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Content

Description	Pg. No.
Agriculture Applications of Internet of Things: A Survey Comparison of Clustering Algorithm S.Sindhu,L.Arockiam	5
Comparison of Clustering Algorithm RugadaVaikuntaRao,N.Sireesha, Mrs.J.Nalini	6
Structural Health Monitoring Using IoT B Satheesh, VelamuriManasa ,Y.Jaswanth, B. SaiLikitha, K. Sri Sahithi, K.Trivani	7
Sensor Based Frisking P Sireesha, Archana B T, , M. PratyushaJyothi, J. Tallababu, Ch. Harika, G. Madhavi	8
Automatic Smart Irrigation System Using IOT Technology Kishore Buddha, K.Poojitha, G.Pavan, Rahul Kumar, D.Devi , V.N SaiRohini Kumar, D. Jaswanth	9
Optimal Time Table Generation Using Genetic Algorithm N G S Raju, B.G.PoornimaHimaketan, M.Tejasri , K. Komali , T. SaiHarika, R. Lohit Kumar	10
Hydrogen Fuel Cell Based Energy Production for Domestic Appliances A Swetha,M.Hemanth Kumar, Suraj Nahak, Manda Sravan Kumar, Vara Prasad	11
Passive Target Tracking Using Sonar Measurements M S B Deepthi, KausarJahan, MallaMounika Naga Lakshmi, Piradula Suresh, Routhulapudi Lalitha Lakshmi S Praveenya, PentakotaSwarjan	12
IoT Based Home Thief Movement Detection and Alerting System Using GSM Technology Matta Sankara Sastry, Srinivasa Rao, N. Prudhivi, P. Jyothi, M. Srinivas, K. Bhagya Lakshmi	13
Wavelet Signal and Image Denoising R. V. S. Lakshmi Kumari , R. Suneel Kumar, B. Pavani, G. Tejasri, Ch. Latha, V.Moulika	14

Design and Implementation of Underground Cable Fault Detector review on control strategies in micro grid to smart 15
R.SrideviAravelli S L K Gopalamma, Kusul Kumar K, N. Srinivas, Sumanth Kumar, S. LaxmanRao

No Death in India over Usage of EMS Application 16
SulochanaKengam,M RVSG Guptha, Mr. Raj PavanPolisetti

Role of Smart Technique in Irrigation System 17
G Rajasekharam , K. Srinivasarao, S. Srinowshya, G. Manoharsri, B. Pydiraju, J. Yaswanth

Study on Green Concrete for the Future 18
Y H PrasannaRaju,B. Sudheerkumar, N. Vamsikrishna, V. Venkatesh

Dynamic Electric Vehicle Charging System 19
Ramesh Surisetty,CH Ravi Kumar, P Gnanendra Kumar, V Ganesh, P Teja, V Sai Kumar

Switched Reluctance Motor for Hybrid Electric Vehicle using IoT Cloud 20
L.V.Rajesh Kumar, Alfoni Jose K, K.S.S.Jahnavi,K.NarayanaMurthy,M.Savan Kumar, M.S.D kiran

Generating Electricity by Using Heating Panel 21
B. V. Suresh, K Vijay Kumar, B P S PrakashRao, B Siva Sai, D S Siva Kumar, B RakeshYadav

Health Care System for Home Quarantine People Using Raspberry Pi, GSM and IOT Technology 22
GiridharBabu, Sheik Shabeena, Karri Jayasri, Lanka VenkataSaiTejaswini, AneLokesh, Kobbari Rajesh

Covid-19 Fencing and Contact Traceability 23
M.G. Varaprasad, A.S.N.Varma,T.Divya,P.Yamini ,I.Sreelekhya, K.Teja

Smart Power Factor Smart Power Factor Controller 24
G Jyothi, T. Ramesh babu, B.Lohidhar ,E.Mohan,CH. Sri harsha ,K .Vamsikrishna

Autonomous Delivery Robot 25
B. Siva Prasad, K.S.N.VSomesheswararao,`K.Mytri,R.Indraja, K.Thriveni, D.Ajay Kumar

Accident Detection and Alert System using Arduino 26
A Vasudeva Rao, P. Amrutha, V. Moulika,M.Manju, K.BhagyaDharani, B.Kedharsai

A Comprehensive Approach to Develop Pavement Bricks from IoT(Iron Ore Tailings) and Solid Plastic Waste to Generate Green And Cyclic Economy Towards Waste To Wealth Mission 27
Rugada Vaikunta Rao

Solar Powered BLDC Motor with HCC Fed Water Pumping System for Irrigation 28
J. Deleep Kumar, S. Sai Kumar

A Review on Control Strategies in Micro grid to Smart 29
O. Lakshmi Bhavana, Aravelli S L K Gopalamma

Capturing Human Categorization of Natural Images by Combining Deep Networks and Cognitive Model 30
VenkataKalyaniVangapandu, NamrathaPadiyar

IOT Applications with Secured Light Weight Cryptography 31
Namratha Padiyar,Venkata KalyaniVangapandu

Implementation of Cloud Technology in Education 32
V. Manasa, B.G. Poornima

Elliptic Cryptography Curve for Secured Text Encryption 33
Likitha.K, M.Srinivasa Rao

Study of Seismic Analysis of Multi Story Buildings With and Without Basement 34
Y Hemanth Kumar

Renewable Energy Based Integrated Automated Full Body Sanitizing System 35
B. V. Veeranjaneyulu

An Approach for Reconstruction of Unavailable Data in Cloud Storage System Using Partially Distributed File System with Parity 36
Ramaraju. S V S V.P, Komali K

Predicting the Hydrogen Storage Capacity of Lithium Doped MWCNTs Nano particles using Machine Learning Techniques 37
Madhavi Konni, Soma Sekhar Kadiyala, Challa Narasimham

Vehicle Accident Prevention and Detection System 38
Alfoni Jose K, B V Siva Prasad

Appraisal of An Employee's Performance at Work With Reference To Coromandal International Ltd, Visakhapatnam 39
Dr. Rama Kumar P.B., Prof. Dr. Jaladi Ravi, Mr. P. Kiran Kumar

Detection of cancer cells using Image processing 40
P.PoornaPriya,S. Harshita ,M. Soujanya,V. Bindu , P. Jhansi

A Study on Employees Satisfaction on Welfare & Safety Measures adopted in Power Sector Companies 41
Y. Babji,P.B.RamKumar,A.Kiran Kumar

Pattern Synthesis using Fourier Transform Method 42
J Babu, AdariBhargavi,MandapatiPavitra, KoiladaChanakya, Buddha Bhanusree

Comparative Study on Text Pre-Processing Techniques 43
SampathiraoSuneetha, Prasanna Kumar Lakineni

PAPR Reduction Using Hybrid Ps-Gw Optimization 44
P.Amrutha, Shiva Kumari

Design of A Compact Mimo Antenna For Fifth Generation Applications 45
Dr. P. PoornaPriya, B. Sirisha, D. Gowri, S. Mounavi, B. Sravani

Measuring Platelet Count by Using contour Aware Segmentation 46
K Vani,R.Suneelkumar ,R.Latha, P.SriRamya, K.Yamini , A.Ramjagan

An automatic toll ticketing system using image processing 47
K Vijaya Pasamsa, M.Kishore kumar,Y. Durga lakshmi, B.Maraju, P.harish, S.Tejasri

Passive Target Tracking Using Sonar Measurements

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Abstract: Target tracking using bearings-only measurements in passive mode operation of sonar is a crucial issue of underwater tracking. Target motion in underwater scenario is analyzed using bearings-only measurements and calculating parameters like range, course and speed of the target. This is called Target Motion Analysis (TMA). TMA process is highly non-linear as the measurements chosen are nonlinearly related to the selected target state vector and the traditional, optimal linear Kalman filter will not be appropriate to use. It is presumed that the target is moving in straight line path with constant velocity, so Extended Kalman Filter (EKF) is proposed in this paper. The algorithm is simulated for several scenarios using MATLAB. Monte-Carlo runs are performed to evaluate the capability of the algorithm.

Keywords: Extended Kalman Filter, Statistical signal processing,
Target motion analysis, Target tracking.