DAIHC-2-02T: AI in Remote Patient Monitoring and Wearable Technology

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 4

Detailed Contents

Module	Module Name	Module Contents	Lectures /Tutorials Hours
Module-1	Fundamentals of Remote Patient Monitoring and Wearable Systems	• Overview of Remote Patient Monitoring (RPM) and its importance in modern healthcare • Components of RPM architecture: Sensors, gateways, cloud platforms, user interfaces • Introduction to wearable health technologies: Smartwatches, fitness bands, implantables, and patches • Types of physiological parameters measured: Heart rate, blood pressure, temperature, SpO_2, ECG, sleep patterns, activity levels • Communication protocols: Bluetooth, Wi-Fi, Zigbee, IoT in RPM • Case examples: RPM for cardiac, diabetic, and geriatric care	15
Module-II	Sensor Data Analytics Using AI Techniques	• Overview of physiological and behavioral signal characteristics • Data acquisition and preprocessing from wearable sensors • Noise filtering, segmentation, and feature extraction • Pattern recognition in	15

		time-series data (e.g., sleep apnea, stress detection) • Basic statistical, ML-based, and deep learning methods for anomaly detection • Tools and platforms: Python (NumPy, pandas, matplotlib), TensorFlow Lite	
Module	**Module Name**	**Module Contents**	**Lectures /Tutorials Hours**
Module-III	AI Applications for Real-Time Patient Monitoring	• ML/DL models for physiological signal classification, Logistic regression, decision trees, SVM, CNNs (intro) • Application scenarios: Fall detection using IMU data, Chronic disease management (e.g., hypertension, diabetes), Personalized health alerts and recommendation systems • Real-time monitoring frameworks using Python and cloud integration • Mini-projects: Build a simple alert system using wearable data	15
Module-IV	Evaluation, Privacy, and Ethical Implications in AI-Driven Wearables	• Metrics to evaluate wearable AI systems: Accuracy, latency, usability • Challenges in continuous monitoring: Power, connectivity, false alarms • Data privacy concerns and strategies for anonymization • Ethical aspects: Bias, transparency, user consent	15

		• Regulatory standards and frameworks: HIPAA, GDPR, FDA (for medical wearables) • Case discussions: Failures and success stories in RPM deployments	

Books

- Patel, S., Park, H., Bonato, P., Chan, L., & Rodgers, M. (2012). A review of wearable sensors and systems with application in rehabilitation. Journal of NeuroEngineering and Rehabilitation, 9(1), 21.
- Goyal, D., & Tripathi, M. M. (2020). Artificial intelligence for Internet of Medical Things: Applications in remote healthcare. Springer.
- Sannino, G., & De Pietro, G. (2020). Remote health monitoring systems: Network architectures and security. Springer.
- Guk, K., Han, G., Lim, J., Jeong, K., Kang, T., Lim, E. K., & Jung, J. (2019). Evolution of wearable devices with real-time disease monitoring for personalized healthcare. Nanomaterials, 9(6), 813.