**AI in Medical Equipment’s**

**Lab Experiments VIII**

**Objectives and Requirements**

1. **AI-guided Smart Contact Lenses for Glucose Monitoring:**

* Aim:
  + To develop smart contact lenses with embedded sensors and AI algorithms for continuous glucose monitoring.
* Objectives:
  + Develop AI algorithms for real-time analysis of glucose levels in tear fluid.
  + Implement alerts and recommendations for diabetes management.
* Requirements:
  + Smart contact lens sensor data.
  + AI models for glucose level analysis.

1. **Automated Skin Cancer Detection in Dermatology Imaging:**

* Aim:
  + To automate the detection of skin cancer using AI analysis of dermatology images.
* Objectives:
  + Develop deep learning models for identifying skin cancer lesions in images.
  + Implement real-time automated screening for early skin cancer detection.
* Requirements:
  + Dermatology image datasets.
  + Deep learning frameworks for image classification.

1. **AI-guided Cochlear Implants for Speech Enhancement:**

* Aim:
  + To enhance speech perception in cochlear implant users using AI algorithms for real-time signal processing.
* Objectives:
  + Develop AI models for analyzing and enhancing auditory signals in real-time.
  + Implement adaptive settings for personalized speech improvement.
* Requirements:
  + Auditory signal data from cochlear implant users.
  + AI models for speech signal processing.

1. **Smart Wearables for Mood Tracking and Intervention:**

* Aim:
  + To develop wearables with AI algorithms for continuous mood tracking and personalized mood interventions.
* Objectives:
  + Develop AI models for analyzing physiological and behavioral indicators of mood.
  + Implement real-time interventions based on AI assessments.
* Requirements:
  + Wearable mood tracking data.
  + AI models for mood analysis and intervention.

1. **AI-based Voice Analysis for Parkinson's Disease Diagnosis:**

* Aim:
  + To develop AI algorithms for voice analysis to aid in the early diagnosis of Parkinson's disease.
* Objectives:
  + Develop AI models for detecting subtle changes in voice patterns indicative of Parkinson's disease.
  + Implement real-time voice analysis for diagnostic support.
* Requirements:
  + Voice recordings from individuals with Parkinson's disease.
  + AI models for voice pattern recognition.

1. **Automated Prostate Cancer Grading in Histopathology Images:**

* Aim:
  + To automate the grading of prostate cancer in histopathology slides using AI.
* Objectives:
  + Develop deep learning models for accurately grading prostate cancer in pathology images.
  + Implement real-time automated grading for efficient diagnosis.
* Requirements:
  + Prostate cancer histopathology image datasets.
  + Deep learning frameworks for image analysis.

1. **AI-guided Rehabilitation Robotics for Lower Limb:**

* Aim:
  + To enhance lower limb rehabilitation using AI-assisted robotic devices.
* Objectives:
  + Develop AI algorithms for tracking and analyzing lower limb movements.
  + Implement personalized robotic rehabilitation programs based on AI assessments.
* Requirements:
  + Lower limb motion tracking data.
  + AI models for movement analysis and control.

1. **Smart Inhalers with Environmental Pollutant Monitoring:**

* Aim:
  + To integrate environmental pollutant monitoring in smart inhalers for respiratory health assessment.
* Objectives:
  + Develop AI algorithms for analyzing inhalation patterns and correlating with environmental pollutant levels.
  + Implement real-time alerts and recommendations for respiratory health.
* Requirements:
  + Smart inhaler usage data.
  + Environmental pollutant data.
  + AI models for respiratory health analysis.

1. **AI-based Virtual Reality Therapy for Chronic Pain Management:**

* Aim:
  + To utilize virtual reality (VR) therapy with AI-generated scenarios for chronic pain management.
* Objectives:
  + Develop AI algorithms for creating personalized VR scenarios based on individual pain profiles.
  + Implement real-time adaptation of VR therapy sessions.
* Requirements:
  + Chronic pain patient data.
  + AI models for VR scenario generation.

1. **Automated Gait Analysis for Parkinson's Disease Patients:**

* Aim:
  + To automate the analysis of gait patterns in Parkinson's disease patients using AI.
* Objectives:
  + Develop AI algorithms for analyzing gait data and detecting abnormalities associated with Parkinson's disease.
  + Implement real-time gait analysis for diagnostic support.
* Requirements:
  + Gait data from Parkinson's disease patients.
  + AI models for gait pattern recognition.

These experiments continue to explore the integration of AI into various medical equipment, offering innovative solutions for diagnostics, rehabilitation, and overall healthcare improvement.