**AI in Medical Equipment’s**

**Lab Experiments VI**

**Objectives and Requirements**

1. **AI-assisted Wearable ECG Monitoring:**

* Aim:
  + To enhance ECG monitoring through wearable devices with AI analysis.
* Objectives:
  + Develop AI algorithms for real-time analysis of wearable ECG data.
  + Implement anomaly detection for early identification of cardiac irregularities.
* Requirements:
  + Wearable ECG data.
  + Machine learning models for anomaly detection.

1. **Automated Dosage Adjustment in Insulin Pumps:**

* Aim:
  + To optimize insulin dosage in real-time based on continuous glucose monitoring.
* Objectives:
  + Develop AI algorithms for predicting glucose trends.
  + Implement closed-loop systems for adaptive insulin pump adjustments.
* Requirements:
  + Continuous glucose monitoring data.
  + AI models for predictive analytics.

1. **AI-powered Dental Radiography Interpretation:**

* Aim:
  + To improve dental radiography interpretation through AI.
* Objectives:
  + Develop deep learning models for detecting dental conditions from X-rays.
  + Implement real-time analysis for precise diagnosis.
* Requirements:
  + Dental radiography datasets.
  + Deep learning frameworks for image analysis.

1. **Smart Wearables for Epileptic Seizure Prediction:**

* Aim:
  + To develop wearables for predicting epileptic seizures in advance.
* Objectives:
  + Develop AI algorithms for analyzing physiological signals indicative of impending seizures.
  + Implement real-time alerts for patients and caregivers.
* Requirements:
  + Physiological data from wearables.
  + Machine learning models for seizure prediction.

1. **AI-guided Robotic Exoskeletons for Rehabilitation:**

* Aim:
  + To enhance rehabilitation using AI-assisted robotic exoskeletons.
* Objectives:
  + Develop AI algorithms for tracking patient movements and adjusting exoskeleton support.
  + Implement personalized rehabilitation programs based on AI assessments.
* Requirements:
  + Motion tracking data.
  + AI models for movement analysis and control.

1. **Automated Capnography Analysis:**

* Aim:
  + To automate the analysis of capnography data for respiratory monitoring.
* Objectives:
  + Develop AI algorithms for interpreting capnography waveforms.
  + Implement real-time alerts for abnormal respiratory patterns.
* Requirements:
  + Capnography data.
  + Machine learning models for waveform analysis.

1. **AI-assisted Ophthalmic Imaging for Retinopathy Screening:**

* Aim:
  + To improve the screening of diabetic retinopathy through AI analysis of retinal images.
* Objectives:
  + Develop deep learning models for identifying retinopathy signs.
  + Implement automated screening programs in ophthalmic clinics.
* Requirements:
  + Retinal image datasets.
  + Deep learning frameworks for image classification.

1. **Smart Inhalers with Medication Adherence Monitoring:**

* Aim:
  + To enhance medication adherence through inhalers with embedded sensors.
* Objectives:
  + Integrate sensors into inhalers for monitoring usage patterns.
  + Develop AI algorithms for analyzing adherence and providing feedback.
* Requirements:
  + Sensor-equipped inhalers.
  + AI models for usage pattern analysis.

1. **AI-guided Surgical Robots for Minimally Invasive Procedures:**

* Aim:
  + To improve the precision of surgical robots in minimally invasive surgeries.
* Objectives:
  + Develop AI algorithms for real-time analysis of surgical scenes.
  + Implement adaptive control systems for robotic instruments.
* Requirements:
  + Surgical robot video and control data.
  + AI models for scene analysis and control.

1. **Smart Wheelchairs with AI-based Navigation:**

* Aim:
  + To develop wheelchairs with AI-powered navigation systems for improved mobility.
* Objectives:
  + Develop computer vision algorithms for real-time scene analysis.
  + Implement autonomous navigation capabilities with obstacle avoidance.
* Requirements:
  + Wheelchair-mounted sensors.
  + Computer vision and control algorithms.

These experiments highlight the continuous evolution of AI applications in medical equipment, aiming to improve diagnostics, treatment, and patient care across various healthcare domains.