

# Table of Contents

## Preface, Committee and Sponsor

## Chapter 1: Communication and Applied Information Technologies

|  |    |
|--|----|
| <b>Feasibility Design of 4G-LTE Cell Sites in an Academic Community</b><br>S. Somchai, J. Potinakkha, N. Ruangchajitatupon, V. Prasertchareonsuk, M. Leeprakobboon, J. Jongudomkan, S. Malisawan and A. Siritaratiwat    | 3  |
| <b>Efficient Frequency Reuse for Broadband Wireless Access with Sectored Cells in Offshore Territory</b><br>K. Kunavut   | 7  |
| <b>Automation Broadcast Radio Controlled by Using Audio Mute Clock</b><br>A. Pattanajakr, A. Siritaratiwat and A. Kruesubthaworn   | 11 |
| <b>Optimization of p-Cycle Protection in Mixed Line Rate WDM Networks with Limited Transmission Reaches</b><br>P. Sornplaeng, P. Saengudomlert and L. Wuttisittikulkij   | 15 |
| <b>Performance Weighted of CMA Algorithm Based on MIMO Channel Measurement for 2.45 GHz Wireless RFID System</b><br>S. Duangsuwan and S. Promwong  | 20 |
| <b>Dual-Port MIMO Rectangular Dielectric Resonator Antenna for 4G-LTE Application</b><br>R. Selvaraju, M.R. Kamarudin, M. Khalily, M.H. Jamaluddin and J. Nasir  | 24 |
| <b>RFID Reader Antenna Design for Groceries Auto Payment System</b><br>A. Abd Rohim, M.R. Kamarudin and M.T. Ali   | 28 |
| <b>UHF TV Band Transparent Antenna for Indoor Television Reception</b><br>S.N.H. Sa'don and M.R. Kamarudin   | 32 |
| <b>The Adaptive Network Coding-Routing (ANCR) Based on Graph Minors for Multicast Networks</b><br>N. Muangboonma, N. Puttarak and P. Kaewprapha  | 36 |
| <b>Investigation on Feeding Techniques for Rectangular Dielectric Resonator Antenna in Higher-Order Mode for 5G Applications</b><br>N.H. Shahadan, M.R. Kamarudin, N.A. Zainal, J. Nasir, M. Khalily and M.H. Jamaluddin | 41 |
| <b>LDPC Coded <math>2^m</math>-ary QAM for Ultra High Speed Communications</b><br>S. Wongroekdee, K. Chaiprathum, V. Imtawil and P. Suthisopapan   | 45 |
| <b>Study of the Feeding Techniques of Microstrip Antenna at 28 GHz for 5G Applications</b><br>N.A. Zainal, M.R. Kamarudin, N.H. Shahadan, J. Nasir, M. Khalily and N. Seman  | 49 |
| <b>Characterization and Formulation of Microstrip-Slot Impedance with Different Thickness and Relative Permittivity</b><br>K.H. Yusof, N. Seman, M.H. Jamaluddin and D.N.A. Zaidel                                       | 53 |
| <b>Performance Investigation of Microstrip Klopfenstein Tapered Line Impedance Transformer Using MathCAD Software for Communication System</b><br>M. Esa, N.N. Nik Abd. Malik, M.K.H. Ismail and S.A. Hamzah             | 57 |
| <b>The Dual Piston-Shaped Monopole Antenna for Wireless Communication Applications</b><br>A. Ruengwaree, S. Boonming and W. Naktong  | 61 |
| <b>F-Shaped Dielectric Resonator Antenna (DRA) for 4G/LTE Applications</b><br>S.F. Roslan, M.R. Kamarudin, M.H. Jamaluddin and M. Khalily  | 65 |
| <b>Comparative Study of Printed Dipole Antenna with Step-Shaped Feed Gap for DTV Applications</b><br>B. Apatsaraphom, W. Thawirot and P. Akkaraekthalin  | 69 |
| <b>Design Tri-Band Fractal Antenna with Minkowski Island Split Ring Resonator Structures</b><br>H. Nornikman, M.R. Kamarudin, B.H. Ahmad and M.Z.A. Abd Aziz   | 73 |
| <b>Indoor Navigation and Tracking Using WLAN-Fingerprinting Technique and K-Inverse Harmonic Means Clustering on Mobile Device</b><br>J. Sangthong, P. Supanakoon and S. Promwong  | 77 |

|   |     |
|---|-----|
| <b>Reconfigurable Frequency Textile Antenna with Circular Polarization Using Slotted Technique</b>                                  | 81  |
| S. Mat Salleh, M. Jusoh, A.H. Ismail, M.R. Kamarudin, M.I. Ahmad and T. Sabapathy   |     |
| <b>Analysis of Ionospheric Irregularity Observed near Suvarnabhumi International Airport in Thailand</b>                            | 85  |
| A. Bumrungkit, S. Rungraengwajiake, P. Supnithi and A. Saekow   |     |
| <b>Indoor Multipath Interference Cancellation Using MMSE-CMA Estimator with 2.45 GHz of MIMO Channel Measurement</b>                | 89  |
| A. Suppayasarn, S. Duangsuwan and S. Promwong   |     |
| <b>A Study of 3G Network Performance Using Video Quality Assessment: Bangkok Case Study</b>   | 93  |
| N. Anupong, P. Sirawongphatsara, P. Wuttidittachotti and T. Daengsi   |     |
| <b>Systematic Reconditioning of Fiber Connector Polishing Process by Reducing Statistical Variance of Connector Characteristics</b> | 98  |
| S. Soukhavong, T. Tangmala and U. Mankong   |     |
| <b>3-D Ionospheric Plasma Bubble Model for Ground-Based Augmentation System</b>   | 102 |
| S. Rungraengwajiake and P. Supnithi   |     |
| <b>Design and Investigation of H-Shaped Patch Antenna Integrated with Light Emitting Diodes</b>                                     | 106 |
| S.N. Kamarudin, M.T. Ali, S. Subahir, A.A. Azlan, S. Muhamud-Kayat and M.R. Kamarudin   |     |
| <b>Performance Analysis and Comparison for Wireless Indoor Positioning Systems in Multi-Floor Building</b>                          | 110 |
| K. Kondee and C. Prommak  |     |
| <b>Development of Rectangular Loop Microstrip Antenna Integrated with Light Emitting Diode (LED) for Wi-Fi Application</b>          | 116 |
| S. Subahir, M.T. Ali, N.A. Ramli, S.N. Kamaruddin, A.H. Awang and M.R. Kamarudin  |     |
| <b>User Perspective Network Reliability Analysis for the Current Multiservice Network Infrastructure</b>                            | 120 |
| T.T.W. Yee and K. Wipusitwarakun  |     |
| <b>Intrusion Detection System Based on Hybrid Feature Selection and Support Vector Machine (HFS-SVM)</b>                            | 125 |
| Y. Khaokaew, T. Anusas-Amornkul and K. Meesublak  |     |
| <b>Monitoring and Indexing System for Illegal Tobacco Sales on Website in Thailand by Using Web Crawler Technique</b>               | 129 |
| P. Soontornpipit  |     |
| <b>Internet Cigarette and Tobacco Business (ICTB) Database for Domestic Markets in Thailand</b>                                     | 133 |
| P. Soontornpipit, C. Viwatwongkasam, P. Satitvipawee, P. Pramnoi and A. Wattananupong   |     |
| <b>Development of Embedded Simple Network Time Protocol Client Clock</b>  | 137 |
| V. Dathong and M. Wongsaisuwan  |     |
| <b>Performance of Interworking Proxy for Interconnecting IEEE1888 Standard at ETSI M2M Platforms</b>                                | 141 |
| T. Klinpratum, C. Saivichit, A. Elmangoush and T. Magedanz  |     |
| <b>Android Antivirus Scanner by Analyzing Operation Codes</b>   | 145 |
| K. Narang, K. Sookhanaphibarn and P. Praneetpolgrang  |     |

## Chapter 2: Electronics and Microelectronics

|   |     |
|---|-----|
| <b>1-D Integer Transform for HEVC Encoder Using DSP Slices on FPGA</b>        | 151 |
| P. Arayacheepreecha, S. Pumrin and B. Supmonchai                              |     |
| <b>Voltage-Mode Multifunctional Biquadratic Filter Using VDDDA</b>            | 155 |
| S. Soisang, K. Jirasereemomkul, W. Jaikla and K. Higuchi                      |     |
| <b>Yield Analysis Based on the Defect Analysis with Derivative Method</b>     | 160 |
| W. Praepattharapisut, W. Pengchan, T. Phetchakul and A. Poyai                 |     |
| <b>The Effect of Anode Width of Dual Schottky Magnetodiode to Sensitivity</b> | 164 |
| T. Phetchakul, W. Luanatikomkul and A. Poyai                                  |     |
| <b>CMOS-Based Current-Mode Elliptic Ladder Band-Pass Filter</b>               | 168 |
| E. Saising, T. Pattanathadapong and P. Prommee                                |     |

|   |     |
|---|-----|
| <b>Effect of MgO Barrier Thickness with Tilted Magnetization on Temperature Increase in Magnetic Tunnel Junction Devices during Current-Induced Magnetization Switching</b> | 172 |
| C. Surawanitkun   |     |
| <b>On the Realization of CMOS Current-Controlled Current Conveyor Transconductance Amplifier (CCCCTA) with Linear Control of <math>g_m</math></b>                           | 176 |
| D. Duangmalai   |     |
| <b>A Simple Fully Controllable Schmitt Trigger with Electronic Method Using VDTA</b>  | 180 |
| M. Siripruchyanun, P. Satthaphol and K. Payakkakul  |     |
| <b>DSSCs Fabrication Using Nano-Structured Titania as Photoanode</b>  | 184 |
| M. Thabuot and C. Kruehong  |     |
| <b>The Potential of Routers Configured with the Switch Matrix by RTL</b>  | 189 |
| T. Sato, S. Chivapreecha and P. Moungnoul   |     |

## Chapter 3: Materials and Technologies for Magnetic Storage Devices

|   |     |
|---|-----|
| <b>Free Layer Characterization of TMR Head with Multi-Stripe Height by Using Ferro Magnetic Resonance Analyzer (FMRA)</b>   | 195 |
| P. Weawhongse, C. Sa-Ngiamsak, W. Pijitrojana and K. Vichienchom  |     |
| <b>Study the Effect of Stripe Height and Read Track Width on Blocking Temperature</b>   | 199 |
| C. Kulpromsaro, K. Vichienchom and W. Pijitrojana   |     |
| <b>Signal Analysis of Scratch-Detection on Magnetic Disc by Using Light Reflection Approach</b>   | 203 |
| A. Polsawat, N. Suwannata, A. Siritaratiwat and A. Kruesubthaworn   |     |
| <b>Effects of Magnetic Properties of L1<sub>0</sub>-CoPt based Bit Patterned Media with Tilted-Easy Axis on Switching Field at Areal Density over 2 Tb/in<sup>2</sup></b> | 207 |
| A. Kaewrawang   |     |
| <b>Role of Intergrain and Intragrain Coupling on Switching Field of Granular Exchange Coupled Composite Media Using Microwave Assisted Magnetic Recording</b>             | 211 |
| N. Wannawong, A. Kaewrawang, K. Pituso, W. Tipcharoen and A. Siritaratiwat  |     |
| <b>Investigation of Perpendicular Magnetic Recording Footprint by Spin-Stand Microscopy</b>   | 215 |
| N. Chaidaungsri, A. Kaewrawang, K. Chooruang and D. Tongsomporn   |     |
| <b>Micromagnetic Modeling for a Study of Spin Transfer Torque in Ferromagnetic Materials</b>  | 219 |
| S. Coomkeaw and B. Damrongsak   |     |
| <b>Equalizer Design for Bit-Patterned Media Recording System Based on ISI and ITI Estimations by Cross Correlation Functions</b>  | 223 |
| L.M.M. Myint and C. Warisarn  |     |
| <b>Laser Cleaning of Polypropylene Contamination on Magnetic Head Slider Surface</b>  | 227 |
| N. Rungcharoen, M. Wannaprapa and W. Pijitrojana  |     |
| <b>Determination of Transition Jitter Noise by Time Domain Analysis</b>   | 231 |
| K. Chooruang  |     |
| <b>The Synthesis of Nano-Porous Alumina by Anodization Process</b>  | 235 |
| E. Jaroopak, P. Terawan, N. Wannawong, A. Kaewrawang, C. Kruehong and M. Thabuth  |     |

## Chapter 4: Power and Electrical Engineering

|   |     |
|---|-----|
| <b>Modelling and Simulation of the 150° Conduction Mode Quasi Space Vector PWM Inverter Fed Permanent Magnet Brushless DC Motor</b> | 241 |
| Y. Weerakamhaeng  |     |
| <b>Time Series Pattern Learning and Forecasting for Long-Term Peak Electricity by Spectral Mixture Gaussian Kernel</b>              | 245 |
| T. Ploysuwan, P. Teekaput and P. Atsawathawichok  |     |
| <b>Grounding Design Improvement to Reduce Back Flashover Rate of 69 kV Subtransmission Line in Power's Distribution System</b>      | 250 |
| A. Songsang, N. Rugthaichareoncheep and A. Phayomhom  |     |
| <b>Resonance Impact on Power Factor Correction System in Power System with Harmonic Distortion</b>                                  | 254 |
| S. Chaladying, P. Dusitakorn and N. Rugthaichareoncheep   |     |

|   |     |
|---|-----|
| <b>Substation Expansion Considering Reliability of Various Bus Configurations and Load Growth</b>   |     |
| W. Nathasri, W. Witoontorn and S. Chaitusaney   | 258 |
| <b>Model of Power Factor Charge for Photovoltaic Generation System Based on its Contribution to Power Systems</b>   |     |
| M. Hemsuree, C. Thiranam and S. Chaitusaney   | 262 |
| <b>The Impact Mitigation of Partial Shading on PV Array Power Generation</b>  |     |
| S. Phiouthonekham, A. Lekkruasawan and S. Chaitusaney   | 267 |
| <b>Impacts of Solar-PV Rooftop on PEA's Distribution System in the Area of Hemaraj Eastern Seaboard Industrial Estates, Thailand</b>                                |     |
| S. Wetchakama and U. Supatti  | 272 |
| <b>Sheath Voltages and Currents in 230kV Oil-Filled Underground Power Cables</b>  |     |
| S. Phanthurat and A. Pruksanubal  | 276 |
| <b>The Comparison of the String Suspension Porcelain (5-6-7 Insulators)/String Efficiency in Case of Dry and Wetted Water Contamination Condition</b>               |     |
| N. Tonmitr, K. Tonmitr and E. Kaneko  | 280 |
| <b>Hybrid Renewable Energy Systems in Saudi Arabia</b>  |     |
| H. El Khashab and M. Al Ghamedi   | 284 |
| <b>Static Voltage Stability Margin Enhancement Using Shunt Capacitor, SVC and STATCOM</b>   |     |
| N. Thasnas and A. Siritaratiwat   | 288 |
| <b>Baseline Consideration for Lightning Location System Based on Magnetic Field Direction Finding to Determine Optimal Grid Cell of Lightning Flash Density Map</b> |     |
| K. Nattanapong and R. Weerapun  | 292 |
| <b>Impact of On-Grids Solar PV Rooftop on Low Voltage Grid Systems: A Case Study of PEA Udonthani, Thailand</b>   |     |
| W. Khuleedee, A. Kaewrawang and K. Tonmitr  | 296 |
| <b>Impact of pin Type Insulators on Power Distribution Networks Caused by Lightning Impulse Overvoltage</b>   |     |
| K. Phothilath, K. Tonmitra and P. Artrit  | 300 |
| <b>Minimization of Voltage Deviation by Considering Active Power Change of Solar PV Plant</b>   |     |
| O. Eth, B. Eua-Arporn, S. Chaitusaney and T. Van Dao  | 304 |
| <b>3-D Computational Simulations of Electrostatic Potential in Partial Surfaces towards the Precision of Ion Balance Analysis</b>                                   |     |
| S. Plong-Ngooluam, N. Jindapetch, P. Wounchoum and D. Sompongse   | 308 |
| <b>The Comparative Study of PD Detecting in Power Transformer Model According to Acoustic Emission and IEC270 Standard Method</b>                                   |     |
| P. Jitjing, P. Sritong, C. Suwanasri and T. Suwanasri   | 312 |
| <b>Impacts of Low Voltage PEVs Single Phase Charging on Electrical Distribution Network</b>   |     |
| T. Klayklueng and S. Dechanupaprittha   | 316 |
| <b>Optimal Capacitor Placement for Loadability Enhancement Based on Continuation Power Flow</b>   |     |
| K. Buayai and K. Kerdchuen  | 321 |
| <b>Optimal Phasor Measurement Unit Placement for Monitoring of PEA Bowin Power</b>  |     |
| K. Khunikakorn and S. Dechanupaprittha  | 325 |
| <b>Optimal Placement of Distributed Generation Using Bacterial Foraging Optimization Algorithm</b>  |     |
| P. Sodsri, B. Sookananta and M. Pusayatanont  | 329 |
| <b>Electrical Stress Analysis of Switching Transients in 115 kV High Voltage Substation</b>   |     |
| R. Kem, W. Srisongkram, P. Fuangpian and T. Suwanasri   | 333 |
| <b>Partial Discharge Detection and Localization of Simulated Cable System</b>   |     |
| C. Suwanasri, T. Suwanasri and P. Fuangpian   | 337 |
| <b>Potential Evaluation of Hybrid Wind-Diesel System Island Area in Thailand</b>  |     |
| K. Daunghom and S. Premrudeepreechacharn  | 341 |
| <b>Optimization for Operation and Design of Solar-Hydro Pump Energy Storage Using GAMS</b>  |     |
| C. Mekmuangthong and S. Premrudeepreechacharn   | 346 |
| <b>Experimental Study on the Movement of Conducting Spheroidal Particles under Electric Field in Air</b>  |     |
| T. Sangsri, V.Q. Huynh and B. Techamnat   | 351 |

## **Chapter 5: Power Electronics and Control in Power Systems**

|   |     |
|---|-----|
| <b>Development of Smart Plug Using Power Line Communication</b><br>N. Srihara and M. Wongsaisuwan   | 357 |
| <b>Design and Construction of 30 kV High Voltage Generator Using Fly-Back Converter</b><br>A. Singhasathein, W. Kesi, S. Boonyayut, P. Suwanpingkarl, P. Poungsri, A. Pruksanubal and N. Tanthanuch | 361 |
| <b>Street Lamps Monitoring System Using Relay Control Technique</b><br>E. Kavichai and C. Deelertpaiboon  | 366 |
| <b>A Seamless Transitions Method for On-Grid and Off-Grid Modes of DG Systems</b><br>W. Juntason and U. Supatti   | 370 |
| <b>Lead Lag Controller of TCSC Optimized by Bees Algorithm for Damping Low Frequency Oscillation Enhancement in SMIB</b><br>N.A. Arzeha, M.W. Mustafa and R. Mohamed Idris                          | 374 |
| <b>A Numerical Study of the Fixed-Threshold Criterion for Expressing Transient Stability Constraints in Optimal Power Flow</b><br>W. Suampun  | 379 |
| <b>Development of On-Line Monitoring for Power Transformer Bushing</b><br>T. Suwanasri and C. Suwanasri   | 384 |
| <b>Dynamic Performance of Reactive Power Control for Voltage Support in Low-Voltage Distribution Networks with Photovoltaic Systems</b><br>P. Pachanapan and S. Premrudeepreechacharn               | 388 |
| <b>A Coordinated Voltage Control Scheme for Distribution Network with Renewable Sources</b><br>W. Nakawiro  | 393 |
| <b>Optimal Parameters Tuning of Power System Stabilizer via Bees Algorithm</b><br>N.S. Ab Khalid, M.W. Mustafa and R. Mohamed Idris   | 397 |
| <b>The Three-Level Sine-Wave Inverter with Power Factor Correction (PFC)</b><br>N. Krachangchaeng and S. Po-Ngam  | 402 |
| <b>A Grid Connected Flyback Inverter with a DC Active Filter for Photovoltaic Cells</b><br>D. Sulong and C. Jeraputra   | 406 |
| <b>A Low Frequency Wireless Power Transfer Using Parallel Resonance under Impedance Matching</b><br>A. Rittiplang and W. Pijitrojana  | 410 |
| <b>Fuzzy Gain Scheduling of PI Plus Derivative Controller to Improve the Transient Response of Boost DC/DC Converter</b><br>Y. Kanthaphayao and C. Reaungpattanawiwat                               | 414 |
| <b>Voltage Multiplier Circuits with Coupled-Inductor Applied to a High Step-Up DC-DC Converter</b><br>C. Reaungpattanawiwat and Y. Kanthaphayao   | 418 |
| <b>Design of A2DOF Controller with Smith Predictor for LLC Current-Resonant DC-DC Converters</b><br>T. Suzuki, K. Higuchi and K. Jirasereamornkul   | 422 |
| <b>The Investigation of Slotted Capacitor Plate on the Performance of Planar Type Witricity Device</b><br>M.H.M. Salleh and N. Seman  | 427 |
| <b>The Double Forward Converter with Synchronous Rectification</b><br>K. Krajam and S. Po-Ngam  | 431 |
| <b>Discontinuous Space Vector Modulation Strategy for Three-Level Neutral Point Clamped Inverter</b><br>K. Ek-Iam and Y. Kumsuwan   | 435 |

## **Chapter 6: Mechatronics, Robotics and Control**

|  |     |
|--|-----|
| <b>Improved Weighted Centroid Localization with Quadratic Means for Indoor Mobile Robot Tracking</b><br>J. Sangthong, K. Torat and S. Promwong | 441 |
|--|-----|

|   |     |
|---|-----|
| <b>Bilateral Control Based on Disturbance Observer of Delta Robot with Gravity Compensation</b>   | 445 |
| N. Niramitvasu and C. Mitsantisuk   |     |
| <b>Unfalsified Control to a pH Neutralization Process with Noisy Measurements</b>   | 450 |
| T. Wonghong   |     |
| <b>Parametric Performances of a Petahertz Band Nano-Patch Dipole Antenna on Electrical Field Distribution for Energy Harvesting</b>                     | 454 |
| M. Esa, M.K.H. Ismail, N.A. Murad, N.N. Nik Abd. Malik, M.F. Mohd Yusoff and S.A. Hamzah  |     |
| <b>Effect of Electrical Field Resonances due to Perturbation Slit Tunnel Junction for a Potential Solar Energy Collector at 10 Micrometer Radiation</b> | 458 |
| M. Esa, M.K.H. Ismail, N.A. Murad, N.N. Nik Abd. Malik, M.F. Mohd Yusoff and S.A. Hamzah  |     |
| <b>Angle Sensor Based on Golden Spiral-Shaped Tapered Ring Resonator Using Finite Difference Time-Domain Method</b>                                     | 462 |
| S. Harnsoongnoen, U. Charoen-In, S. Pattitanang, C. Auntarin and N. Angkawisittpan  |     |
| <b>An Analysis of Force Response by Using Spectrogram</b>   | 466 |
| N. Varachitchai and C. Mitsantisuk  |     |
| <b>Error Analysis of 4-Crossing Hall Sensor with Frequency Domain in Measurement of Material Imperfection</b>   | 471 |
| S. Suwannasuk, W. Sriratana and R. Murayama   |     |
| <b>Unrelated Parallel Machine Scheduling with Sequence-Dependent Setup Times in Frozen Food Industry</b>  | 475 |
| P. Chatavithee, K. Piewthongngam and S. Pathumnakul   |     |
| <b>An Artificial Neural Network Model for Chilling Environment Control in Meat Production</b>   | 479 |
| A. Wongsriworaphon, A. Apichottanakul, T. Laonapakul and S. Pathumnakul   |     |
| <b>A Randomized Approach in Identifying High Quality Force Closure Grasp from Contact Points in Real Time</b>   | 483 |
| W. Watcharawisetkul, M. Borwornpadungkitti, N. Niparnan and A. Sudsang  |     |
| <b>Ultra-Capacitors and Battery Management System of Electric Vehicles</b>  | 487 |
| S. Sungtum and U. Supatti   |     |
| <b>Tracking from Unmanned Aerial Vehicles</b>   | 491 |
| C. Meng, J. Morris and C. Sombatheera   |     |
| <b>Orbit Control Manoeuvre Strategy for Post-Mission De-Orbiting of a Low-Earth-Orbit Satellite</b>   | 495 |
| M. Aorpimai and P. Navakitkanok   |     |
| <b>Hardware-in-the-Loop Simulation of Functional Safety Compliant Electric Power Steering System</b>  | 500 |
| K.J. Lee and H.S. Ahn   |     |

## Chapter 7: Image, Data and Signal Processing

|  |     |
|--|-----|
| <b>A Study of Two Robust Features for Effective Open or Closed Eye Classification</b>                        | 507 |
| P. Tiawongsombat and C. Rattanapoka  |     |
| <b>Active Contour Model with Edge Flow Vector for Texture Segmentation</b>                                   | 511 |
| T. Boonnuk, S. Srisuk and T. Sripramong  |     |
| <b>Rice Kernel Separations Using Contour Analysis and Skeleton</b>   | 515 |
| C. Siriwongkul and P. Polpinit   |     |
| <b>Gaussian Filter Based Image Watermarking</b>  | 519 |
| K. Thongkor and T. Amornraksa  |     |
| <b>Prediction of Financial Time-Series Signals Using á Trou Wavelet Transform</b>                            | 523 |
| W. Sangjun, S. Supakwong and S. Thajchayapong  |     |
| <b>An Improvement Particle Swarm Optimization for Travelling Salesman Problem with the Mutation Operator</b> | 527 |
| J. Sriborikit and P. Tuwanut   |     |
| <b>Robust Texture Classification Using Local Correlation Features for Thai Buddha Amulet Recognition</b>     | 531 |
| W. Kompreyarat and T. Bunnam   |     |

|  |     |
|--|-----|
| <b>Arctangent Gradient Based Adaptive Algorithm for a Second-Order Adaptive IIR Notch Filter</b>               | 535 |
| R. Punchalard  |     |
| <b>Comparative Results of Phenology Obtained from Satellite and Ground Observation Images on Paddy Field</b>   | 539 |
| N. Soontranon, S. Lawawirojwong, P. Tangpattanakul, P. Srestasathiern and P. Rakwatin                          |     |
| <b>Homomorphic Filter Based Image Watermarking</b>   | 543 |
| P. Chotikawanid, K. Thongkor and T. Amornraksa   |     |
| <b>Multi-Window and Line Scan Histogram Features for Bilateral Filtering</b>                                   | 547 |
| S. Ongkittikul, W. Kesjindatanawaj and S. Srisuk   |     |
| <b>Speech Emotion Feature Extraction Using FFT Spectrum Analysis</b>   | 551 |
| C. Thiangtham and J. Srinonchat  |     |
| <b>Gaussian Kernel Posterior Elimination for Fast Look-Ahead Rao-Blackwellised Particle Filtering for SLAM</b> | 555 |
| S. Nasuriwong and P. Yuwapoositanon  |     |
| <b>A Preference-Based Multiobjective Evolutionary Algorithm for Finding Knee Solutions</b>                     | 559 |
| S. Sudeng and N. Wattanapongsakorn   |     |
| <b>Effects of Spatial Domain Image Watermarking on Types of Printers and Printing Papers</b>                   | 564 |
| T. Amornraksa and K. Thongkor  |     |
| <b>Real-Time Bilateral Filtering Using GPGPU</b>   | 568 |
| S. Srisuk, W. Kesjindatanawaj and S. Ongkittikul   |     |
| <b>A Versatile Analytical Expression of Time Domain Response of Arbitrary Order Fractance</b>                  | 572 |
| R. Banchuin  |     |

## Chapter 8: Biomedical Engineering

|   |     |
|---|-----|
| <b>Design and Development of Data Model for Thai Sub Acute and Non Acute Patients</b>                                       | 579 |
| S. Sala and P. Soontornpipit  |     |
| <b>Dental Guidelines with Decision Support System for Hypertension and Stroke Patients</b>                                  | 583 |
| T. Teerakuldej and P. Soontornpipit   |     |
| <b>E-Referral System by Means of Decision Support System</b>  | 587 |
| W. Pensuwan, C. Viwatwongkasam, P. Satitvipawee and P. Soontornpipit  |     |
| <b>Appointment Tracking System for Improving Patient Waiting Time</b>   | 591 |
| A. Wattananupong and P. Soontornpipit   |     |
| <b>Comparison of Implantable Antennas for Cardiovascular Patients</b>   | 595 |
| P. Soontornpipit  |     |
| <b>Spatial Mapping of HIV Infection by Means of Mixture Models</b>  | 599 |
| C. Viwatwongkasam, W. Gunngam and P. Soontornpipit  |     |
| <b>Analysis of Electromyography in Dynamic Hand Motions Using L-Kurtosis</b>  | 604 |
| S. Thongpanja, A. Phinyomark, C. Limsakul and P. Phukpattaranont  |     |
| <b>Modeling of Gelatin-Based Head Phantom Based on its Electrical Properties for Wideband Microwave Imaging Application</b> | 608 |
| M.S. Md Said, N. Seman, N.R. Sulaiman and T. Abd Rahman   |     |
| <b>Simulation of Electric Field in Co-Field Treatment Chamber Using FEM</b>   | 612 |
| T. Kriengkriwut and B. Techamunat   |     |
| <b>Chromatin Detection in Malaria Thick Blood Film Using Automated Image Processing</b>                                     | 616 |
| A. Pinkaew, T. Limpiti and A. Trirat  |     |
| <b>Increased Probability of Cell Membrane Breakdown by Use of Microfluidic System</b>                                       | 620 |
| T. Thonapan, B. Techamunat and A. Tuantranont   |     |
| <b>Heart Disease Classification Using Artificial Neural Networks</b>  | 624 |
| R. Wongsathan and P. Pothong  |     |
| <b>Prediction Modeling of PM-10 in Chiangmai City Moat by Using Artificial Neural Networks</b>                              | 628 |
| R. Wongsathan, I. Seedadan and M. Kavilkrue   |     |
| <b>Mammogram Enhancement Using Wavelet Transform and Sigmoid Function</b>   | 632 |
| V. Kidsumran and W. Chiracharit   |     |
| <b>Incomplete Nucleic Acid Sequences Visualization: A Case Study in Virus Sequences</b>                                     | 637 |
| T. Piyatamrong, A. Kamolphanus, G. Lergechinnaboot, K. Suphakarn and C. Temiyasathit  |     |

## **Chapter 9: Bioengineering Research**

|   |     |
|---|-----|
| <b>Fuel Property of Pyrolytic-Oil from Para Rubber De-Oiled Seed Residue</b>  |     |
| T. Unpinit and M. Thabuot   | 643 |
| <b>Supply Chain Network Design of Ethanol in Thailand</b>   |     |
| R. Homchalee and W. Sessomboon  | 647 |
| <b>Forecasting of Production and Consumption of Ethanol in Thailand Using Time Series Analysis</b>                                    |     |
| S. Sriyotha, R. Homchalee and W. Sessomboon   | 651 |
| <b>Biodiesel Production From Crude Rubber Seed Oil Using Supercritical Methanol Transesterification</b>                               |     |
| T. Sawiwat and S. Kajorncheappunngam  | 655 |
| <b>Characteristics of Activated Carbon Produced from Rubber Seed Shell by Using Different Methods of Chemical Activation with KOH</b> |     |
| T. Pagketanang, P. Wongwicha and M. Thabuot   | 659 |
| <b>Collaborative Production Planning in Multi-Plant Feed Mill Industry</b>  |     |
| S. Khamjan and S. Pathumnakul   | 663 |
| <b>Feed Formulation under Raw Material and Production Costs Consideration</b>   |     |
| M. Ittiphalin, T. Nakrachata-Amon and S. Pathumnakul  | 667 |
| <b>The Effect of Temperature on the Structure of Cotton Carbon Fiber by Chemical Vapor Deposition</b>                                 |     |
| J. Nissayan, S. Kruehong, C. Kruehong and A. Artnaseaw  | 671 |