ISSN: 2320-5407

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: **IJAR-53323** Date: 16-08-2025

Title: Intelligent Dual-Leg Wearable for Early Arthritis Screening via Gait Analysis and On-Device Machine Learning

Recommendation:
Accept as it is .....YES.....
Accept after minor revision.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality			✓	
Clarity			✓	
Significance		✓		

Reviewer Name: Mir Bilal

Reviewer's Comment for Publication.

Abstract Review:

The abstract clearly articulates the problem statement—early identification of arthritis to improve mobility and long-term outcomes—and situates the study within the context of wearable health technologies. The paper introduces a novel prototype: a dual-leg, knee-mounted, 3D-printed wearable integrating ADXL335 tri-axial accelerometers and Arduino Nano 33 BLE microcontrollers.

The described system architecture—data acquisition, Bluetooth Low Energy transmission, real-time classification, and multimodal biofeedback—is concise and coherent. The abstract emphasizes on-device machine learning through Google's Tiny Motion Trainer, with clinical categorization into "No Arthritis," "Moderate Arthritis," and "Major Arthritis." The integration of a mobile interface, real-time visualisation, and corrective biofeedback underscores the user-centric approach.

The results highlight feasibility by demonstrating stable acquisition, reliable transmission, and responsive classification, while also motivating future validation across larger and more diverse populations. The balance between technical details and clinical relevance makes the abstract

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

comprehensive and focused. The keywords—*Arthritis Detection, Wireless Health Monitoring Device, Machine Learning, Gait Analysis*—appropriately encapsulate the study's core themes.

Introduction Review:

The introduction situates osteoarthritis (OA) within a global public health framework, citing prevalence data from the Global Burden of Disease (GBD) estimates and projecting future rise due to demographic and lifestyle shifts. This epidemiological grounding underscores the significance of early detection.

The review of prior literature is thorough and well-structured. It outlines the documented functional gait changes in OA and their recognition as early clinical markers. References to narrative and scoping reviews provide evidence of gait deviations (spatiotemporal parameters, joint kinematics, and acceleration magnitudes) as meaningful metrics. The discussion highlights the increasing adoption of wearable inertial measurement units (IMUs) for low-cost, objective gait quantification in both clinical and free-living contexts.

The introduction further elaborates on machine learning advances applied to gait analytics, citing multicentre studies and systematic reviews. Specific findings—such as gait asymmetry, step length, and dominant frequency—are contextualized as prognostic markers of disease progression. Complementary studies using shoe-mounted sensors and supervised algorithms are also included, demonstrating classification accuracy and subgroup differentiation.

The section closes by emphasizing the sensitivity of spatiotemporal gait features (stride length, cadence) as robust endpoints, while pointing to advanced kinematic measures for disease-specific adaptations. This progression from epidemiology, literature review, and machine-learning applications builds a strong rationale for the study's wearable-based, on-device machine-learning approach.

Overall Assessment:

The abstract and introduction together present a coherent, well-supported foundation for the study. The abstract emphasizes innovation and feasibility, while the introduction anchors the work in epidemiological significance, existing scientific literature, and technological advancement. The combination highlights the relevance of wearable gait analytics and

ISSN: 2320-5407
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

embedded machine learning in preventive musculoskeletal care, setting the stage for the detailed methodology and results to follow.