



RITA 2018

Proceedings of the 6th International
Conference on Robot Intelligence Technology
and Applications

ISSN 2195-4356

ISSN 2195-4364 (electronic)

Lecture Notes in Mechanical Engineering

ISBN 978-981-13-8322-9

ISBN 978-981-13-8323-6 (eBook)

<https://doi.org/10.1007/978-981-13-8323-6>

© Springer Nature Singapore Pte Ltd. 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Contents

Design of Fast Climbing Robot for Tree with Multiple Diverging Branches	395
Ahmad Najmuddin Ibrahim, Oh Yi Pang, Wong Kien Yap and Ahmad Shahrizan Abdul Ghani	
The Flexural Strength Prediction of Porous Cu-Sn-Ti Composites via Artificial Neural Networks	403
Abdelrahman El-Sawy, Anwar P. P. Abdul Majeed, Rabi'u Muazu Musa, Mohd Azraai Mohd Razman, Mohd Hasnun Arif Hassan and Abdul Aziz Jaafar	
Machine Learning Approach in Identifying Speed Breakers for Autonomous Driving: An Overview	409
Chun Sem Choong, Ahmad Fakhri Ab. Nasir, Anwar P. P. Abdul Majeed, Muhammad Aizzat Zakaria and Mohd Azraai Mohd Razman	
Biosensors Approach for Lung Cancer Diagnosis—A Review	425
Amanina Iymia Jeffree, Salmah Karman, Suriani Ibrahim, Mohd Sayuti Ab Karim and Shaifulazuar Rozali	
Preliminary Results on Underwater Object Recognition with a Laser Scanner for Unmanned Underwater Vehicle	437
Yeongjun Lee, Yoongeon Lee, Junbo Chae, Hyun-Taek Choi and Tae-Kyeong Yeu	
Modelling of Fuzzy Inference System for Micro Milling—A Preliminary Study Through FEM	445
Ainur Munira Rosli, Ahmad Shahir Jamaludin, Mohd Nizar Mhd Razali, Amiril Sahab Abdul Sani, Saiful Bahari Hamzah and Mohd Shahril Osman	

Design of Fast Climbing Robot for Tree with Multiple Diverging Branches

Ahmad Najmuddin Ibrahim, Oh Yi Pang, Wong Kien Yap
and Ahmad Shahrizan Abdul Ghani

Faculty of Manufacturing Engineering, Universiti Malaysia Pahang,
26600 Pekan, Pahang, Malaysia
e-mail: anajmuddin@ump.edu.my

Abstract:

There are various situations where climbing of a tree without the use of cranes or ladders are needed, such as the collection of seed and leaf samples of wild trees in the jungle by geneticists and forest managers, and the harvest of fruits or bee hives for natural honey. The use of robots is limited by the existence of branches on a tree as it prevents the use of simple climbing mechanics. In this paper we designed a novel tree climbing robot to climb a tree with multiple diverging branches. The scope of the tree for the design are tree height 2.4 m, trunk diameter range between 0.13 and 0.26 m and branch diameter range of between 0.07 and 0.10 m. Various tree climbing methods were studied and compared to select the method that most closely fulfills a set design principle for a climbing robot. The mechanical design of our tree climbing robot combines wheel mechanism with interlock gripping mechanism to allow for maneuverability around a tree trunk to navigate between tree branches. Analysis was done using CAD software to help in designing the parameters of the climbing robot..

Keyword: CAD Software; Multiple Diverging; Forest Managers