

# Table of Contents

## Preface, Conference Organizers and Organizing Committee

## Chapter 1: Sensors and Instrumentation

<b>Transit Time Multipath Ultrasonic Flowmeter: An Issue on Acoustic Path Arrangement</b> D. Kurniadi	3
<b>A Computer-Based Marine Automatic Radar for Rain Detection</b> G.A. Nugroho, M.M. Munir and K. Khairurrijal	9
<b>A Portable and USB-Powered Device for Heart Rate Extraction of Optical Plethysmography Signal</b> M. Sasono and A. Rusdiarna Ip	13
<b>A Simple Spectrometer Using Various LEDs and a Photodiode Sensor for Photocatalytic Performance Evaluation</b> A. Rajak, M.M. Munir, M.S. Abidin and K. Khairurrijal	17
<b>An X-Ray Detector Using a Fluorescent Material ZnS:Ag Attached on a Phototransistor in Darlington Configuration</b> Kusminarto and R. Fadela	21
<b>Building Up of Surface Plasmon Resonance Instrument Using Spreeta 2000 and Arduino Mega 2560</b> Harsojo, E.E. Pramesta and K. Triyana	25
<b>Design of Dual Edge 0.5 Hz Precision Frequency Counter for QCM Sensor</b> V.R. Wijayanto and S.P. Sakti	29
<b>Design of Wireless Ambient Air Condition Monitoring System</b> C.B. Dwi Kuncoro, M.A. Falahuddin, A.J. Ceceng and M. Aditya	33
<b>Designing a Telemetry System of Temperature and Soil Moisture for Irrigation Control</b> I. Boimau and E. Endarko	38
<b>Development of a Wireless Sensor Network for Temperature and Humidity Monitoring</b> M.M. Munir, K.D.F. Mataubenu, R.A. Salam, H. Latief and K. Khairurrijal	42
<b>Development of Digital Variable Frequency Triangle Signal Generator Using Cygnal C8051F005 SoC</b> E. Widiatmoko, M.M. Munir and K. Khairurrijal	46
<b>Development of Electronic Nose with Low-Cost Dynamic Headspace for Classifying Vegetable Oils and Animal Fats</b> K. Triyana, M. Taukhid Subekti, P. Aji, S. Nur Hidayat and A. Rohman	50
<b>Fluxgate Based Detection of Magnetic Material in Soil Subsurface</b> W. Indrasari, M. Djamal, W. Srigutomo, G. Handayani, N. Hadziqoh and R. Ramli	55
<b>Reconfigurable Controller Based on Fuzzy Descriptor Observer for Nonlinear Systems with Sensor Faults</b> K. Indriawati, A. Jazidie and T. Agustinah	59
<b>Effect of Light Illumination on Leaves Movement of <i>Mimosa pudica</i></b> H. Soetedjo, B. Haryadi and D. Taspyanto	63
<b>A Novel Method of Mobile Robot Fire Detection and Tracing Using Proportional Derivative (PD) Algorithm</b> U.D. Fatmawati, W. Hidayat and D. Lelono	68
<b>Prototype of Photometric Stereo System Using 6 and 9 LED Light Source to Reconstruct Human Skin Texture</b> E. Juliastuti, Suprijanto and M. Nurguritno	72
<b>Self-Powered Wireless Sensor for Forest-Fire Detection in Sumatera with Various Environmental Energy Source</b> L. Umar, Y. Hamzah and R.N. Setiadi	76
<b>Suitability of Self-Fabricated Solid Tissue Phantom for Quality Assurance Examination of Shortwave Diathermy (SWD) Unit</b> Lamidi, S. Koentjoro and A. Nasution	80

<b>The Reliability of Low Cost Data Logger for Active Seismic (Surface-Wave) Data Measurements</b>	
E. Hartantyo, K. Sri Brotospito, Sismanto and Waluyo	84
<b>The Use of Acoustic Emission for Leak Detection in Steel Pipe</b>	
I.B.A. Putra, I. Prasetyo and D.P. Sari	88
<b>Web-Based Surface Level Measuring System Employing Ultrasonic Sensors and GSM/GPRS-Based Communication</b>	
M.M. Munir, R.A. Salam, E. Widiatmoko, Y. Supriadani, A. Rahmadhani, H. Latief and K. Khairurrijal	92
<b>A System for Characterizing Batteries and their Charging-Discharging Properties</b>	
M.M. Munir, S.N. Wahid, F. Iskandar and K. Khairurrijal	96
<b>Preliminary Study of Bio-Impedance Based Sensor Using Organic Polymer Membrane for Identification of Pork and Beef</b>	
B. Purnama, A.N. Fajarini, A. Masykur and A.H. Wibowo	100
<b>A Simple Unconsolidated Undrained Triaxial Compression Test Emulator</b>	
R. Ekawita, H. Nawir, Suprijadi and K. Khairurrijal	104
<b>A Cross-Sectional TEM Specimen of a Multilayer Thin Film Prepared Using the FIB Technique</b>	
H. Sosiati, S. Hata and T. Doi	108
<b>Development of Simple Digital Image Acquisition System for an Accurate Quantification of Corneal Arcus Formation</b>	
A. Nasution and D.I. Cahya	112
<b>Development of Ultrasonic Based Air Bubble Detection and Safety System for Hemodialysis Machine to Prevent Embolism</b>	
P. Busono	116
<b>Elaboration of Low Field and Room Temperature Magnetoresistive Sensor of <math>\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3</math> Nanoparticles Synthesized by Sol-Gel Method</b>	
C.F. Naa, D. Fasquelle, M. Mascot and M. Djamal	121
<b>Terahertz Signal Measurement on a Chiral Metamaterial Using Terahertz Emission Spectroscopy</b>	
J. Partini, K. Abraha, A. Hermanto, S. Tomita and M. Takahiro	125
<b>The Small Telescopes Performance in the Visual to Near Infrared Wavelengths</b>	
D. Herdiwijaya	129
<b>Sub ppb CO Gas Measurement Using a Non Invasive QCL Laser Absorption Spectrometer Technique</b>	
R. Widiatmono, J. Mandon, F.J.M. Harren, Kusminarto, M.A.J. Wasono and M. Mitrayana	133
<b>A Computer-Based Air Flow Control System for Aerosol and Filtration Research</b>	
M.M. Munir, M.S. Abidin, A. Rajak and K. Khairurrijal	137
<b>Photodynamic Combined with Magnetic Field Applications for Viability Activation of Anaerobic Photosynthetic Bacteria</b>	
S.D. Astuti, D.G.D. Nike, A. Supriyanto and K. Triyana	141
<b>Designing of a High Voltage Power Supply for Electrospinning Apparatus Using a High Voltage Flyback Transformer (HVFBT)</b>	
M.M. Munir, D.A. Hapidin and K. Khairurrijal	145
<b>Strain Gauge Sensors Implemented in a New Female Torso Model Have Increased Student's Motivation and Confidence in Gynecologic Bimanual Examination on Clinical Skill Training</b>	
S. Budiharjo, N. Arfian, R. Wijaya, D.C. Ratna Sari, D. Prakosa and M.M. Romi	149

## **Chapter 2: Methods of Measurement and Metrology**

<b>An Accurate Smoothness Indicator for Shallow Water Flows along Channels with Varying Width</b>	
S. Mungkasi	157
<b>Analysis of Wood's Capacitance Characteristic to its Hardness</b>	
M. Esofita, M. Djamal, W.P. Taruno, M. Al Huda, M. Baidillah, G. Pari and R. Damayanti	161
<b>Application of Radon Isotopes to Determine Permeable Zones in Rajabasa Geothermal Field, Indonesia</b>	
N. Haerudin, Wahyudi, D. Risdianto and W. Suryanto	165

<b>Application of Multivariate EMD to Improve Quality VLF-EM Data: Synthetic and Fields Data</b>	170
Sungkono, A.S. Bahri and B.J. Santosa	
<b>Boundary Data Analysis of Continuous Wave Domain Diffuse Optical Tomography with Structured Refined Mesh Algorithm for Product Quality Control</b>	174
V. Nadhira, D. Kurniadi, E. Juliastuti, T.A. Yudha and K. Budiono	
<b>Combination of Active and Passive Seismic Analyses for Embankment Characterization</b>	179
Y. Widyaningrum, Sungkono, A. Husein, B.J. Santosa and A.S. Bahri	
<b>Determining Contact Angle and Spreading Velocity of a Droplet Impacted Hot Solid Surface</b>	183
W.H. Mitrakusuma, Deendarlianto, S. Kamal, Indarto, M. Nuryadi and R. Rustandi	
<b>Fundamental Metrology: Its Significance for Scientific Awareness in Higher Education</b>	187
A. Rusli	
<b><i>In Situ</i> Measurement of Thermal Resistance of Building Envelope at the Residential Occupancy in Indonesia</b>	191
W. Sujatmiko, H.K. Dipojono, F.X. Nugroho Soelami and Soegijanto	
<b>Metrological Overview for Coordinate Measuring Machines</b>	195
K. Dhoska, T. Kübarsepp, A. Dorri and A. Pramono	
<b>Microscopic Surface Measurement Using Phase Shifting Method</b>	200
Suprijanto, N. Zahra and E. Juliastuti	
<b>Quantifying the Influence of Moving Artifact on the Determination of Pulse Rate Variability (PRV) from the Pulse Oximetry (SpO<sub>2</sub>) Signal Measurements</b>	204
Sumber and A. Nasution	
<b>Rapid Discrimination of Indonesian Herbal Medicines by Using Electronic Nose Based on Array of Commercial Gas Sensors</b>	209
F. Hardoyono, K. Triyana and B.H. Iswanto	
<b>Seepage Monitoring of an Embankment Dam Using Resistivity Method: A Case Study of LUSI Mud Volcano P.79 - P.82 Embankment</b>	213
A. Husein, B.J. Santosa and A.S. Bahri	
<b>The Best Mother Wavelet for Stock Prediction Using Adaplet Method</b>	218
A.E. Putra, N.U. Hasanah and C. Atmaji	
<b>A Gold Bar Purity Testing Method Based on Vibration Characteristics</b>	223
I. Prasetyo, I. Sihar, K. Agusta and I. Handayani	
<b>Velocity Measurement of EHD Flow Produced by Pin-Multi Concentric Ring Electrodes Generator</b>	227
Sumariyah, Kusminarto, A. Hermanto and P. Nurwantoro	
<b>Crystallinity as a Non-Destructive Indicator of Wood Hardness at Standing Trees</b>	232
R. Damayanti, J. Ilic, B. Ozarska, G. Pari and P. Vinden	
<b>Natural Produce Classification Using Computer Vision Based on Statistical Color Features and Derivative of Radius Function</b>	242
A.S. Prabuwono, J. Siswantoro and A. Abdullah	
<b>Effects of Surface Tension on the Liquid Holdup and Wave Characteristics in Horizontal Annular Two-Phase Flow</b>	248
A. Setyawan, Indarto, Deendarlianto and Prasetyo	
<b>Heat Treatment of Ultrafine Grained AA 6061 Consolidation by Equal Channel Angular Pressing</b>	252
A. Pramono, L. Kollo, R. Veinthal, K. Kallip and J.K. Gomon	
<b>Modeling of Seismic Wave Propagation at Tiris Geothermal Area Using 2D Spectral Element Method (SEM)</b>	257
A. Suprianto, Wahyudi, W. Suryanto and A. Subekti	