AI in Medical Equipment's

Lab Experiments VII

Objectives and Requirements

1. **AI-powered Personalized Hearing Aids:**
   - Aim:
     - To enhance the customization of hearing aid settings based on individual preferences and environments.
   - Objectives:
     - Develop AI algorithms for real-time analysis of acoustic environments.
     - Implement adaptive adjustments in hearing aid parameters for optimal user experience.
   - Requirements:
     - Hearing aid usage data.
     - AI models for acoustic environment analysis.

2. **Smart Blood Pressure Monitoring Devices:**
   - Aim:
     - To develop blood pressure monitoring devices with embedded AI for accurate and personalized measurements.
   - Objectives:
     - Develop AI algorithms for real-time analysis of blood pressure data.
     - Implement personalized blood pressure monitoring and alerts.
   - Requirements:
     - Blood pressure monitoring data.
     - Machine learning models for blood pressure analysis.

3. **AI-guided Robotic Orthopedic Surgery:**
   - Aim:
     - To improve the precision of orthopedic surgeries using AI-guided robotic systems.
   - Objectives:
     - Develop AI algorithms for real-time analysis of surgical scenes.
     - Implement adaptive control systems for robotic orthopedic instruments.
   - Requirements:
     - Robotic orthopedic surgery video and control data.
     - AI models for scene analysis and control.

4. **Automated Spirometry Analysis:**
   - Aim:
     - To automate the interpretation of spirometry data for respiratory function assessment.
   - Objectives:
     - Develop AI algorithms for interpreting spirometry results.
     - Implement real-time feedback and analysis for respiratory health monitoring.
   - Requirements:
     - Spirometry data.

- Machine learning models for lung function analysis.

5. **AI-based Rehabilitation Robots for Stroke Patients:**
   - Aim:
     - To develop rehabilitation robots with AI-powered assistance for stroke survivors.
   - Objectives:
     - Develop AI algorithms for tracking patient movements.
     - Implement adaptive robotic assistance based on patient progress.
   - Requirements:
     - Patient rehabilitation data.
     - AI models for movement analysis.

6. **Smart Wearables for Stress Monitoring:**
   - Aim:
     - To utilize wearables for continuous monitoring of stress levels and provide timely interventions.
   - Objectives:
     - Develop AI algorithms for analyzing physiological and behavioral indicators of stress.
     - Implement real-time alerts and stress management recommendations.
   - Requirements:
     - Wearable sensor data.
     - Machine learning models for stress detection.

7. **AI-assisted Magnetic Resonance Spectroscopy (MRS):**
   - Aim:
     - To enhance the analysis of metabolic information in magnetic resonance spectroscopy through AI.
   - Objectives:
     - Develop AI algorithms for automated interpretation of MRS data.
     - Implement real-time metabolic profiling for improved diagnosis.
   - Requirements:
     - MRS data.
     - AI models for spectral analysis.

8. **Automated Radiosurgery Planning:**
   - Aim:
     - To optimize radiosurgery treatment plans using AI for improved targeting and reduced side effects.
   - Objectives:
     - Develop AI algorithms for treatment planning based on patient anatomy and tumor characteristics.
     - Implement real-time adjustments for adaptive radiosurgery.
   - Requirements:
     - Patient imaging data.
     - AI models for treatment planning.

9. **AI-guided Smart Glasses for Low Vision Assistance:**
    - Aim:
        - To develop smart glasses with AI-enabled features for assisting individuals with low vision.
    - Objectives:
        - Develop computer vision algorithms for real-time scene analysis.
        - Implement augmented reality overlays for enhanced visual assistance.
    - Requirements:
        - Smart glasses-mounted cameras.
        - Computer vision and AR development tools.

10. **Smart Prosthetic Limbs with AI-based Gait Optimization:**
    - Aim:
        - To improve the functionality of prosthetic limbs using AI for personalized gait optimization.
    - Objectives:
        - Develop AI algorithms for real-time analysis of user movements.
        - Implement adaptive control systems for prosthetic gait adjustments.
    - Requirements:
        - Prosthetic limb sensor data.
        - AI models for movement analysis and control.

These experiments continue to explore the integration of artificial intelligence into various medical equipment, aiming to enhance precision, personalization, and accessibility in healthcare technologies.