**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.

1. **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.

1. **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.

1. **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.

1. **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.

1. **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.

1. **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.

1. **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.

1. **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.

1. **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.