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Heddoko: Objective Functional Movement and range of motion Assessment System

Authors

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Objective Functional Movement AND RANGE OF MOTION Assessment system

# Company Description

Heddoko™ builds smart compression shirts and compression pants that track the movement of the body joints using textile embedded sensors. It is designed for amateur and professional athletes and will serve them as a virtual coach. The smart garments will teach the athletes how to improve their techniques and avoid injury by capturing the full body movements, modeling it in 3D on their smart devices and giving them live coaching feedback.

The solution consists of the combination of an intelligent garment, a mobile application, a backend system, and a web dashboard. The intelligent garment captures the data of the user’s movements, filters it, and sends it to the mobile application. The mobile application serves a dual purpose: it models the 3D movement of the user’s body and provides live coaching feedback. It also transmits all the information to the artificial intelligence backend system. The AI backend system compiles and analyzes all the captured information over time in order to determine body metrics such as muscle fatigue and amount of pressure applied on the joints. Finally, the web application provides dashboards and reports that the user can customize to track performances and enhance the user’s experience.

Heddoko teaches the user to consistently maintain perfect form while executing a sequence of movements. In the event of injury, recuperating athletes will be able to limit specific kinds of exertion in order to recover without aggravation to existing injury by tracking their movement. It also allows coaches, trainers and instructors to evaluate with precision the level of performance at which their athletes execute their exercises. It increases their productivity by reporting on analytics recorded by the intelligent garments.

# Project description

## Step 1: Traditional Mocap vs Heddoko systems

## Step 2-1: Functional Movement and mobility screening

* Objective VS Subjective assessment

## Step 2-2: Impact on training plans

* Automatic Detection of Reduced Range of Motion
* Biomechanical Performance Metrics

Injury Prevention assessment: Effects of continuous evaluation of Mobility and functional movement screening

Would be ideal to do a research project (i.e. take 20 trainers and get them to administer the FMS test and can compare their subjective measurements vs. our objective measurements).

Using the garment to do an FMS would be the ultimate gold standard because it removes all subjectivity and gives specific and meaningful feedback (i.e. “Left knee is collapsing 5 degrees medially while squatting (valgus))

Maximum vertical jump measurement system

Sports specific tracking

It would be really cool to have an alarm that goes off when starting an FMS test if the athlete’s feet aren’t in the right position to being the test, etc. (We already thought of this and are integrating haptic feedback so the suit can vibrate and give instant feedback in this case)

We can approach CoachMePlus (i.e. through Paulo’s connections)

The MLS is already planning something along the lines of using once-a-week FMS tests during the season

Would be great to know more re: specific injury markers we need to take into account

Example of basketball players → it would be very valuable to know how many times players are jumping and landing, how they are decelerating, how many times they go into knee flexion so coaches and trainers can have more information to use for designing training and practice plans (i.e. “Player X did 4x10 sets of squats in the gym, so was in knee flexion 40 times, + jumped and landed 200 times in practice, so that’s 240 knee flexions, which is below the tolerable threshold of 300 knee flexions/day”… Would be very good if he could attain data for things like rate of deceleration and # of knee flexions as well)

# Project Objectives

* Do a comparative analysis: Traditional motion capture vs. Heddoko systems
* Do a comparative analysis: Objective vs. Subjective scoring of functional movement and mobility screening
* Determine the benefits in terms of injury prevention of continuous mobility screening
* Determine impact of continuous mobility screening on designing practice plans
* Gathering of biomechanical analysis data from coaches and athletes
* Determine biomechanical-based performance metrics for training
  + Strength and conditioning
  + Specific Sports (sports to be determined)
    - Basketball
    - Soccer
    - Football
    - Volley ball