



# Six-Legged Robot Gait Analysis

B. Stańczyk\* and J. Awrejcewicz

*Department of Automation, Biomechanics and Mechatronics,  
Lodz University of Technology, Stefanowskiego 1/15, 90-924, Lodz*

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**Abstract:** This paper includes results of investigations of real six-legged robot. By the name of hexapod we call a robot that walks on six legs. Due to specific construction of legs, each leg has 3 degrees of freedom, prototype constructed by us allows to model gait of reptiles and insects. Presented system of rotation angle of each of the cells (servos) allows to analyze every single type of the movement. Applied measurement system allows also to measure current, and use it for calculation of power generated by motor. It allows to calculate power necessary for each type of the robot movement. Applied mathematical model allows for identification and check of the angular velocity, acceleration and moments generated by each of the robot cells separately. As a result it is possible to determine quality coefficients of different gait patterns of the robot, i.e. maximal speed or maximal load depending on the number of working legs. Obtained results were confronted with theoretical model of differential equations regulating gait of our hexapod.

**Keywords:** *hexapod, control, servo, gait, micro control.*

**Mathematics Subject Classification (2010):** 70E60.

## 1 Introduction

Nowadays mobile robotics is based mainly on the wheeled devices [1]. Due to the difficulties in the construction and control walking robots are much less common. Also, the equations used to describe the movements of the robot are less complicated for wheeled robots than in the case of the devices with legs [1]. However, due to the rapid development of technology, miniaturization and continuous growth of microcontroller productivity, robots with legs appear more and more frequently. Due to the desire to expand knowledge of the human gait most of robots subjected to the analysis are anthropomorphic, therefore in literature test results and structures of the two-legged robots are most

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\* Corresponding author: <mailto:bartchez@gmail.com>