

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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.