Advances in Intelligent Systems and Computing 1079

K. Srujan Raju
Roman Senkerik
Satya Prasad Lanka
V. Rajagopal *Editors*

Data Engineering and Communication Technology

Proceedings of 3rd ICDECT-2K19

Springer

Advances in Intelligent Systems and Computing

Volume 1079

The series "Advances in Intelligent Systems and Computing" contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing such as: computational intelligence, soft computing including neural networks, fuzzy systems, evolutionary computing and the fusion of these paradigms, social intelligence, ambient intelligence, computational neuroscience, artificial life, virtual worlds and society, cognitive science and systems, Perception and Vision, DNA and immune based systems, self-organizing and adaptive systems, e-Learning and teaching, human-centered and human-centric computing, recommender systems, intelligent control, robotics and mechatronics including human-machine teaming, knowledge-based paradigms, learning paradigms, machine ethics, intelligent data analysis, knowledge management, intelligent agents, intelligent decision making and support, intelligent network security, trust management, interactive entertainment, Web intelligence and multimedia.

The publications within "Advances in Intelligent Systems and Computing" are primarily proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

**** Indexing: The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink ****

More information about this series at http://www.springer.com/series/11156

K. Srujan Raju · Roman Senkerik ·
Satya Prasad Lanka · V. Rajagopal
Editors

Data Engineering and Communication Technology

Proceedings of 3rd ICDECT-2K19

Springer

Editors
K. Srujan Raju
Professor & Head
Department of Computer Science & Engineering
CMR Technical Campus
Hyderabad, India

Roman Senkerik
Faculty of Applied Informatics
Tomas Bata University in Zlín
Zlín, Czech Republic

Satya Prasad Lanka
Stanley College of Engineering and Technology
Hyderabad, Telangana, India

V. Rajagopal
Department of EEE
Stanley College of Engineering and Technology
Hyderabad, Telangana, India

ISSN 2194-5357 ISSN 2194-5365 (electronic)
Advances in Intelligent Systems and Computing
ISBN 978-981-15-1096-0 ISBN 978-981-15-1097-7 (eBook)
https://doi.org/10.1007/978-981-15-1097-7

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

Stanley College of Engineering and Technology for Women, Osmania University, Hyderabad, India

Stanley College of Engineering and Technology for Women—a temple of learning—was established in the year 2008 on a sprawling 6-acre campus of historic Stanley College campus at Abids, Hyderabad. The college provides a serene and tranquil environment to the students, boosting their mental potential and preparing them in all aspects to face the cut-throat global competition with a smile on the face and emerge victoriously. Stanley College of Engineering and Technology for Women has been established with the support of Methodist Church of India that has been gracious and instrumental in making the vision of an engineering college on this campus a reality.

The college is affiliated to the prestigious Osmania University, Hyderabad. It has been approved by AICTE, New Delhi, and permitted by the Government of Telangana. Today, it is the reputed college among the campus colleges of Osmania University. The Decennial Celebrations have been done in 2018. The college was, accredited by NBA in 2018 and NAAC in 2019 with Grade A. The college offers four-year engineering degree courses leading to the award of Bachelor of Engineering (B.E.) in computer science and engineering, electronics and communication engineering, electrical and electronics engineering, and information technology. The college also offers postgraduate programmes in M.E/M.Tech and MBA. As of today, there is a yearly intake of 420 undergraduate students (full-time) and 108 postgraduate students.

We at Stanley aim to serve the state, the nation and the world by creating knowledge, preparing students for lives of impact, and addressing critical societal needs through the transfer and application of knowledge.

All UG Courses offered by Stanley are accredited by NBA, New Delhi. Stanley College of Engineering and Technology for Women is accredited by NAAC with "A" Grade.

ICDECT Organizing Committee

Chief Patrons

Prof. S. Ramachandram, Vice Chancellor, Osmania University
Bishop M. A. Daniel, Resident and Presiding Bishop, Hyderabad Episcopal Area

Patrons

Mr. K. Krishna Rao, Secretary and Correspondent, Stanley College of Engineering and Technology for Women (SCETW)
Dr. Satya Prasad Lanka, Principal, Stanley College of Engineering and Technology for Women (SCETW)

Conference Chair

Dr. A. Vinaya Babu, Director, Stanley College of Engineering and Technology for Women (SCETW)

Honorary Chair

Dr. Suresh Chandra Satapathy, Professor, School of Computer Engineering, Kalinga Institute of Industrial Technology (KIIT), Deemed to be University, Bhubaneswar

Conveners

Dr. B. Srinivasu, Professor in CSE, Stanley College of Engineering and Technology for Women (SCETW)
Dr. M. Kezia Joseph, Professor in ECE, Stanley College of Engineering and Technology for Women (SCETW)

Co-conveners

Dr. Kedar Nath Sahu, Professor in ECE, Stanley College of Engineering and Technology for Women (SCETW)
Dr. K. Vaidehi, Associate Professor in CSE, Stanley College of Engineering and Technology for Women (SCETW)

Programme Chair

Dr. K. Chennakesava Reddy, Professor and Head in ECE, Stanley College of Engineering and Technology for Women (SCETW)

Organizing Committee

Dr. A. Gopala Sharma, HOD, ECE
Dr. B. V. Ramana Murthy, HOD, CSE
Dr. A. Kanakadurga, HOD, IT
Dr. V. Rajagopal, HOD, EEE
Dr. M. Kasireddy, HOD, MBA
Dr. R. Manivannan, Coord. Infra
Dr. G. V. S. Raju, TPO

National Advisory Committee

Dr. A. Venugopal Reddy, VC, JNTUH
Dr. A. Govardhan, Rector, JNTUH
Dr. V. Bhikshma, OU
Dr. P. Ramesh Babu, OU
Dr. P. Sateesh, IIT Roorkee

Dr. D. V. L. N. Somayajulu, NITW
Dr. E. Selvarajan, AU, TN
Dr. Kiran Chandra, FSMI
Dr. N. Sreenath, UoP
Dr. K. Narayana Murthy, UoH
Dr. C. R. Rao, UoH
Dr. R. V. Ravi, IDRBT
Dr. Kumar Molugaram, OU
Dr. LakshmiNarayana, OU
Dr. P. Premchand, OU
Dr. S. Sameen Fatima, OU
Dr. P. Chandhrashekar, OU
Dr. B. Rajendra Naik, OU
Dr. K. Shymala, OU
Dr. P. V. Sudha, OU
Dr. A. Q. Ansari, JMO
Dr. B. Padmaja Rani, JNTUH
Dr. B. Vishnuvardhan, JNTUH
Dr. S. Vishwanath Raju, JNTUH
Dr. L. Pratap Reddy, JNTUH
Dr. T. S. Subashini, AU, TN
Dr. Ch. Satyanarayana, JNTUK
Dr. A. Ananda Rao, JNTUA

Web and Publicity Committee

Prof. D. V. RamSharma, Professor in EEE, SCETW
Dr. D. Shravani, Associate Professor in CSE, SCETW
Mrs. Kezia Rani, Associate Professor in CSE, SCETW

Foreword

The aim of this 3rd International Conference on Data Engineering and Communication Technology (ICDECT) is to present a unified platform for advanced and multidisciplinary research towards the design of smart computing, information systems and electronic systems. The theme focuses on various innovation paradigms in system knowledge, intelligence and sustainability that may be applied to provide a realistic solution to variegated problems in society, environment and industries. The scope is also extended towards the deployment of emerging computational and knowledge transfer approaches, optimizing solutions in a variety of disciplines of computer science and electronics engineering. The conference was held on 15 and 16 March 2019 at Stanley College of Engineering and Technology for Women, Hyderabad, Telangana, India.

After having a thorough review of each submitted article, only quality articles are published in this volume. Eminent academicians and top industrialists are delivering lectures on contemporary thrust areas. The resource pool is drawn from IITs, NITs, IIITs, IDRBT and universities along with software companies like TCS, ThoughtWorks, GSPANN, Variance IT, FSMI, etc.

A galaxy of nearly 40 eminent personalities are chairing and acting conference as jury. The papers are classified into 7 tracks which will be delivered in 2 days in spacious technically state-of-the-art air-conditioned rooms.

On 14 March 2019, Conference Tutorial on DATA SCIENCE, Conference Workshop on Technology Trends, Conference Workshop on Python and Conference on IoT and Cloud Computing are scheduled.

Hyderabad, India
April 2019

Dr. A. Vinaya Babu
Director SCETW and Conference Chair

Preface

This book constitutes the thoroughly refereed post-conference proceedings of the 3rd International Conference on Data Engineering and Communication Technology (ICDECT) held at Stanley College of Engineering and Technology for Women, Hyderabad, Telangana, India, on 15–16 March 2019. The aim of this conference is to enhance the information exchange of theoretical research and practical advancements at national and international levels in the fields of computer science, electrical, electronics and communication engineering. This encourages and promotes professional interaction among students, scholars, researchers, educators, professionals from industries and other groups to share the latest findings in their respective fields towards sustainable developments.

The refereed conference proceedings of the ICDECT-2K19 are published in a single volume. Out of 286 paper submissions from all over India, only 81 papers are being published after reviewing thoroughly; this Volume 1 under the theme "Advances in Intelligent Systems and Computing—3rd International Conference on Data Engineering and Communication Technology (ICDECT-2K19)" comprises the comprehensive state-of-the-art technical contributions in the areas computer science engineering streams. Major topics of these research papers include the latest findings in the respective fields towards sustainable developments include Internet of things, cryptography and network security, image processing, natural language processing, data mining, machine learning, etc.

Hyderabad, India — Dr. K. Srujan Raju

Acknowledgements

We thank all the authors for their contributions and timely response. We also thank all the reviewers who read the papers and made valuable suggestions for improving the quality of the papers.

We are indeed thankful to keynote speakers for delivering lectures which create curiosity on research and session chairs for their fullest support and cooperation.

We would like to thank the array of distinguished Vice Chancellors Prof. S. Ramachandram, Osmania University, Prof. V. Venugopal Reddy, JNTUH, Prof. A. K. Pujari, Central University of Rajasthan, Prof. Amiya Bhaumik, Lincoln University College, Malaysia, for delivering inaugural and valedictory speech of ICDECT-2K19.

We express our sincere thanks to Sri K. Krishna Rao, Correspondent, Stanley College of Engineering and Technology for Women (SCETW), for accepting and organizing ICDECT-2K19 conference with exponentially higher success rate.

We would like to extend our sincere thanks to eminent Profs. A. Vinaya Babu, Director and Satya Prasad Lanka, Principal and family members of SCETW, the institute which is empowering girl students.

We would like to thank Dr. K. Vaidehi, Dr .YVSS Pragathi, Dr. D. Shravani, Mrs. Kezia Rani, Dr. Kezia Joseph and Dr. K. N. Sahu, the coordinators of this conference, for their combined efforts, and they put together as a team to make this event a huge success.

A dream does not become reality through magic. It takes sweat, determination and hard work. Let us extend our thanks to all the teaching, technical and administrative staff, and student volunteers of SCETW, who had worked tirelessly to accomplish this goal.

Finally, we sincerely thank the team comprising Prof. Suresh Chandra Satapathy, Dr. M. Ramakrishna Murthy and editors of this conference Prof. K. Srujan Raju, Prof. Satya Prasad Lanka, Prof. V. Rajagopal, Prof. Roman Senkerik for guiding and helping us throughout.

Hyderabad, India
May 2019

Contents

Automatic Water Controller Switch and pH Determination for Water in Overhead Tank Using IoT 1
Farha Nausheen and Amtul Sana Amreen

A Dynamic ACO-Based Elastic Load Balancer for Cloud Computing (D-ACOELB) 11
K. Jairam Naik

Tamil Stopword Removal Based on Term Frequency 21
N. Rajkumar, T. S. Subashini, K. Rajan, and V. Ramalingam

Query-Based Word Spotting in Handwritten Documents Using HMM 31
V. C. Bharathi, K. Veningston, and P. V. Venkateswara Rao

Biometric Passport Security by Applying Encrypted Biometric Data Embedded in the QR Code 41
Ziaul Haque Choudhury and M. Munir Ahamed Rabbani

An Extensive Review on Cloud Computing 53
Mahendra Kumar Gourisaria, Abhishek Samanta, Aheli Saha, Sudhansu Shekhar Patra, and Pabitra Mohan Khilar

Performance Comparison of Filter-Based Approaches for Display of High Dynamic Range Hyperspectral Images 79
R. Ragupathy and N. Aswini

Survey on Ontology-Based Sentiment Analysis of Customer Reviews for Products and Services 91
Sumalatha Bandari and Vishnu Vardhan Bulusu

Spam Detection in Link Shortening Web Services Through Social Network Data Analysis 103
Sankar Padmanabhan, Prema Maramreddy, and Marykutty Cyriac

Definitional Question Answering Using Text Triplets 119
Chandan Kumar, Ch. Ram Anirudh, and Kavi Narayana Murthy

Minimum Cost Fingerprint Matching on Fused Features Through Deep Learning Techniques 131
Pavuluri Vidyasree and Somalaraju ViswanadhaRaju

Enhanced Edge Smoothing for SAR Data Using Image Filter Technique 141
G. Siva Krishna and N. Prakash

Implementation of Home Automation Using Voice Commands 155
M. Karthikeyan, T. S. Subashini, and M. S. Prashanth

Configure and Management of Internet of Things 163
M. Varaprasad Rao, K. Srujan Raju, G. Vishnu Murthy, and B. Kavitha Rani

Automatic Race Estimation from Facial Images Using Shape and Color Features 173
B. Abirami and T. S. Subashini

A Security Model to Make Communication Secure in Cluster-Based MANETs 183
Deepa Nehra, Kanwalvir Singh Dhindsa, and Bharat Bhushan

Performance Improvement of Naïve Bayes Classifier for Sentiment Estimation in Ambiguous Tweets of US Airlines 195
Jitendra Soni, Kirti Mathur, and Yuvraj S. Patsariya

A Nonparametric Approach to the Prioritization of Customers' Online Service Adoption Dimensions in Indian Banks 205
Kishor Chandra Sahu and J. Kavita

Feasibility of Soft Real-Time Operations Over WLAN Infrastructure-Independent IoT Implementation by Enhancing Edge Computing 223
Sujanavan Tiruvayipati and Ramadevi Yellasiri

LANMAR Routing Protocol to Support Real-Time Communications in MANETs Using Soft Computing Technique 231
Anveshini Dumala and S. Pallam Setty

The SOP of the System with TAS Based Underlay CRN 245
Anshu Thakur and Ashok Kumar

Key Exchange and E-Mail Authentication Using Lagrange Interpolation 253
P. Lalitha Surya Kumari and G. Soma Sekhar

Author Profiles Prediction Using Syntactic and Content-Based Features 265
T. Raghunadha Reddy, M. Srilatha, M. Sreenivas, and N. Rajasekhar

An Investigation of the Effects of Missing Data Handling Using ‘R’-Packages 275
Sobhan Sarkar, Anima Pramanik, Nikhil Khatedi, and J. Maiti

Performance Assessment of Multiple Machine Learning Classifiers for Detecting the Phishing URLs 285
Sheikh Shah Mohammad Motiur Rahman, Fatama Binta Rafiq, Tapushe Rabaya Toma, Syeda Sumbul Hossain, and Khalid Been Badruzzaman Biplob

Parallel Queuing Model in a Dynamic Cloud Environment-Study of Impact on QoS: An Analytical Approach 297
Shahbaz Afzal, G. Kavitha, and Shabnum Gull

Analysis of Efficient Classification Algorithms in Web Mining 319
K. Prem Chander, S. S. V. N. Sharma, S. Nagaprasad, M. Anjaneyulu, and V. Ajantha Devi

RETRACTED CHAPTER: Students’ Performance Prediction Using Machine Learning Approach 333
Srinivasu Badugu and Bhavani Rachakatla

Bio-Inspired Scheme of Killer Whale Hunting-Based Behaviour for Enhancing Performance of Wireless Sensor Network 341
C. Parvathi and Suresha Talanki

Fingerprint Cryptosystem Using Variable Selection of Minutiae Points 359
Mulagala Sandhya, Mulagala Dileep, Akurathi Narayana Murthy, and Md. Misbahuddin

Multi-secret Sharing Scheme Using Modular Inverse for Compartmented Access Structure 371
Abdul Basit, V. Ch. Venkaiah, and Salman Abdul Moiz

FM Broadcast Audio Signal Analysis Using Time–Frequency Distribution Function 387
Kartik Patel and Paawan Sharma

A Sentiment Analysis Based Approach for Understanding the User Satisfaction on Android Application 397
Md. Mahfuzur Rahman, Sheikh Shah Mohammad Motiur Rahman, Shaikh Muhammad Allayear, Md. Fazlul Karim Patwary, and Md. Tahsir Ahmed Munna

ECG Arrhythmia Detection with Machine Learning Algorithms 409
Saroj Kumar Pandey, Vineetha Reddy Sodum, Rekh Ram Janghel, and Anamika Raj

Innovative Sensing and Communication Model to Enhance Disaster Management in Traffic 419
K. S. Sandeep Sagar and G. Narendra Kumar

Prediction of Student's Educational Performance Using Machine Learning Techniques 429
B. Mallikarjun Rao and B. V. Ramana Murthy

A Novel Approach for Authorship Verification 441
P. Buddha Reddy, T. Murali Mohan, P. Vamsi Krishna Raja, and T. Raghunadha Reddy

A System for Efficient Examination Seat Allocation 449
Charitha Tuniki, Vanitha Kunta, and M. Trupthi

Clustering-Based Blockchain Technique for Securing Wireless Sensor Networks 461
T. C. Swetha Priya and A. Kanaka Durga

IoT-Based Agriculture Monitoring System 473
Kantamneni Raviteja and M. Supriya

A Review on Automatic Glaucoma Detection in Retinal Fundus Images 485
Shahistha, K. Vaidehi, and J. Srilatha

IoT-Based Monitoring System for Safe Driving 499
Bulusu Sowjanya and C. R. Kavitha

Toward Secure Quantum Key Distribution Protocol for Super Dense Coding Attack: A Hybrid Approach 515
R. Lalu Naik, Seelam Sai Satyanarayana Reddy, and M. Gopi Chand

RETRACTED CHAPTER: Data Transmission Based on Selection of Cluster Head Using M-RED Technique 527
Arjumand Sayeed, T. Nagalaxmi, P. Chandrasekhar, and Satya Prasad Lanka

Machine Translation Evaluation: Manual Versus Automatic—A Comparative Study 541
Kaushal Kumar Maurya, Renjith P. Ravindran, Ch Ram Anirudh, and Kavi Narayana Murthy

A Structural Topic Modeling-Based Machine Learning Approach for Pattern Extraction from Accident Data 555
Sobhan Sarkar, Suvo Gaine, Aditya Deshmukh, Nikhil Khatedi, and J. Maiti

Emotion Detection Framework for Twitter Data Using Supervised Classifiers 565
Matla Suhasini and Badugu Srinivasu

Multiple Object Detection Mechanism Using YOLO 577
G. A. Vishnu Lohit and Nalini Sampath

Prediction of Remaining Useful Life of an End Mill Using ANSYS 589
Venkateswara Rao Mudunuru and Saisumasri Komarraju

Colon Cancer Stage Classification Using Decision Trees 599
M. Vidya Bhargavi, Venkateswara Rao Mudunuru, and Sireesha Veeramachaneni

Novel Performance Analysis of DCT, DWT and Fractal Coding in Image Compression 611
D. B. V. Jagannadham, G. V. S. Raju, and D. V. S. Narayana

CBIR using SIFT with LoG, DoG and PCA 623
Katta Sugamya, Pabboju Suresh, A. Vinaya Babu, and Rakshitha Akhila

RETRACTED CHAPTER: Design of Deep Learning Controller for Vector Controlled Induction Motor Drive 639
B. T. Venu Gopal, E. G. Shivakumar, and H. R. Ramesh

RETRACTED CHAPTER: A Survey on Face Recognition Using Convolutional Neural Network 649
M. Swapna, Yogesh Kumar Sharma, and B. M. G. Prasad

A Hybrid Ensemble Feature Selection-Based Learning Model for COPD Prediction on High-Dimensional Feature Space 663
Srinivas Raja Banda Banda and Tummala Ranga Babu

RETRACTED CHAPTER: Comparative Study on Internet of Things: Enablers and Constraints 677
C. Kishor Kumar Reddy, P. R. Anisha, Rajashekar Shastry, and B. V. Ramana Murthy

Telugu Movie Review Sentiment Analysis Using Natural Language Processing Approach 685
Srinivasu Badugu

RETRACTED CHAPTER: Short-Term Load Forecasting Using Wavelet De-noising Signal Processing Techniques 697
S. Anbazhagan and K. Vaidehi

Sentiment Extraction from Bilingual Code Mixed Social Media Text 707
S. Padmaja, Sameen Fatima, Sasidhar Bandu, M. Nikitha, and K. Prathyusha

Incidence of Cancer in Breastfed Grownups-a Study 715
K. L. Vasundhara, Srinivasu Badugu, and Y. Sai Krishna Vaideek

RETRACTED CHAPTER: A Study of Physiological Homeostasis and Its Analysis Related to Cancer Disease Based on Regulation of pH Values Using Computer-Aided Techniques 725
Rakesh Kumar Godi, G. N. Balaji, and K. Vaidehi

Automatic Detection and Classification of Chronic Kidney Diseases Using CNN Architecture 735
R. Vasanthselvakumar, M. Balasubramanian, and S. Sathiya

We Bring Your Identity: A Secure Online Passenger Identity Protocol (SOPIP) for Indian Railways Using Aadhaar Number 745
Sivakumar Thangavel, S. Gayathri, and T. Anusha

Review of Decision Tree-Based Binary Classification Framework Using Robust 3D Image and Feature Selection for Malaria-Infected Erythrocyte Detection 759
Syed Azar Ali and S. Phani Kumar

Prediction of Phone Prices Using Machine Learning Techniques 781
S. Subhiksha, Swathi Thota, and J. Sangeetha

An Extended Polyalphabetic Cipher Using Directional Shift Patterns 791
Karishma Yadav and Muzzammil Hussain

Real-Time Aspect-Based Sentiment Analysis on Consumer Reviews 801
Jitendra Kalyan Prathi, Pranith Kumar Raparthi, and M. Venu Gopalachari

RETRACTED CHAPTER: Performance Analysis on IARP, IERP, and ZRP in Hybrid Routing Protocols in MANETS Using Energy Efficient and Mobility Variation in Minimum Speed 811
Chatikam Raj Kumar, Uppe Nanaji, S. K. Sharma, and M. Ramakrishna Murthy

Analysis of Big Data in Healthcare and Life Sciences Using Hive and Spark 825
A. Sai Hanuman, R. Soujanya, and P. M. Madhuri

Long Short-Term Memory with Cellular Automata (LSTMCA) for Stock Value Prediction 841
N. S. S. S. N. Usha Devi and R. Mohan

Detection of Lightening Storms in Satellite Imagery Using Adaptive Fuzzy Clustering 849
Gurram Sunitha and J. Avanija

Detection of Concept-Drift for Clustering Time-Changing Categorical Data: An Optimal Method for Large Datasets 861
K. Reddy Madhavi, A. Vinaya Babu, G. Sunitha, and J. Avanija

A Model for Securing Institutional Data Using Blockchain Technology . 873
D. Durga Bhavani and D. Chaithanya

Cloud-Based Dempster-Shafer Theory (CDST) for Precision-Centric Activity Recognition in Smarter Environments 881
Veeramuthu Venkatesh, Pethuru Raj, T. Suriya Praba, and R. Anushiadevi

Brilliant Corp Yield Prediction Utilizing Internet of Things 893
R. Vijaya Saraswathi, Sravani Nalluri, Somula Ramasubbareddy, K. Govinda, and E. Swetha

Chronic Heart Disease Prediction Using Data Mining Techniques 903
Sravani Nalluri, R. Vijaya Saraswathi, Somula Ramasubbareddy, K. Govinda, and E. Swetha

Server Security in Cloud Computing Using Block-Chaining Technique . 913
Illa Pavan Kumar, Swathi Sambangi, Ramasubbareddy Somukoa, Sravani Nalluri, and K. Govinda

RETRACTED CHAPTER: Dominant Color Palette Extraction by K-Means Clustering Algorithm and Reconstruction of Image 921
Illa Pavan Kumar, V. P. Hara Gopal, Somula Ramasubbareddy, Sravani Nalluri, and K. Govinda

Spot a Spot—Efficient Parking System Using Single-Shot MultiBox Detector 931
Yashvi Thakkar, Anushka Sutreja, Ashutosh Kumar, Sanya Taneja, and RajeshKannan Regunathan

Optimization of Railway Bogie Snubber Spring with Grasshopper Algorithm 941
Abhishek G. Neve, Ganesh M. Kakandikar, Omkar Kulkarni, and V. M. Nandedkar

QoS Aware Group-Based Workload Scheduling in Cloud Environment 953
Suneeta Mohanty, Suresh Chandra Moharana, Himansu Das, and Suresh Chandra Satpathy

Retraction Note to: Data Engineering and Communication Technology C1
K. Srujan Raju, Roman Senkerik, Satya Prasad Lanka, and V. Rajagopal

Author Index 961

About the Editors

Dr. K. Srujan Raju is the Professor and Head, Department of CSE, CMR Technical Campus, Hyderabad, India. Prof. Raju earned his PhD in the field of network security and his current research includes computer networks, information security, data mining, image processing, intrusion detection and cognitive radio networks. He has published several papers in refereed international conferences and peer reviewed journals and also he was in the editorial board of CSI 2014 Springer AISC series; 337 and 338 volumes, IC3T 2014, IC3T 2015, IC3T 2016, ICCII 2016 & ICCII 2017 conferences. In addition to this, he has served as reviewer for many indexed National and International journals. Prof. Raju is also awarded with Significant Contributor, Active Young Member Awards by Computer Society of India (CSI). Prof. Raju also authored 4 Text Books and filed 7 Patents so far.

Dr. Roman Senkerik is a Researcher/Lecturer of Applied Informatics and Lectures on the fundamentals of theoretical informatics, theory of algorithms and cryptology. Seminars and laboratories in courses of Applied Informatics, Methods of Artificial Intelligence, Cryptology, Mathematical Informatics, Theory of Algorithms, Fundamentals of Computer Science. Supervision of Bachelors and Masters theses and consultations for Ph.D. students. His research in the field of artificial intelligence, optimization, chaos theory, soft computing and evolutionary techniques. Presently working as professor, Department of Applied Informatics, Tomas Bata University, Czech Republic.

Dr. Satya Prasad Lanka is currently working as Principal in Stanley College of Engineering and Technology for Women, Hyderabad, India and he is serving as a professor in Electronics and Communication Engineering department. He received his Ph.D degree in Image Processing from JNTUK, Kakinada and Master degree in Electronics and Communication Engineering from IT, BHU, Varanasi. He obtained his Bachelor degree from Bangalore University, Karnataka. He has more than 31 years of teaching and research experience. He has published several papers in International conferences and journals. He has guided more than 35 projects. His area of interest are

Digital Signal Processing, VLSI design, Digital Image Processing, Pattern Recognition and Communications. He is a member of ISTE and Fellow of Institution of Engineers and Institution of Electronics and Telecommunication Engineers.

Dr. V. Rajagopal received his bachelor's degree in Electrical Engineering in the year 1999 from The Institution of Engineers (India). He completed his M.Tech Degree in Power Electronics and Drives from Uttar Pradesh Technical University in the year 2004. He pursued his Ph.D degree in Power Electronics from I.I.T. Delhi in the year 2012. He worked in various educational institutions and also worked as a NBA, NAAC and Autonomous coordinator. He is trained on Jaguar Aircraft, Jaguar Simulator and worked for up-gradation of Jaguar Simulator with French Delegation of Thales while serving in Indian Air Force. His has rich teaching, research and industry experience of 27 years. He has published over 12 International Journals, 06 National Journals, 27 International and 6 National Conferences, and 01 Indian Patent filed. He coordinated Symposium and workshops. He is a reviewer of various International Journals like IEEE, IET and Taylor and Francis. He is a life member of ISTE and Fellow of Institution of Engineers (India). Currently he is guiding 04 Ph.D. Research Scholars and given 20 lectures in various institutions all over India. Currently he is working as a Professor and Head of EEE Department at Stanley College of Engineering and Technology for Women in Hyderabad.

Automatic Water Controller Switch and pH Determination for Water in Overhead Tank Using IoT

Farha Nausheen and Amtul Sana Amreen

Abstract Water is a valuable natural resource which is used very thoughtlessly. Ground water is pumped up to overhead tanks through electric motors for daily usage. To overcome the alarming water crisis, the unnecessary wastage of water due to overflow in overhead tanks needs to be controlled. Automatic water level controller switch is designed to overcome this concern by automating the manual switch used to control water fill-up in the overhead tank. It is implemented using water level detector and Raspberry Pi module. The water level detector made using probes detects "empty-tank" condition in overhead tank and triggers fill-up process. The switch can be controlled through mobile phone app facilitating the user to regulate the overflow anywhere outside the home also. We also propose to determine the pH of the water stored in the overhead tank enabling us to identify acidic content of the water supplied for daily use and suitably initiate necessary cleaning action.

Keywords Water level detector · Overhead tanks · Raspberry PI · pH determination

1 Introduction

According to the World Health Organization Fact sheets [1], it is reported that by 2025 half of the world's population will live in the water-stressed areas. Water scarcity [2] is results due to the inadequacy of natural water resources and poor

F. Nausheen (✉)
IT Department, Muffakham Jah College of Engineering & Technology, Hyderabad, India
e-mail: farha@mjcollege.ac.in

A. S. Amreen
CSE Department, Stanley College of Engineering & Technology for Women, Hyderabad, India
e-mail: amsana@stanley.edu.in

K. S. Raju et al. (eds.), *Data Engineering and Communication Technology*, Advances in Intelligent Systems and Computing 1079,
https://doi.org/10.1007/978-981-15-1097-7_1

management of available resources. Many homes and other public places use ground water for their daily usage which is pumped up to overhead tanks using water pumps which are controlled by electric motors. The water motor switch is manually turned ON and it is monitored for the tank to be filled-up for about 30 to 90 min. Controlling the pumps has become important to avoid wastage of water.

In this paper, we propose to develop an automatic water level controller switch, the switch is used to switch ON the motor when the water level in the overhead tank falls below pre-defined low level and switch OFF the motor when the water level rises up to pre-determined high level.

We also aim to determine the pH of the water being filled-up. This will help us to find the presence of hydrogen ions in the water which thereby determines whether the water is acidic or alkaline. Internet of things (IoT) allows to connect water level controller and pH sensor to be controlled from a handheld device embedded with an app or a computer.

2 Literature Survey

In [3], based on availability of water level in tank, the water pump is adjusted and is implemented using sequential logic circuits. In [4], ultrasonic sensor is used to measure water level in non-contact approach, while existing automated systems involve contact-based water level sensors. In [5], Zigbee technology is used to monitor the overhead tank water level employing three-tank simulation model. [6] discusses how GSM technology is used to monitor water levels and notify users on low state.

3 Proposed Methodology

The overall goal of this paper is to overcome the unnecessary wastage of water that occurs due to overflow in overhead tanks thereby preventing the alarming water crisis. Automatic water controller switch is designed to implement water level detector in the overhead tank to identify the water level. The overhead tank is indicated with three levels basically, level 3 depicting tank fill condition, level 2 indicating half fill condition, and level 1 indicating empty-tank condition. Initially, GPIO pins on Raspberry PI 2 module are configured to be connected to water level detector and pump motor. The water level sensing is performed through the probes in contact with the water in overhead tank. This may lead to two possibilities. If the water level reading is 1, it represents an “empty-tank” condition. The relay controls the submersible pump motor by switching it ON and initiate water fill process in the overhead tank from the water sump storage. If the water level reading is 3, it represents a “filled tank” condition and the relay controls the switching OFF of the submersible water pump.

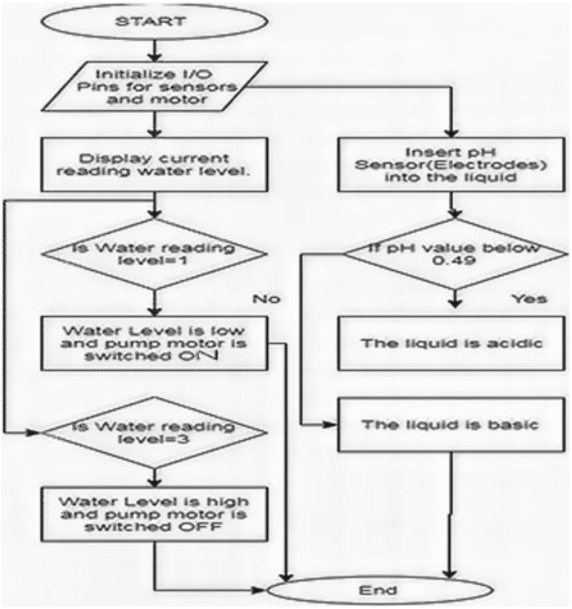

Fig. 1 Proposed methodology

Additionally, we propose to determine the pH of the water available in the overhead tank helps in identifying if the water supplied for daily use is acidic or not. Since the usage of acidic water may lead to health concerns, necessary cleaning action may be initiated for pure water. Figure 1 illustrates the proposed methodology.

4 Design and Development

4.1 Hardware Interface

Raspberry Pi: The Raspberry Pi [7] is a credit card-sized electronic board which offers full complement of features and interfacing capabilities. It comes with a quad-core ARM Cortex-A53 processor and USB Micro power supply. Raspberry PI has a row general purpose IO pins (GPIO PINS) which interfaces the Pi from the outside world.

Pump Motor: A pump is a tool that moves about fluids by mechanical action. It is immersed in the fluid to be pumped.

Relay: A relay is an electrically operated switch used to control a circuit by a separate low-power signal, or where single signal controls several circuits.

Power supply section: Power supply unit, PSU, forms an important part of different components of electronics equipment. It primarily contains the following components: transformer, rectifier circuit, filter, and regulator circuits.

Analog-to-digital converter (LM 317): An analog-to-digital converter (ADC) [8] is a very essential feature that converts an analog voltage on a pin to a numerical value. This enables to interface the analog components with the electronics.

pH sensor: pH gives the concentration of free hydrogen and hydroxyl ions in the water. The pH [9] of a solution is the measure of the acidity. The pH is a logarithmic scale which ranges from 0 to 14 with a neutral point being 7.

4.2 Development of Water Level Detector and pH Sensor

Water Level Detector

The water level detector works on a simple principle to identify and represent the level of water in an overhead tank or any other water container. The sensing is performed by utilizing three probes which are positioned at three different levels in the tank (where probe 3 at the highest level and probe 1 at the lowest level), common probe (i.e. a supply carrying probe) is positioned at the bottom of the tank. The level 3 marks the “tank full” condition whereas level 1 marks the “tank empty” condition. When the water level falls below the minimum detectable level (MDL), indication is made that the tank is empty (level 1), if the water reaches level 2 (which is above level 1 and below level 3), indication of half-full level is made.

pH Sensor

A pH measurement loop consists of three components, namely the pH sensor, that comprises a measuring electrode, a reference electrode, and a temperature sensor; a preamplifier; and an analyzer. This loop is basically a battery where in the positive end is the measuring electrode and the negative end is the reference electrode. The measuring electrode being sensitive to the hydrogen ion concentration tends to build up a voltage difference (potential) directly associated to the concentration of hydrogen ion in the solution. The reference electrode supplies a stable potential to compare with the measuring electrode and it does not vary with the changing concentration of hydrogen ions. A solution in the reference electrode is in the contact with the sample solution and the measuring electrode via a junction. The preamplifier performs signal-conditioning and converts high-impedance electrode signal into low-impedance signal.

4.3 Circuit Diagram

The complete circuit diagram is shown in Fig. 2. The circuit comprises of water level detector, power supply section. LM 317 facilitates the purpose of analog-to-digital converter. In the power supply section, transformer is used to step

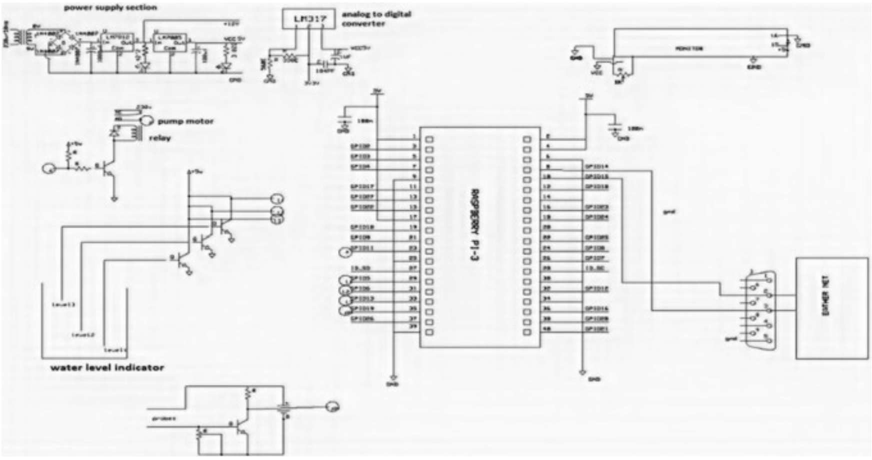

Fig. 2 Complete circuit diagram showing different components like power supply section, analog-to-digital converter, Raspberry PI, water level detector, relay, and sensor network

up or step down the input voltage line to the desired level and also couples this voltage to the rectifier section. The rectifier converts the AC signal to pulsating DC voltage which is further converted to filtered DC voltage using filter. Regulator is used to maintain the power supply section output at a constant level irrespective of large change that occur in load current or in input line voltage. Through the Raspberry PI, conductivity input pin and another pin to relay to pump motor output connections are made. The monitor is used to observe the water level readings and status of overhead tank fill-up. In our case, the values are observed as a message through Cayenne [10] app on mobile phone or in e-mail.

4.4 Circuit Operation

The power supply section consists of transformer, rectifier, filter, and regulator. The 230 V power supply is passed through the step-down transformer and submersible pump motor. A set of four bridge rectifiers are used to convert AC to DC power. Regulators are used to control the power and supply only 12 V to entire circuit. The relay controls the switching of pump motor. The water level is indicated through three probes placed at 3 levels in the tank through conductivity. When the water level is low it gets detected through conductivity and passes the input to relay. The relay passes logic 1 and pump motor is switched ON. When the water level is full, it gets detected and the relay passes logic 0 and pump motor is switched OFF. The pH sensor is used to record pH of given liquid by means of electrodes and these values are passed to analog-to-digital converter and finally observed on Cayenne app.

Fig. 3 **a**, **b** Raspberry PI connections being configured through the Cayenne app

4.5 Programming Raspberry PI

A C++ code is written to program Raspberry PI 2.0 using Arduino [11] IDE. WiringPI access library is used to program and setup GPIO pins. QThread class is used to manage threads and suitably define timer functions. A handler is created to process and respond incoming requests. The code is downloaded to configure Raspberry PI connections. Figure 3 illustrates the Raspberry PI connections through Cayenne app.

5 Results and Discussion

5.1 Specifications

The specifications of the hardware, software and apps involved in the development of automatic water level controller switch are listed in Table 1.

5.2 Interfacing Raspberry PI with the Water Level Detector

The water level is detected by three probes placed at three levels in the tank through conductivity. Pins 11 and 13 on Raspberry PI are connected to the conductivity pins

Table 1 Specifications for automatic water level controller switch

Hardware		Software	Apps
Component	Rating		
Power supply	12 V 1 A	Arduino IDE	Cayenne Yahoo Mail
ADC	12 V 1 A		
Raspberry PI 2	5 V 2 A		

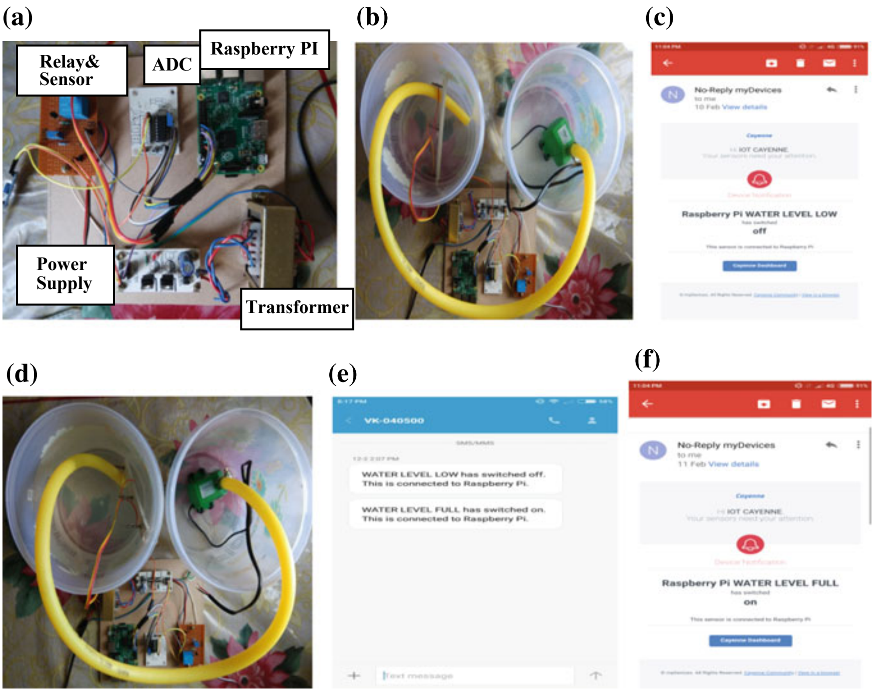

Fig. 4 **a** Labeled circuit setup. **b** Setup showing empty overhead tank scenario **c** E-mail sent indicating water level low condition. **d** Setup showing water fill-up process. **e** Message sent on mobile phone and e-mail through Cayenne app on tank full

coming from water level detector. Pin 22 is connected from Raspberry PI to relay for pump motor output. When the low level is detected, logic 1 is passed to relay switch which automatically switches on the submersible pump motor which initiates water fill-up into the overhead tank. When the full level is detected, logic 0 is passed to relay from raspberry pi and the pump motor is switched off by relay. Figure 4a shows water controller using labeled components. Figure 4b and c depict the water level low condition and e-mail notified to the user. Figure 4d, e, and f depict tank fill condition and all notifications made to user's phone and e-mail for the condition.

5.3 *pH Determination*

The pH value is calculated using electrode. Totally, three pins are connected to pH sensor. Out of the three pins, two are connected to Vdd and Gnd of power section. One pin is connected to analog-to-digital converter to show values in digital format. The pH value is represented on the scale of 0–1.