Hirosaki Univ. Technology

Walking characteristic evaluation system

Three-dimensional walking characteristics can be evaluated regardless of location or time!

Overview

The relationship between motor function and dementia has been pointed out, and walking speed has been investigated as one of the indicators. In addition, gait parameters that are considered to be effective for the diagnosis and evaluation of gait disorders are collected in gait measurement performed in medical settings, and by analyzing these parameters, it is possible to effectively diagnose gait disorders and determine the effects of treatment.

Conventional gait evaluation methods include measurement methods using stopwatches, pedometers, video cameras, etc., but it has been difficult to evaluate the characteristics of each step without being restricted by the location and walking distance. Another conventional method is to evaluate gait characteristics by integrating toe acceleration using inertial sensors. However, this method has a problem that it can only be applied to forward walking.

The present invention relates to a method for generating three-dimensional foot-toe trajectories for each step using a small and lightweight sensor that can be attached to a subject's foot. From the three-dimensional trajectories, three-dimensional gait characteristics such as step number, step length, cadence, walking speed, distance between the foot-toe and the walking surface, and swinging angle of the foot-toe can be evaluated.

Product Application

- Health checkup
- Rehabilitation, injury prevention, development of insoles, etc.

IP Data

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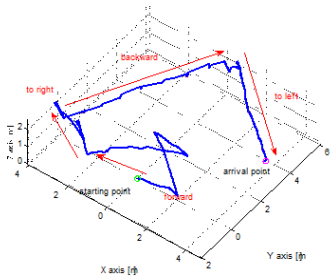
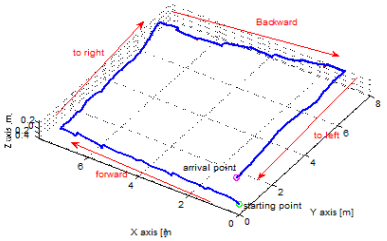
Gait characteristics can be obtained with higher accuracy than conventional methods!

Conventional method



	estimated distance [m]	Error [%]
Horizontal direction	33.79	20.7
vertical direction	2.06	6.1

How to search



	estimated distance [m]	Error [%]
Horizontal direction	29.2	4.3
vertical direction	0.22	0.8

Related Works

[1] Koichi Sagawa, Ken Shimamoto, Estimation of 10 m Walking Time at Normal and Maximum Speeds by Toe-Mounted Inertial Sensors , Clinical Biomechanics

[2]Koichi Sagawa, Kensuke Ohkubo, 2D trajectory estimation during free walking using a tiptoe-mounted inertial sensor, Journal of Biomechanics, 48(10), (2015) 2054-2059

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