

**Implementation and Evaluation of a Video-Based AI Motion Tracking System for
Basic Dance Moves Training**

By

Samuel Kevin Laluyan

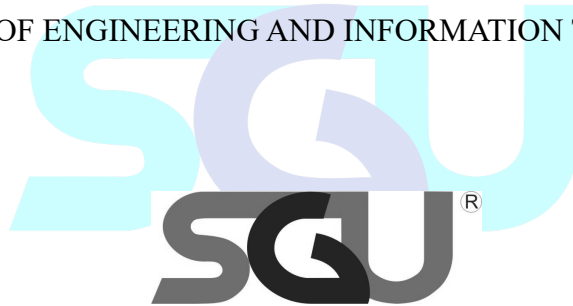
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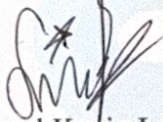
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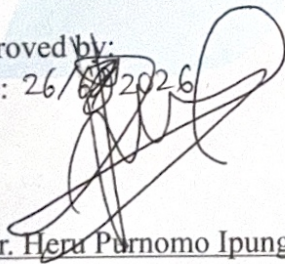
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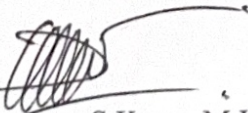
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ABSTRACT

IMPLEMENTATION AND EVALUATION OF A VIDEO-BASED AI MOTION TRACKING SYSTEM FOR BASIC DANCE MOVES TRAINING

By

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This research aims to implement and evaluate a video-based AI-assisted motion tracking system for basic dance moves training. The system is designed as a lightweight web-based self-assessment tool for beginner hip-hop learners practicing three foundational movements: Bouncing, Stepping, and Sliding. The methodology uses MediaPipe BlazePose for markerless pose estimation, 13 analytical joint-angle features for kinematic analysis, FFT-based audio cross-correlation for temporal alignment, and FastDTW for movement sequence comparison. The scoring framework is based on Wiraga, representing physical movement correctness, and Wirama, representing timing synchronization, with each component contributing 50% to the final score. The system also generates semantic natural-language feedback to support learner correction. Evaluation was conducted using 45 videos from five students across three movements and three attempts, with expert scores provided by a professional dance coach. The overall Pearson correlation between system and expert scores was weak and not statistically significant, $r = 0.25$, $p = 0.092$, with a Mean Absolute Error of 17.27 points. The SUS usability score was 69.00, indicating acceptable usability. The system is functional as a prototype, but scoring refinement is required before expert-level reliability can be claimed.

Keywords: AI-assisted dance training, MediaPipe BlazePose, motion tracking, FastDTW, semantic feedback, Wiraga, Wirama.



DEDICATION

I dedicate this thesis to my family and to everyone who supported me throughout my academic journey.



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TABLE OF CONTENT

STATEMENT BY THE AUTHOR.....	2
ABSTRACT	3
DEDICATION	5
ACKNOWLEDGEMENTS	6
TABLE OF CONTENT	7
LIST OF FIGURES	10
LIST OF TABLES.....	11
1. CHAPTER 1 - INTRODUCTION.....	12
1.1. Background	12
1.2. Problem Identification.....	13
1.3. Research Objectives.....	13
1.4. Research Questions.....	14
1.5. Hypothesis	14
1.6. Significance of the Study	14
1.7. Scope and Limitations	15
2. CHAPTER 2: LITERATURE REVIEW.....	16
2.1. Theoretical Perspective	16
2.1.1. Foundational Hip-Hop Movements Taxonomy	16
2.1.2. Wiraga and Wirama: A Two-Pillar Evaluation Framework	17
2.1.3. Human Pose Detection with BlazePose (MediaPipe).....	19
2.1.4. View-Invariant Kinematic Feature Extraction	22
2.1.5. Temporal Alignment: FastDTW and Audio Cross-Correlation.....	23
2.1.6. Pedagogical Principles of Semantic Corrective Feedback.....	24
2.2. Review of Previous Studies	25
2.2.1. BlazePose: On-Device Real-Time Body Pose Tracking	26
2.2.2. Human Pose Estimation Using MediaPipe Pose and Optimization	26
2.2.3. Application of Improved DTW Algorithm in Sports Posture Analysis	27
2.2.4. Comparative Study of Human Motion Recognition Based on Pose Estimation	28
2.2.5. Online Dance Learning with Teacher-AI Cooperation.....	29
2.3. Research Gap	31
3. CHAPTER 3: RESEARCH METHODOLOGY	34

3.1.	Research Overview	34
3.2.	Step 1: Requirement Analysis.....	34
3.2.1.	<i>Functional Requirements</i>	<i>34</i>
3.2.2.	<i>Non-Functional Requirements</i>	<i>35</i>
3.3.	Step 2: System Design.....	35
3.3.1.	<i>System Architecture.....</i>	<i>35</i>
3.3.2.	<i>System Interface</i>	<i>36</i>
3.3.3.	<i>Use Case Design</i>	<i>38</i>
3.3.4.	<i>Entity Relationship Diagram (ERD)</i>	<i>39</i>
3.3.5.	<i>Activity Diagram</i>	<i>41</i>
3.4.	Step 3: System Implementation (Kinematic Extraction)	42
3.4.1.	<i>Human Pose Estimation with Visibility Gating.....</i>	<i>42</i>
3.4.2.	<i>View-Invariant Kinematic Modeling.....</i>	<i>43</i>
3.4.3.	<i>Landmark-to-Analytical-Feature Mapping.....</i>	<i>44</i>
3.5.	Step 4: Motion Alignment and Scoring Model.....	45
3.5.1.	<i>Temporal Alignment Through Audio Cross-Correlation.....</i>	<i>45</i>
3.5.2.	<i>Sequence Comparison Using FastDTW.....</i>	<i>45</i>
3.5.3.	<i>Movement-Specific Wiraga Scoring.....</i>	<i>46</i>
3.5.4.	<i>Wirama (Temporal) Scoring.....</i>	<i>48</i>
3.5.5.	<i>Composite Overall Score</i>	<i>48</i>
3.5.6.	<i>Regional Scoring Partition (The Rubric).....</i>	<i>51</i>
3.6.	Semantic Feedback Generation.....	51
3.6.1.	<i>Kinematic Thresholding and Noise Filtering.....</i>	<i>52</i>
3.6.2.	<i>Natural Language Processing Mapping (Semantic Transition)</i>	<i>52</i>
4.	CHAPTER 4: RESULTS AND ANALYSIS.....	54
4.1.	Experimental Design	54
4.2.	Expert Evaluation Results	54
4.3.	Notable Observations from Expert Data	56
4.3.1.	<i>Interpretation of the Score 20 Across Different Skill Levels</i>	<i>57</i>
4.4.	System Output Interface	58
4.5.	System Evaluation Results	61
4.5.1.	<i>Overview of System Scores.....</i>	<i>62</i>
4.5.2.	<i>Descriptive Statistics by Movement Type.....</i>	<i>63</i>
4.5.3.	<i>System Score Trends Across Attempts</i>	<i>63</i>
4.5.4.	<i>System Scores by Skill Level.....</i>	<i>64</i>
4.6.	Correlation Analysis Between System and Expert Scores	65
4.6.1.	<i>Overall Correlation.....</i>	<i>65</i>
4.6.2.	<i>Per-Movement Analysis.....</i>	<i>66</i>
4.6.3.	<i>Sliding Scoring Limitation</i>	<i>67</i>
4.6.4.	<i>Notable Observations.....</i>	<i>68</i>
4.7.	Usability Evaluation (SUS)	69
5.	CHAPTER 5: DISCUSSION, LIMITATIONS, AND FUTURE WORK	71

5.1.	Discussion of Findings	71
5.1.1.	<i>Hypothesis H1: Audio-Temporal Alignment</i>	<i>71</i>
5.1.2.	<i>Hypothesis H2: Semantic Feedback Quality</i>	<i>71</i>
5.1.3.	<i>Hypothesis H3: System-Expert Correlation.....</i>	<i>72</i>
5.1.4.	<i>The Wiraga-Wirama Framework as Computational Rubric.....</i>	<i>73</i>
5.2.	System Limitations	74
5.2.1.	<i>Single Reference Per Movement</i>	<i>74</i>
5.2.2.	<i>Absence of Movement Type Classifier.....</i>	<i>74</i>
5.2.3.	<i>Wirasa Dimension Not Implemented.....</i>	<i>74</i>
5.2.4.	<i>Camera Angle Dependency.....</i>	<i>75</i>
5.2.5.	<i>Fixed Scoring Thresholds.....</i>	<i>75</i>
5.2.6.	<i>Evaluation Dataset Size</i>	<i>76</i>
5.3.	Future Work.....	76
5.3.1.	<i>Movement Type Auto-Detection</i>	<i>76</i>
5.3.2.	<i>Adaptive Skill-Level Thresholds.....</i>	<i>77</i>
5.3.3.	<i>Multi-Reference Dataset</i>	<i>77</i>
5.3.4.	<i>Wirasa Proxy Measurement</i>	<i>77</i>
5.3.5.	<i>Real-Time Browser-Side Processing.....</i>	<i>77</i>
5.3.6.	<i>Extended Movement Vocabulary.....</i>	<i>78</i>
5.3.7.	<i>Longitudinal Improvement Study.....</i>	<i>78</i>
5.3.8.	<i>Scalability to Larger Student and Instructor Participation</i>	<i>78</i>
5.4.	Conclusion	79
REFERENCES.....		82



LIST OF FIGURES

Figure 3-1 System Architecture Diagram	36
Figure 3-2 Student dashboard displaying per-movement progress statistics, best scores, and recent attempt history.	37
Figure 3-3 Movement selection screen presenting the three foundational movements available for evaluation.....	37
Figure 3-4 Reference video screen displaying the pre-loaded approved-by-expert reference for the selected movement.	38
Figure 3-5 Video upload screen with drag-and-drop interface for student attempt submission.	38
Figure 3-6 Use Case Diagram.....	39
Figure 3-7 Entity Relationship Diagram.....	41
Figure 3-8 Activity Diagram.....	42
Figure 3-9 Flowchart of Wiraga and Wirama Score Calculation.....	50
Figure 4-1 Dashboard Interface	58
Figure 4-2 Movement Selection Interface	59
Figure 4-3 Reference Video Interface.....	59
Figure 4-4 Upload Interface.....	60
Figure 4-5 Processing/Loading Interface.....	60
Figure 4-6 Result Interface	61
Figure 4-7 Timeline Marker Feedback Interface	61

LIST OF TABLES

Table 2-1 Mapping of BlazePose Landmarks to the 13 Analytical Features	21
Table 2-2 Comparison of Reviewed Studies.....	30
Table 3-1 Grading rubric.....	51
Table 4-1 Expert Scores - Bouncing	55
Table 4-2 Expert Scores - Stepping	55
Table 4-3 Expert Scores - Sliding	55
Table 4-4 System-Generated Overall Scores by Student, Movement, and Attempt....	62
Table 4-5 System Score Descriptive Statistics by Movement Type	63
Table 4-6 Mean System Scores by Skill Level	65
Table 4-7 Per-Movement Correlation Analysis Between System and Expert Scores (Pearson r, MAE, and Bias)	66
Table 4-8 SUS Scores by Participant	69

