LOC Case Report 1

AI-Assisted Gait Analysis Shows Major Improvement in Running Posture With Carbon AFOs in an 8-Year-Old With Spastic Diplegic Cerebral Palsy

Professor Saeed Forghany[1], Sam Walmsley[1]

Orthotic research department, London Orthotic Consultancy, UK

Overview

This case report highlights how switching from traditional plastic AFOs to advanced carbon-fibre AFOs significantly improved trunk posture and running mechanics in a child with spastic diplegic cerebral palsy. Using LOC's AI-assisted gait analysis system, we objectively measured how the new orthoses improved stability, alignment, and running efficiency.

Why This Case Matters

Many children with CP experience toe walking, excessive pronation, poor trunk posture, and fatigue during play or school activities. This report demonstrates how modern orthotic technology can improve not only the foot and ankle, but also whole-body posture, including pelvis and trunk control.

Patient Background

An 8-year-old girl with spastic diplegic CP presented with tiptoe walking, severe overpronation, knee hyperextension, forward trunk lean, reduced endurance during running, and limited improvement with plastic AFOs.

Assessment at LOC

Barefoot results showed marked forward trunk lean and poor midfoot control. Plastic AFOs improved foot position but the improvement in trunk posture during walking and running was limited (Figure 1).

Orthotic Intervention: Custom Carbon AFOs

Carbon AFOs provide stronger ankle control, improved alignment of ground reaction forces, and superior energy return. These features

support more upright trunk posture during walking (Figure 2) and running (Table 1).

Table1. How trunk posture changes at different stages of walking when barefoot, wearing plastic AFOs, and wearing carbon AFOs.

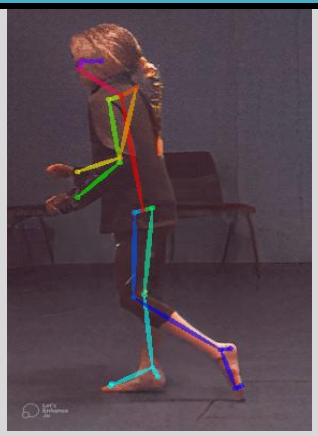
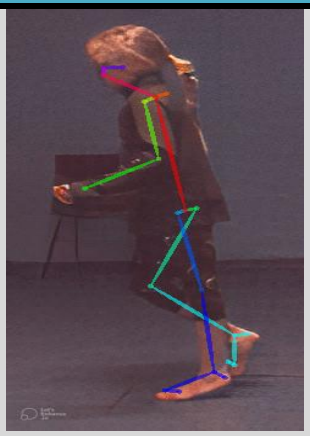
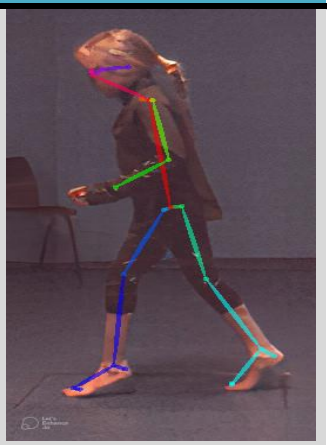
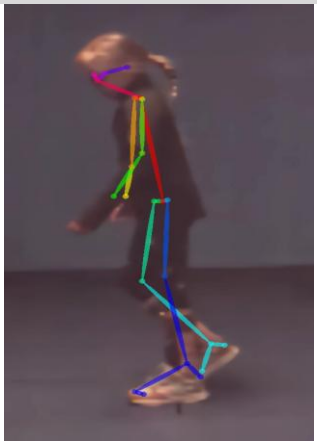
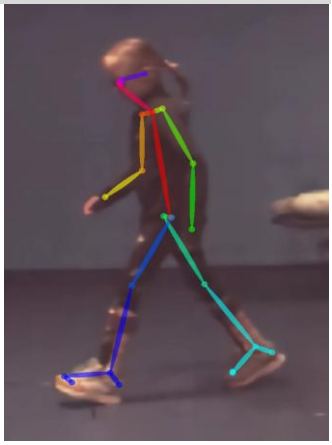
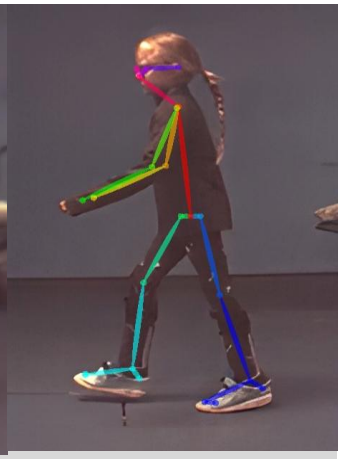
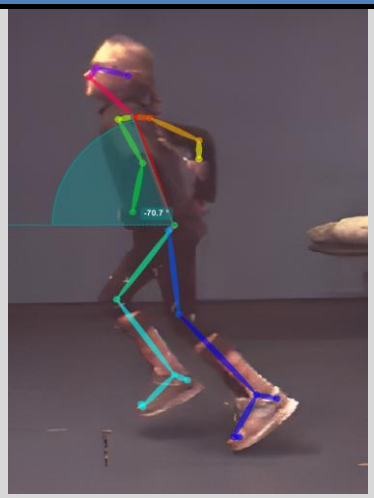
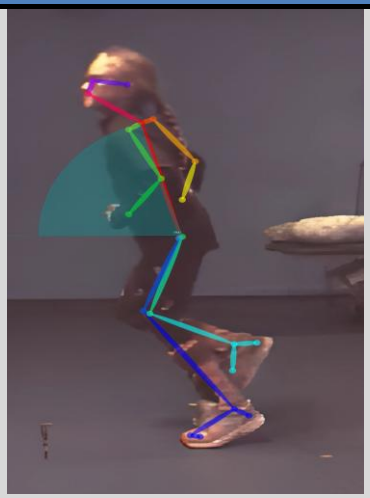
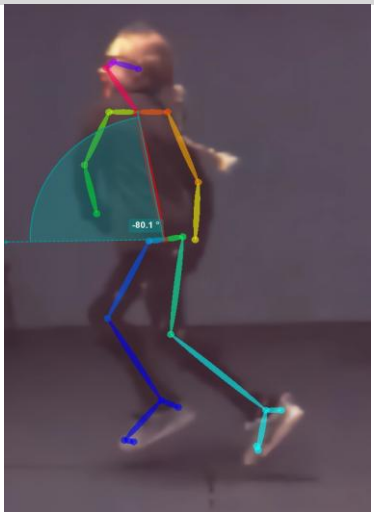
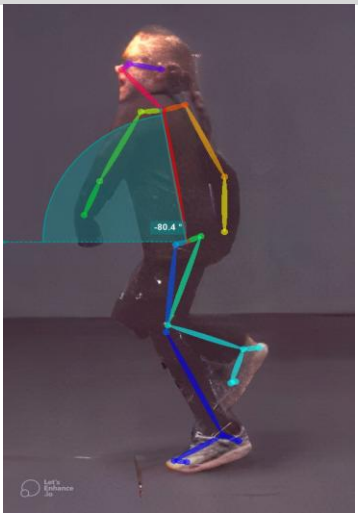
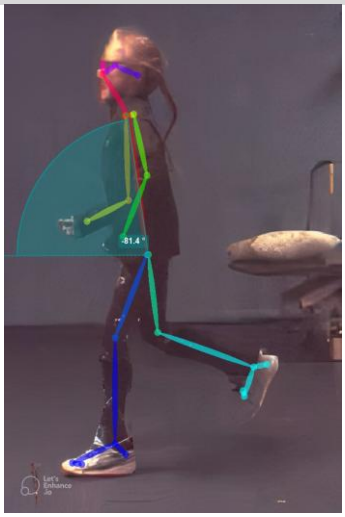
Walking	Toe off	Mid stance	Initial contact
Barefoot			
Plastic AFO			
Carbon AFO			

Table2. How trunk posture changes at different stages of running when wearing plastic AFOs, and wearing carbon AFOs.

Running	Toe off	Mid stance	Initial contact
Plastic AFO			
Carbon AFO			

AI-Gait Analysis Results

Carbon AFOs reduced forward trunk lean by 35–50% during running (Table 3).

Table1. Forward trunk lean (in degrees) at initial contact, mid stance, and toe off when running in plastic versus carbon AFOs.

Running	Plastic AFO	Carbon AFO
Initial contact	14.3°	9.6°
Mid stance	16.8°	9.6°
Toe off	19.3°	9.9°

Outcome

The child demonstrated more upright running posture, better symmetry, improved stability, and reduced fatigue.

Follow-Up Plan

6-week review for comfort assessment and 3-month gait reevaluation.

Consent

Published with parental consent.