Al-Mustaqbal University
College of Engineering & Technology
Biomedical Engineering Department

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Lecturer: Assist lect. Hiba Diaa Alrubaie

Email: hiba.diaa.abdulameer@uomus.edu.iq

Lecture No.:-4

Lecture Title: [Rehabilitation engineering and assistive technology]

Introduction

Rehabilitation engineering and assistive technology are closely related fields focused on enhancing the quality of life for individuals with disabilities through the development and application of technological solutions.

Rehabilitation engineering involves the systematic application of engineering principles to design, develop, and improve devices and systems that help individuals with disabilities.

- Rehabilitation engineers also improve upon standard rehabilitation methods to regain functions lost due to congenital disorders, disease (such as stroke or joint replacement) or injury (such as limb loss) to restore mobility.

Prosthetics and Orthotics: Development of artificial limbs (prosthetics) and supportive devices (orthotics) to improve mobility and functionality.
Wheelchairs and Mobility Aids: Design of manual and powered wheelchairs, scooters, and other devices to assist in mobility.
Robotic Aids: Creation of robotic systems to assist with movement, including exoskeletons and robotic arms.
Rehabilitation Devices: Development of equipment used in physical therapy to aid in recovery and improve physical capabilities.
Environmental Control Systems: Systems that help individuals control their environment, such as smart home technologies adapted for accessibility.

Goals:

1. Enhance independence and quality of life for individuals with disabilities.
2. Improve functionality and comfort of assistive devices.
3. Facilitate recovery and rehabilitation from injuries.

Assistive Technology

Assistive technology refers to any product, device, or equipment that is used to maintain, increase, or improve the functional capabilities of individuals with disabilities.

Types of Assistive Technology:

Communication Aids: Devices that help individuals communicate, including speech-generating devices, text-to-speech software, and communication boards.

Vision and Hearing Aids: Technologies designed to assist those with visual or hearing impairments, such as screen readers, braille displays, and hearing aids.

Computer Access: Specialized hardware and software that allow individuals with disabilities to use computers, such as adaptive keyboards, voice recognition software, and eye-tracking systems.

Daily Living Aids: Tools that assist with everyday tasks, including modified utensils, dressing aids, and adaptive cooking tools.

Educational Tools: Software and devices that aid learning for students with disabilities, including digital textbooks, audiobooks, and interactive learning applications.

Goals

- Promote greater independence in daily activities.
- Enhance educational and employment opportunities.
- Improve access to information and communication.

Interdisciplinary Collaboration

Both fields involve collaboration among various disciplines including:

- Engineering: To design and develop new technologies.
- Occupational Therapy: To ensure devices meet the functional needs of users.
- Physical Therapy: To integrate rehabilitation devices into therapy programs.
- Speech-Language Pathology: To develop communication aids.
- Medical Professionals: To tailor solutions to individual health needs.

Emerging Trends

Smart Technologies: Integration of IoT (Internet of Things) in assistive devices for better connectivity and functionality.

AI and Machine Learning: Use of AI to improve user interfaces and personalize assistive technologies.

3D Printing: Customization of prosthetics and orthotics using 3D printing technology.

Wearable Technology: Development of wearable devices that provide real-time health monitoring and assistance.