

# **2024 International Conference on Information and Communication Technology for Development for Africa (ICT4DA 2024)**

**Bahir Dar, Ethiopia  
18-20 November 2024**



**IEEE Catalog Number: CFP24AS8-POD  
ISBN: 979-8-3315-2780-8**

**Copyright © 2024 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP24AS8-POD
ISBN (Print-On-Demand):	979-8-3315-2780-8
ISBN (Online):	979-8-3315-2779-2

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# Table of Contents

Preface	v
Organizing Committees	vii
Keynotes	ix
Special Sessions	xii
<b>Track 1: Intelligence Systems and Data Science</b>	
An Ensemble Feature Extraction Approach for Ethiopian Coffee Beans Variant Identification <i>Wakjira Tesfaye, Tenagne Fikirie</i>	1
A Comparative Evaluation of GA and PSO Tuned PID Controllers for the Quadruple Tank System <i>Gashaye L. Hailu, Tefera T. Yetayew</i>	7
The Integration of Deep Learning Techniques and Big Data Analytics for Improved Breast Cancer Diagnosis and Treatment: A Systematic Review <i>Hambisa Mitiku Gebre, Getachew Mamo Wegari</i>	13
Detection and Classification of Ethiopian Kale Leaf Disease using Deep Learning <i>Hana Dibekulu Tafese, Michael Melese Woldeyohannis, Damtew Mekash Shenkute, Temesgen Mengistu Helana</i>	19
AI-Integrated Wearable Sensing: A Technological Intervention to Physiological Monitoring and Early Detection of Pandemic Diseases <i>Stanley Leonard Tito, Jamal F Banzi</i>	25
<i>Brain Tumor Segmentation Using Multi-Task Learning</i> <i>Tensay Nigussie, Yirga Yayeh, Yenework Belayneh, Atinkut Molla, Bizuayehu Simegnaw, Wasjihun Admass</i>	31
Cervical Cell Segmentation and Classification Using U-Net and Hybrid VGG19-AlexNet Architecture <i>Betelhem Zewdu Wubineh, Andrzej Rusiecki, Krzysztof Halawa</i>	37
Classifying Dairy Farmers' Knowledge, Attitudes, and Practices towards Aflatoxin Using Bootstrap Oversampling and Machine Learning <i>Betelhem Zewdu Wubineh, Sosina Dires Sewunet</i>	43
Model Predictive Controller Design For Precision Agricultural Robot <i>Eskeziyaw Alemneh Mekonen, Ermias Kassahun, Kindu Tigabu, Melkamu Bekele, Admasu Yehule</i>	49
Zema Dataset: A Comprehensive Study of Yaredawi Zema with a Focus on Horologium Chants <i>Mequanent Argaw Muluneh, Yan-Tsung Peng, Worku Abebe Degife, Nigussie Abate Tadesse, Aknachew Mebreku Demeku, Li Su</i>	55

Classification of Angular Leaf Spot, Bean Rust Diseases in Haricot Bean Leaves using CNN and Transfer Learning <i>Kebad Nigussie Werku, Ibrahim Gashaw Kassa, Abinet Bizuayehu Desta, Dessalegn Melkie Ayal, Mesenbet Abewa Bimrew, Misganaw Ketema Ayele</i>	62
Tekele Zemamie Action Recognition in Ethiopia Orthodox Tewahedo Church Using CNN-Bi-LSTM <i>Tenagne Fikirie, Emiyamrew Azmeraw, Wakjira Tesfay, Abrham Debasu</i>	68
Controlling of 3 DOF car model active suspension system using Adaptive Neuro Fuzzy Inference System controller <i>Yibeltal Antehunegn Admas, Gashaw Wubante, Getnet Ayele Kebede, Temesigen Ashenafi Beyene, Tadele Beshaw Acheneff, Sewagegn Zewudie Tegegne</i>	73
Deep Learning Approach for Medicinal Plant Identification and Therapeutic Use Prediction <i>Emiyamrew Azmeraw, Abebe Tesfahun, Tsegazewold Kinfu, Tenagne Fikirie, Kindu Tigabu</i>	78
Addressing the Limitations of News Recommendation Systems: Incorporating User Demographics for Enhanced Personalization <i>Zerihun Olana Asefa, Alemisa Endebu Ergosa</i>	84
Financial Health Assessment for Households in Kenya <i>Samson Kinyanjui, Felix Lopuran, Peter Kimanga, Edna Mugoh, Dennis Kiprotich, Patrick Gikunda</i>	90
Barriers and Challenges in Clinical Application of Machine Learning Algorithms <i>Hamza Shukri Abdurahman, Amare Kassaw Yimer</i>	96
Predicting Household-based Emergency Food Assistance using Hybrid learning with Explainable Artificial Intelligence <i>Abraham Alamirew Endalew, Million Meshesha, Alex Tadeg Getaneh, Behaylu Tadele Alemu, Birhanu Alemneh Truwork and Mulatu Yirga Beyene</i>	102
Orange Fruit Disease Detection and Classification Using AI-Based <i>Gebrhans weldegebriel weldergs</i>	108
Balancing the Risks and Rewards of Deepfake and Synthetic Media Technology: A Regulatory Framework for Emerging Economies <i>Mohammad Shakil, Fisseha Mekuria</i>	114
<b>Track 2: Wireless Communication &amp; Emerging Technology</b>	
Long Short-Term Memory and Synthetic Minority Over Sampling Technique-Based Network Traffic Classification <i>Yirga Yayeh, Yenework Belayneh, Atinkut Molla, Bizuayehu Simegneu</i>	120
Assessing Cloud Service Quality: An Empirical Study in Ethiopia	125

<i>Natnael Wondafrash, Solomon Gizaw</i>	
Indoor Localization Using a Hybrid Algorithm of BiLSTM and SVM <i>Biruh Andualem Demelash, Belayneh Teshome Kebie, Yirga Yayeh Munaye, Tesfahun Nurrie Mengestie</i>	131
<b>Track 3: Computing Systems</b>	
Software Complexity Analysis with the Advanced CB Metric <i>Thathsarani H. A. N. N.</i>	136
<b>Track 4: Security and Privacy</b>	
Secure Ad hoc On-demand Distance Vector Routing Protocol for Wireless Sensor Networks Data Transmission <i>Kindu Tigabu, Addisalem Genta, Ermias Kassahun, Emiyamrew Azmeraw, Awoke Berara</i>	142
Encrypted Malicious Network Traffic Detection: Leveraging Attention Mechanism and Markov Chain Sequencing <i>Sileshi Nibret Zeleke, Amsalu Fentie Jember, Mario Bochicchio</i>	148
<b>Track 5: Natural Language Processing</b>	
Kafi Noonoo Grammar Errors Detection Using Deep Learning Approaches <i>Ashagire Adinew, Dereje Teferi</i>	154
Deep Learning Based Model for a Spellchecker Of Wolaita Language <i>Selemon Lera Gamo, Amin Tuni Guri, Bereket Dea Getechaw</i>	160
Designing an Automatic Sentence based Parsing for Ge'ez Sentences Mebit Kefale Getahun, Yirga Yayeh Munaye, Wasyihun Admass, Habtamu Shiferaw Asmare	166
Authorship Attribution on an Afrikaans Corpus using Burrows Delta <i>Previn Govender, Josef Langerman, Nazeer Joseph</i>	172
Development of Sentiment Analysis for Wolaita Language using Machine Learning Approaches <i>Aklilu Thomas Bedecho, Radha Krishna Bokka</i>	178
A Hybrid Deep Learning Approach for Optical Character Recognition of Multi-Dialect Guragegna Printed Documents <i>Tesfahun Nurrie Mengestie, Belayneh Teshome Kebie, Adane Kasie Chekole, Biruh Andualem Demelash</i>	183
Effect of Parallel Data Processing Model on BiDirectional English-Khimtagne Machine Translation Using Deep Learning <i>Adane Kasie Chekole, Belayneh Teshome Kebie, Tesfa Tegegne Asfaw, Mengistu Kinfe Negia, Tesfahun Nurrie Mengestie, Yohannes Abinet Worku</i>	189
Sinhala Java Development Aid with Machine Translation Integration <i>D. I. De Silva, K. S. N. Athukorala</i>	194

Parallel Corpora Preparation for bi-Directional Amharic-Kistannigna Machine Translation <i>Mengistu Kinfe Negia, Rahel Mekonen Tamiru, Million Meshesha, Bizuayehu Tadege Tegegne, Adane Kasie Chekole</i>	200
Sub Event Relation Classification for Amharic Texts Using Deep Learning Approach <i>Abinet Bizuayehu Desta, Abebe Alemu Abetw, Kebab Nigussie Werku, Nega Agmas Asfaw, Habtamu Molla Belachew, Wubie Belay Alemu</i>	205
Enhancing Early Childhood Literacy: A Technological Aid for Letter Learning <i>D. I. De Silva, K. S. N. Athukorala</i>	211
Extractive Text Summarization for Wolaytta Language Using Recurrent Neural Network <i>Eyobed Birhanu Paulos, Michael Melese Woldeyohannis, Biniyam Sime Dana, Seiyfedin Mohammed Yesuf, Mesay Gemedas Yigezu</i>	217
Design and Develop Automatic Parts of Speech Tagger for Siltigna Language Using Deep Learning Algorithm <i>Biniyam Sime Dana, Michael Melese Woldeyohannis, Seiyfedin Mohammed Yesuf, Eyobed Birhanu Paulos, Mesay Gemedas Yigezu</i>	223
The Role of Syntax and Semantics in Rule-Based Translation: A Comprehensive Review <i>D. I. De Silva, I. S. Gallage</i>	229
<b>Track 6: Information Systems &amp; Services</b>	
An Investigation into the Use of Open-Source Software Development Tools in the South African Mining Industry <i>Lulama Jack, Josef Langerman</i>	235
Review of AI Technologies for Enhancing the Lives of Visually Impaired Individuals: Applications, Outcomes, and Future Directions <i>Fitsum Gizachew Deriba, Betelhem Zewdu Wubineh, Mengistu Zenebe Teka</i>	241
Embedded Responsible Computing: Mainstreaming Ethics into Computer Science Curriculum: A Case Study of Dedan Kimathi University of Technology (DeKUT) <i>George Musumba, Michael Kagiri, Hellen Mwangi, David Wachepele, Dennis Miano</i>	247
Authors Index	253