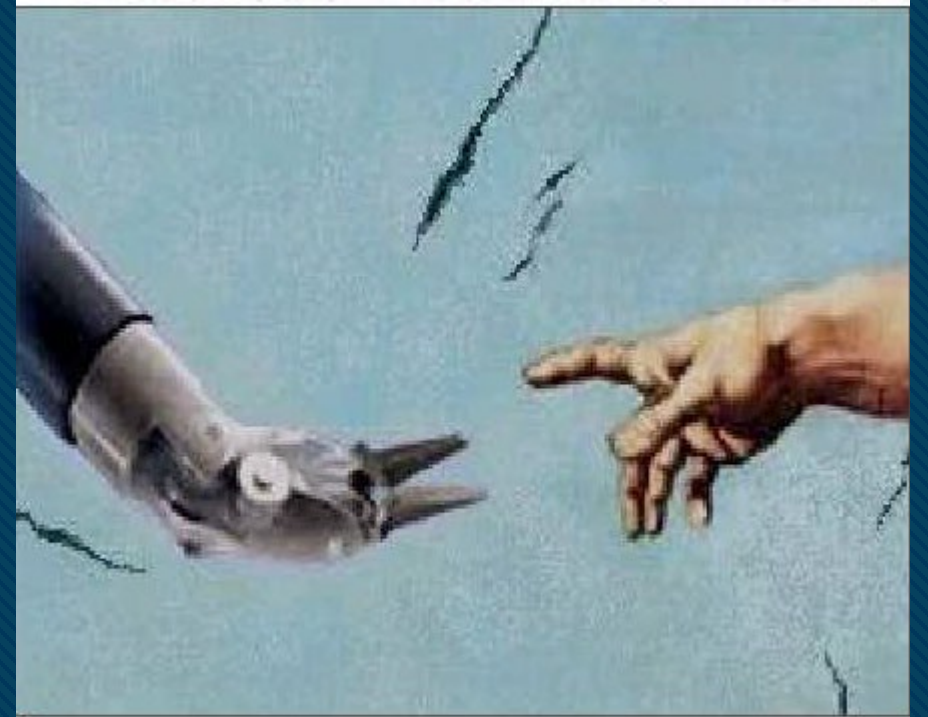


جامعة بغداد
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Robotics In Surgery

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Before the birth of modern surgery: The operating room in the 1860-1870



Source: nmhm.washingtondc.museum/news/bs101.html

The operating room in the 20th century



INTRODUCTION

The term “Robot ” was coined by the Czech playwright Karel Capek in 1921 in his play Rossum's Universal Robots.

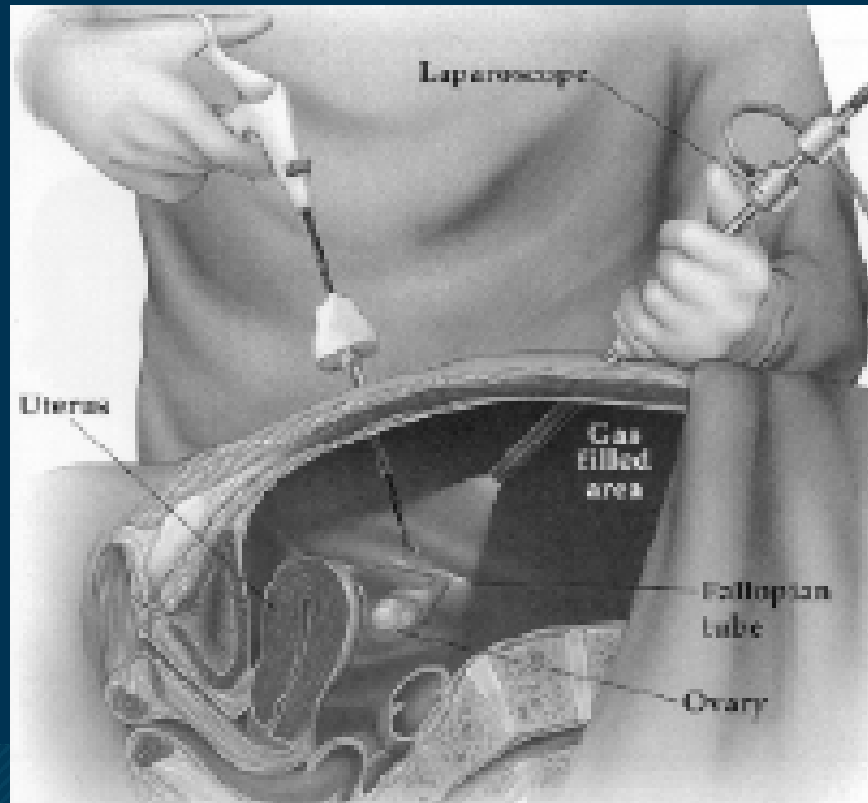
In 1985 a ROBOT, the PUMA 560, was used to place a needle for a brain biopsy using CT guidance.

Robots were first introduced in 1987 with the first laparoscopic surgery.



Minimally Invasive Surgery

1987: Mouret in Lyon published the first laparoscopic cholecystectomy using video - technique



Laparoscopic Procedure

DEFINITION OF ROBOTICSURGERY

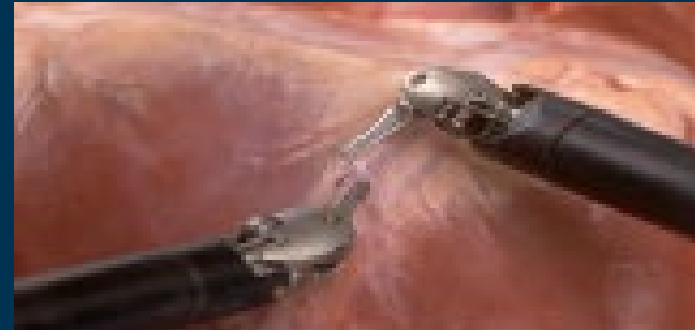
Robotic surgery is
Microsurgery in which the
surgeon performs surgery by
manipulating the hands of a
robot

Any mechanical device that
operates automatically with
human like skill

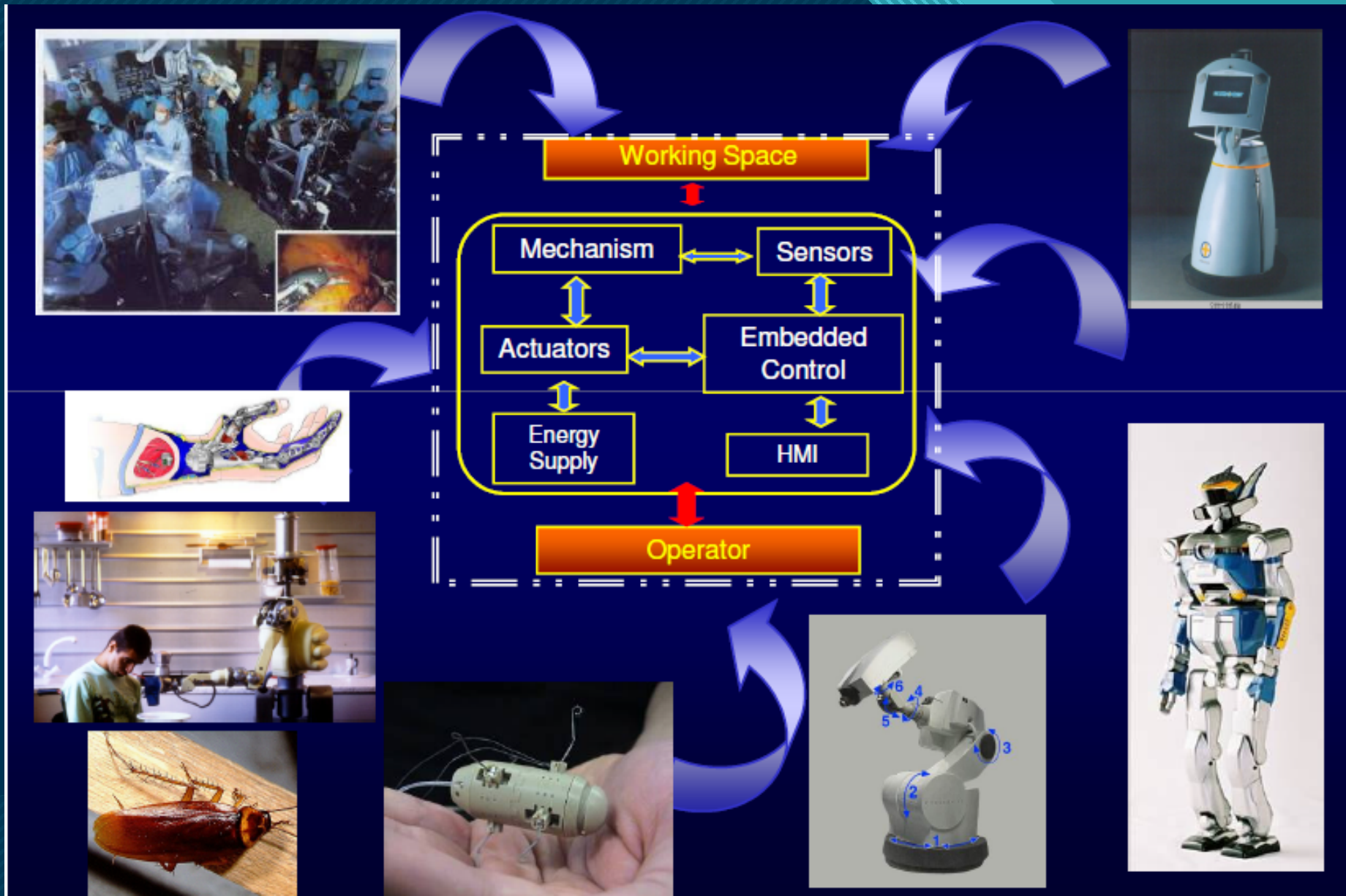


Convergence to Computer Assisted and Robotic Surgery

Computer-assisted surgery: (Medical imaging + Mechatronics)



Mechatronics: the Modern Paradigm of Machine Design



Types of Robots

Passive:

Retractor system

Position the tool and then hold

Active

Robot would actively move the tool upon the surgeons command

DaVinci Robotic System

Magnified (12x), stereoscopic 3D vision

Robotic wrist with 6 degrees of freedom

Movements are scaled, filtered, translated



Advantages

Shorter hospital stay

Reduced Trauma to the body

Less anesthesia

Less Blood loss

Less post- operative pain

Less pain

Less risk of infection

Less scarring

Faster recovery and return to daily activities

Disadvantages

Human presence

Fault consequence

Time

Cost

Efficiency & Compatibility

APPLICATION

General surgery

Cardiology

Gastrointestinal surgery

Gynecology

Neurosurgery

Orthopedics

Radical surgery

What is next ?

[Future Trends in Surgical Robotics]

Trends

Increased Automation: Future surgical robots are expected to incorporate more advanced automation features, allowing for greater precision and reduced variability in surgical procedures.

Artificial Intelligence Integration: AI will play a significant role in surgical robotics, enabling real-time data analysis, improved decision-making, and enhanced surgical planning.

Enhanced Haptic Feedback: Allowing surgeons to feel the texture and resistance of tissues during procedures

Trends

Miniaturization and Portability: Surgical robots are likely to become smaller and more portable, making them easier to use in various settings, including remote or underserved areas.

Tele-surgery: The ability to perform surgeries remotely using robotic systems is expected to grow. This could allow specialists to operate on patients in distant locations, improving access to care.

Trends

Multi-robot Systems: Future surgical environments may see the use of multiple robotic systems working in tandem, allowing for more complex procedures to be performed with enhanced efficiency and precision.

Augmented Reality (AR) and Virtual Reality (VR): The integration of AR and VR technologies into surgical robotics will provide surgeons with enhanced visualization and simulation capabilities, improving training and intraoperative guidance.

Trends

Patient-Specific Robotics: Customizable robotic systems tailored to individual patient anatomies may become more prevalent, allowing for personalized surgical approaches and improved outcomes.

Regulatory and Ethical Considerations: As surgical robotics evolve, there will be an increasing need for clear regulatory frameworks and ethical guidelines to ensure patient safety and the responsible use of technology.



Thank You