System Requirements of Gait Laboratory Agent

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System Requirements

Funtional specifications

Within the gait laboratory, a number of sensors are used to capture objective movement data, such as dynamic and kinematic patterns, muscle activation and energy expenditure during movement. Dynamic variables describe general or specific forces, moments and powers, measured with the use of force platforms or pressure mats. On the other hand, kinematic variables describe the geometry of the movement by analyzing the change of the musculoskeletal system, measured with the use of opto-electronic systems, electrogoniometers or accelerometers. In addition, muscle activation is measured with an electromyograph and energy expenditure is measured from the evaluation of oxygen consumption or the monitoring of cardio-respiratory expenditure. These are means by which data from the environment is measured and which are useful.

In relation to this, the actuators of the system would fulfill the objective of showing the users recommendations, to improve their performance, prevent injuries, know their energy expenditure and in some cases give a clinical report. So, the gait laboratory agent collects data with the use of sensors, then these data are stored and biomechanical simulations are performed to analyze the behavior and evaluate movement patterns in order to detect anomalies. Finally, a series of recommendations are made according to the user's needs, which will help the user to reinforce his conditions and when he enters the system again, his needs will be different, if possible. Feedback, generated by the Insight Engine, is also provided, which fulfills a transversal function within the Running Lab, by providing a continuous cycle of analysis, improvement and customization, which will allow the system to continuously evolve based on the accumulated experience and the specific needs of each case.

User Stories

The following user stories describe the key functionalities of the Gait Lab agent system, addressing the needs of the different profiles that interact with the platform. These

stories focus on how users (patients, healthcare professionals, athletes, and administrators) interact with the system, what they expect to gain, and the expected benefit of that interaction.

Title: Clinical Diagnosis	Priority: High	Estimate:
User Story: As a healthcare professional, I want to receive a clinical report based on the patient's gait data, so that I can identify abnormalities and prescribe appropriate treatment.		
Acceptance Criteria: Given a patient has completed a gait analysis session, When the data is processed and analyzed, Then a complete clinical report is generated with diagnostic suggestions.		

Title: Personalized Recommendation	Priority: Half	Estimate:
User Story: As an user, I want personalized recommendations to optimize my movement, so that I can improve my performance and prevent injuries.		
Acceptance Criteria: Given my movement data is collected and analyzed, When the system identifies movement inefficiencies, Then I receive tailored suggestions to enhance my technique.		

Title: Energy Expenditure Calculation	Priority: Half	Estimate:
User Story: As a rehabilitation specialist, I want to know the energy expenditure of a patient's gait, so that I can evaluate recovery progress and endurance.		
Acceptance Criteria: Given that gait data is collected via sensors, When the system calculates energy usage, Then the result is displayed in the report for evaluation.		

Title: Personal Progress Tracking	Priority: High	Estimate:
User Story: As a patient in rehabilitation, I want to visualize my gait analysis results and improvements over time, so that I can stay motivated and track my recovery progress.		
Acceptance Criteria: Given I've completed multiple gait sessions, When I access my personalized report or app, Then I can view comparisons, improvements, and suggestions tailored to me.		

Title: Continuous System Learning (Insight Engine)	Priority: High	Estimate:
User Story: As a system administrator, I want the platform to learn from past recommendations and user feedback, so that the diagnostic engine becomes more accurate over time.		
Acceptance Criteria: Given a set of recommendations has been evaluated, When feedback from users is processed, Then the system should refine future analysis and predictions accordingly.		

References

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