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## Contents

<b>A Study of Walking Stability of Seabed Walking Robot in Forward Incident Currents</b> . . . . .	249
Seong-Yeol Yoo	
<b>A Hybrid Automata Framework for an Adaptive Impedance Control of a Robot-Assisted Training System</b> . . . . .	257
Ismail Mohd Khairuddin, Shahrul Na'im Sidek, Anwar P. P. Abdul Majeed, Asmarani Ahmad Puzi and Hazlina Md Yusof	
<b>Mechanical Structure Design of a Magnetic Flux Leakage Based Robot for Pipeline Inspection</b> . . . . .	267
Catalina Marentes, Pedro Pablo Diaz and John Leonardo Quiroga	
<b>Forced Vibration Analysis of a Silk Fibre Embedded Pneumatic Artificial Muscle</b> . . . . .	281
Bhaben Kalita and S. K. Dwivedy	
<b>Dynamic Modelling and Control of a Compact Autonomous Underwater Vehicle</b> . . . . .	303
Avilash Sahoo, S. K. Dwivedy and P. S. Robi	
<b>Development of Integrated Digging Robot Using Drill Bit-Limbs Hybrid Mechanism That Mimics Burrowing Animals Behavior</b> . . . . .	323
Christian Tirtawardhana, Byeongho Yu, Wancheol Myeong and Hyun Myung	
<b>Path Planning for an Unmanned Aerial Vehicle Considering Dynamic Geo-Fence in Urban Environment</b> . . . . .	333
Jinkwang Kim, Junho Choi, Sungwook Jung and Hyun Myung	
<b>Design of Forelimbs and Digging Mechanism of Biomimetic Mole Robot for Directional Drilling</b> . . . . .	341
Junseok Lee, Jongheon Kim and Hyun Myung	

# A Hybrid Automata Framework for an Adaptive Impedance Control of a Robot-Assisted Training System

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## Abstract:

There is an increasing demand for an effective and adaptive robot-assisted training system for traumatic brain injury patients which can considerably promote their sensorimotor control performance, apart from ensuring the safety of the patients. This study focuses on the impedance control framework to simultaneously track the position trajectory while regulating the apparent impedance of the robot. The framework is based on the hybrid automata model that is used to govern the desired trajectory deployed by the robot-assisted training in assisting rehabilitative motion. A designed experimental setup was developed to evaluate the performance of the proposed hybrid automata scheme. Preliminary simulation results demonstrated the excellent response of the proposed framework with its ability to track the desired trajectory as well as the varying patients' arm impedance profile.

**Keyword:** Hybrid Automata; Hybrid Automata; Robot-Assisted