# Artificial Intelligence in Medical Equipment's

## Lab Experiment IV

## Objectives and Requirements

1. **Smart Inhalers for Asthma Management:**
   - Aim:
     - To improve asthma management through AI-enabled inhalers.
   - Objectives:
     - Develop AI algorithms for analyzing inhalation patterns.
     - Implement real-time feedback for patients and healthcare providers.
   - Requirements:
     - Inhaler usage data.
     - AI models for pattern recognition.

2. **Automated Dermatology Imaging Analysis:**
   - Aim:
     - To enhance the diagnosis of skin conditions using AI.
   - Objectives:
     - Develop deep learning models for image-based dermatology analysis.
     - Implement automated lesion detection and classification.
   - Requirements:
     - Dermatology image datasets.
     - Deep learning frameworks for image analysis.

3. **Automated Radiological Report Summarization:**
   - Aim:
     - To automate the summarization of radiological reports using AI.
   - Objectives:
     - Develop NLP algorithms for extracting key information from radiology reports.
     - Implement summarization models for concise and informative reports.
   - Requirements:
     - Radiology report datasets.
     - NLP libraries for text extraction.

4. **AI-guided Surgical Navigation Systems:**
   - Aim:
     - To enhance surgical precision through AI-guided navigation.
   - Objectives:
     - Develop computer vision algorithms for tracking surgical instruments.
     - Implement augmented reality overlays for real-time guidance.
   - Requirements:
     - Surgical video and tracking data.
     - Computer vision and AR development tools.

5. **AI-assisted Dental Imaging:**
   - Aim:
     - To improve dental diagnostics through AI analysis of imaging data.
   - Objectives:
     - Develop AI algorithms for detecting dental conditions from X-rays and scans.
     - Implement real-time image analysis for early identification of issues.
   - Requirements:
     - Dental imaging datasets.
     - Machine learning models for image recognition.

6. **Automated Mammogram Analysis:**
   - Aim:
     - To enhance mammogram interpretation through AI.
   - Objectives:
     - Develop deep learning models for detecting and classifying breast abnormalities.
     - Implement real-time analysis for early breast cancer detection.
   - Requirements:
     - Mammogram datasets.
     - Deep learning frameworks for image classification.

7. **AI-assisted Robotic Surgery:**
   - Aim:
     - To improve the precision of robotic surgical procedures through AI.
   - Objectives:
     - Develop AI algorithms for real-time analysis of surgical scenes.
     - Implement adaptive control systems for robotic instruments.
   - Requirements:
     - Robotic surgery video and control data.
     - AI models for scene analysis and control.

8. **AI-powered Hearing Aid Optimization:**
   - Aim:
     - To customize hearing aid settings using AI for optimal user experience.
   - Objectives:
     - Develop AI algorithms for analyzing user preferences and auditory environments.
     - Implement real-time adjustments in hearing aid parameters.
   - Requirements:
     - Hearing aid usage data.
     - Machine learning models for preference analysis.

9. **Smart Orthopedic Implants:**
   - Aim:
     - To develop orthopedic implants with embedded sensors for continuous monitoring.
   - Objectives:
     - Integrate sensor technologies into orthopedic implants.
     - Develop AI algorithms for analyzing biomechanical data.

- Requirements:
    - Sensor-equipped orthopedic implants.
    - AI models for biomechanical analysis.

10. **AI-guided Personalized Rehabilitation Devices:**
    - Aim:
        - To customize rehabilitation devices using AI for individual patient needs.
    - Objectives:
        - Develop AI algorithms for monitoring patient progress and adapting rehabilitation exercises.
        - Implement real-time adjustments in rehabilitation device settings.
    - Requirements:
        - Patient rehabilitation data.
        - AI models for progress monitoring and adaptation.

These additional experiments highlight the versatility of AI applications across various medical equipment, ranging from respiratory devices to surgical instruments, imaging technologies, and rehabilitation devices.