

FIELD DATA BASED MODELING OF HUMAN WALK: BACKDROP FOR BIPED ROBOT

**PRASHANT SHIWALKAR, JAYANT MODAK
AND JYOTI PRAFULL SHIWALKAR**

Abstract

Intricacies involved in human walk are best appreciated during development of Humanoid Robots. Inclusion of 'Heel-Strike-Toe-Off' (HSTO) type of ground contact for stance foot is one of the steps towards covering and emulating finer aspects of human walk in robotic practice. Zero Moment Point (ZMP) criterion remains the main stay for providing Dynamic Equilibrium in Humanoids. During human walk ZMP is expected to cross boundaries of Support Polygon (SP) and deviate from the criterion. To ascertain or negate this statement ZMP trajectory must be superimposed on SP atleast for the key instances of Gait cycle. Inaccessibility to a wider data base of normative kinesiology with corresponding biometrics is considered to be the reason for lack of understanding of segmental inertia force. Locating ZMP at given instance needs an exact knowledge of the inertia vector. As a first step towards this bigger project a Field Data Based Model has been developed using regressions for predictions of Peak Breaking (PB) and Peak Propulsion (PP) force values in the variation of Anterior-Posterior Force (APF) component of Ground Reaction Force (GRF) during walk. To develop the model Biometric, extraneous, physiological and kinetic factors are incorporated to study the complex phenomenon as it occurs. Concept of mean APF is introduced to describe the economic speed of walk.

Keywords : Dynamic Equilibrium, Gait, Ground Reaction Force, Humanoids.