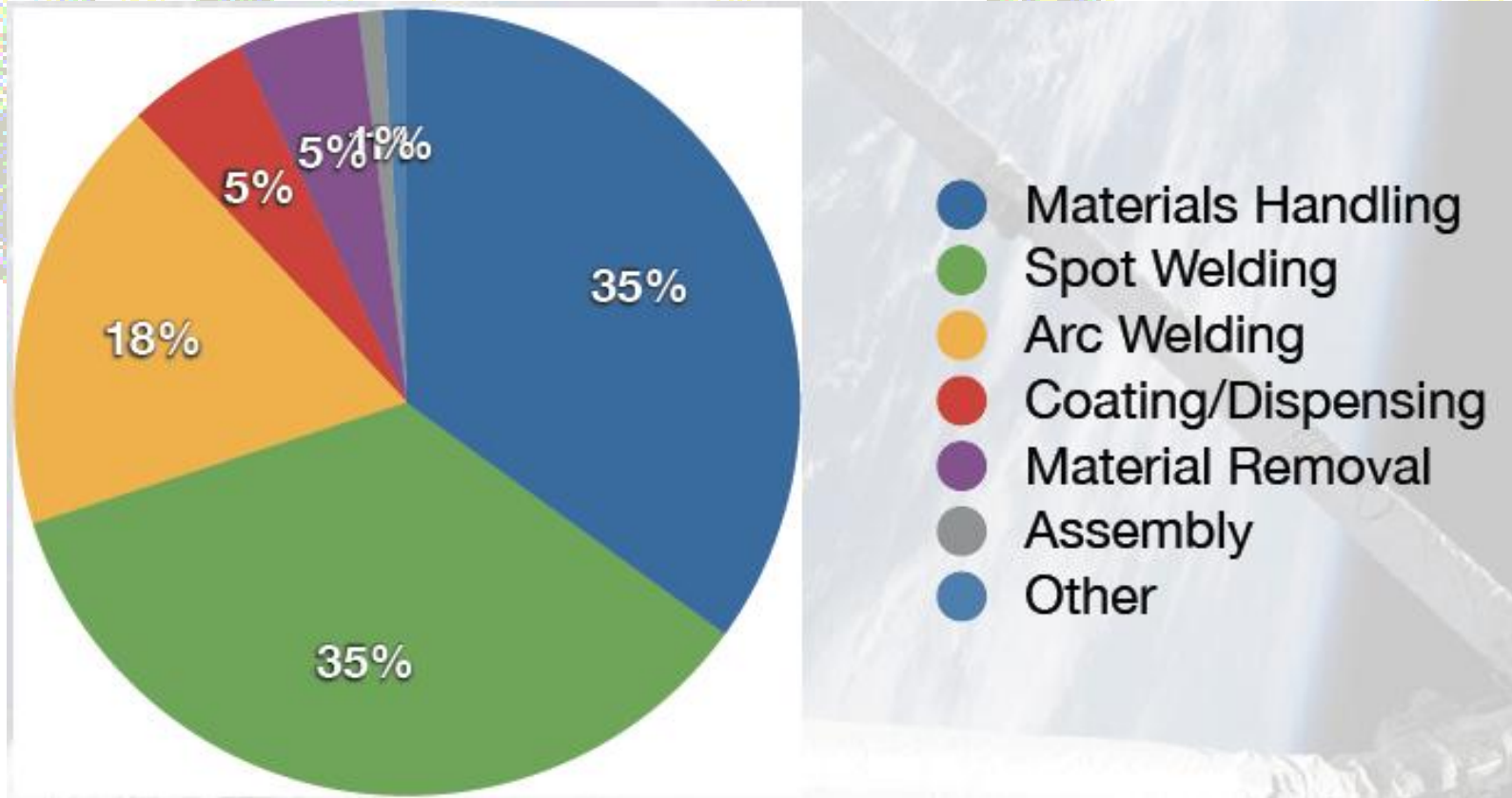


Other Possible Applications of Robotics

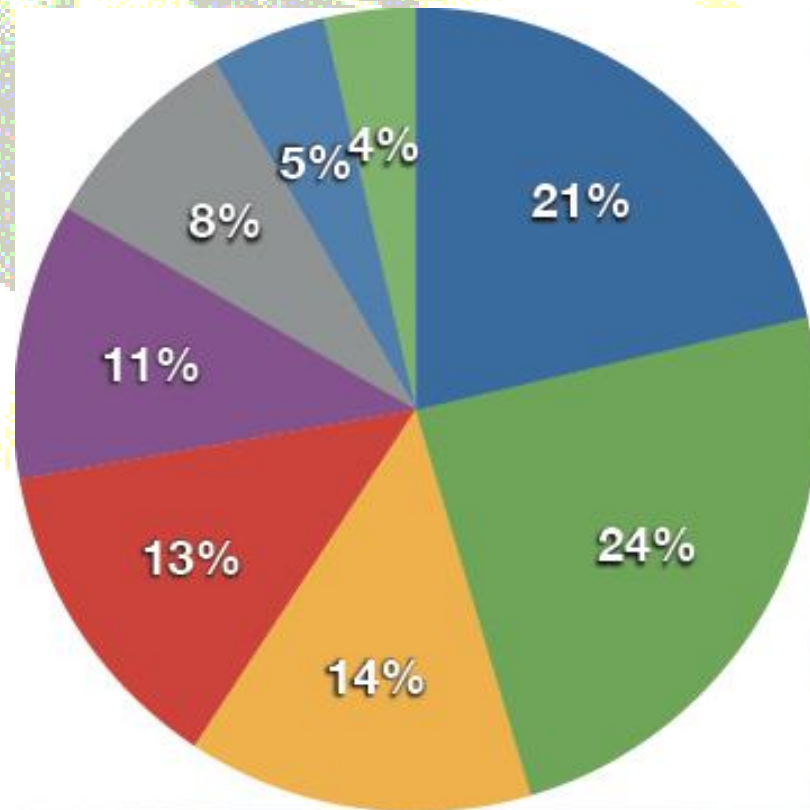
- Barber Robots (Cut Hair)
- Cooking Robots
- Garbage Collector Robots
- Materials Handling
- Paint a Picture with a Brush
- Perform Surgeries
- Pick Fruits
- Play Sports (football, volleyball, etc.)
- Post Office(i.e. mailman)
- Pump Gasoline in Cars
- Security Robots
- Sheer Sheep
- Street Cleaner Robots
- Vacuum a Rug/Carpet
- Wait Tables in Restaurants
- Wash/Clean Airplanes
- Wash Windows



Industrial Robotic Applications (2005)



Service Robotic Applications (2005)



- Underwater
- Cleaning
- Laboratory
- Demolition/Construction
- Medical
- Mobile Platform
- Rescue/Security
- Field (milk, forestry)

Robotic Swing



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