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# INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN ELECTRONIC AND TELECOMMUNICATION ENGINEERING

27th & 28th February, 2018, Karachi, Pakistan

**ABSTRACT**

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27th & 28th February, 2018

**N.E.D. UNIVERSITY OF ENGINEERING AND  
TECHNOLOGY,  
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# A Survey of Network Survivability Schemes for Optical Networks

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**Abstract**—Network survivability ensures the uninterrupted services. Natural and anthropogenic disaster (e.g. earthquakes, tsunami, hurricanes, fiber cuts, fires, malicious attacks etc.) can have significant impacts on optical networks. Therefore, the design of survivable optical network has grasped the attention of research community. Enhancing the awareness of networks to disaster-based failures is becoming a key issue. In this paper, we critically studied several survivability techniques to discourse the influence of disaster-based failures. We briefly introduced the characteristics of the optical network, network survivability, and the impacts of disaster-based failures. During the survey, we analytically address the different protection and restoration schemes along with mitigating techniques to survive geographically correlated disaster-based failures.

**Keywords**—Optical networks; network survivability; fault management.

# A Traffic Variation Aware Approach for Energy Efficient Heterogeneous Cellular Networks

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**Abstract**—The major concern in recent times is the development of efficient networks which provide high data rates. The service providers are required to provide the subscribers with good signal quality and speedy internet browsing. Small cell deployment contributes in energy efficiency if equipped with intelligent power saving techniques. In this paper, previously proposed energy saving technique (small cell controlled sleep mode) is compared with a new idea to reduce the supplied power according to traffic pattern of the cell. Results from the new scheme provide 13-15% energy savings compared to old scheme. Hence, the new scheme provides substantial results for the development of green network.

**Keywords**—Heterogeneous networks; energy efficiency; power distribution.

# Design and Analysis of Load Switching Mechanism for Islanded Microgrids

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**Abstract**—Microgrids are evolving as a solution to exhausted, overburdened conventional power systems. However, several issues related to inverter interfaced microgrids exist. These issues include intermittency of renewable energy based generations sources which leads to the voltage, frequency mismatch that eventually disturbs the grid quality and affect the loads. This paper develops a load switching mechanism (LCM) which switches the load from one distributed generation to the other using central controller. The loads are divided into three groups i.e. Heavy loads, light loads and critical loads. Two distributed generators, solar power and wind power along with the central storage are the generation sources. The central controller checks the power generation from the two sources and connects the heavy and light loads to the distributed generator appropriate for the loads. In case of no power available from any distributed generators, demand response program is initiated to supply the critical loads only. Three scenarios have been tested based on the frequency deviations during transition state from one source to the other source.

**Keywords**—Microgrid; Frequency; energy management; Stability.

## Device-to-Device Communication in Cellular Networks: A Survey

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**Abstract**—Device-to-Device (D2D) Communication has been envisioned as a promising solution to cater the demands of high bandwidth increased data rate and minimum latency of future generation of cellular communication i.e. 5G, supporting wide variety of emerging applications. The process of D2D communication coexisting with cellular communication has been under research and is well studied in literature to provide potential benefits like cellular traffic offloading, cellular coverage range extension, and provision of fallback connectivity, increased spectral efficiency, and increased energy efficiency. This article provides a survey of D2D communication and its taxonomy in cellular network with the potential application scenarios and use cases. The development of a test bed for demonstration of cellular system incorporating D2D communication is also discussed followed by the process of standardization of D2D communication, specifically, 3GPP for Proximity Services and Mission Critical Push-to-Talk services in Release 12 and 13 respectively.

**Keywords**—Device-to-Device Communication; 5G technology enabler; proximity services; standards; uses cases.

# Cost Effective Long Range IR Communication in Outdoor Environment (Low Cost LASER Tag System)

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**Abstract**—There is immense need for youth to be highly tactful and strategic in terms of defensive combat shooting pertaining to the current terror situation in the world. These skills can be instilled in them both through civil-defense training courses and gaming events.

To bridge the gap, the project has simulated combat shooting environment through development of electronic guns and jackets for long range in outdoor integrated with realistic effects. The project encompasses the use of IR technology as its core. The highly customized system can work over a range of 70 m with impact vibrations, track of bullets, health level indications and others to give a real-shooting experience. Embedded PCBs have been produced to fit product design requirements. Primary focus has been given to keep the product low cost provided a good tagging range and outdoor operability. The system has been designed, rigidly tested, fabricated in product form. Small scale production has been achieved and is ready in terms of commercial use. The entire system is connected on the server and real time scores and health is displayed in graphical user interface. Various gadget versions are produced so far. In this paper only core tagging technology is discussed in detail.

**Keywords**—LASER TAG; Embedded Systems; Opto Electronics; Infrared (IR) Transmitter; Convex Lens; Infrared (IR) Receiver.

# Power Efficient Negative Current Feedback OTA for Portable Biomedical Application

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**Abstract**—This paper presents a fully differential operational transconductance amplifier (OTA) structure having a linear range which is improved using negative current feedback topology. The OTA circuit is operated in subthreshold region due to the stringent power limitation requirement in integrated circuits. The transconductance of the OTA is 92nA/V with a linear range of +/- 0.25V. To test the applicability of the proposed OTA, a third order Butterworth OTA-C low pass filter is realized. The circuit is operated at a supply voltage of 1V and the power consumption of the filter is 487nW. The DC gain of the filter is -6.2dB with a cut-off frequency of 250Hz. THD of - 55.84dB of the OTA-C filter is obtained for a 100mVpp signal with 100Hz frequency. The

circuit shows the best THD performance with less pass band attenuation for fully differential filter circuit. The circuit is simulated in cadence environment using LFoundry 150nm CMOS process technology.

**Keywords**—Operational transconductance amplifier; subthreshold; negative current feedback; linear range; power efficient (key words).

## Green Internet of Things: Applications and Techniques for Energy Efficient Networks

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**Abstract**—Nowadays, with the advancement and development of the latest technologies such as autonomous machines, etc, are getting connected to each other through smart gadgets. Internet of Things explained the scheme of linking smart devices with each other. Internet of Things has become an increasing topics in the field of research and development for business purposes. With the guidance of IOT several electronic equipment's can easily accessible from our homes or offices. However, to create energy efficiency in Internet of Things the idea of Green Internet of Things have being introduced which has gained enormous attention from researchers and designers in the recent few years. The major purpose of the G\_IOT is to reduce the energy consumption. Moreover, additional sensor and equipment will be placed in wide range of electronic devices and it applications and additional energy will be need. In this paper we will discuss on green internet of things and applications. Furthermore, we will observe what challenges will be faced by G-IOT when we start implementing it. Also we will witness what other techniques will be applied to reduce energy consumption if we are not designing energy efficient hardware and software.

**Keywords**—Components; Internet of Things; Techniques; Energy Efficiency; Applications.

## Physical Modeling and Simulation of Au/ZnO Schottky Diode

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**Abstract**—A Schottky diode of Gold (Au)/ ZnO is simulated using an open source TCAD device simulator (Minimos-NT) and the effect of different device models on the electrical characteristics of ZnO Schottky diode have been studied. The simulated results have been compared with electrical characterization experimental results reported in [1] and the reasons for discrepancy in the results have been addressed. For effective simulation, material parameters of ZnO collected from literature published in various research papers and magazine articles were supplied to the software. Hence, development of a complete database of ZnO parameters was also aimed which will assist in future simulations of the said material.

**Keywords**—Zinc Oxide; Schottky diode; TCAD device simulator; Simulation.



# Space Weather Monitor to Detect Sudden Ionospheric Disturbances (SID)

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**Abstract**—In this paper we will confine our attention towards the design and development of SID monitors, used for sensing the alterations caused in the D layer of ionosphere because of solar flares. Implementation of this project requires a balanced loop antenna with a VLF receiver system having low SNR ratio so that spikes appearing because of solar flares do not look like noise caused because of thunderstorms. Attention is restricted to GOES satellite results, diurnal variations and reflected signal strengths variations during day and night. A continuous system for long term monitoring is recommended for this work.

**Keywords**—D layer; VLF; Diurnal Variations.

# Synthesis of Graphene Ink for Electrode of Dye Sensitized Solar Cells

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**Abstract**—In this study graphene ink have been prepared by Ultra-sonication method. The effect of exfoliation on quality of synthesized graphene ink through ultra-sonication has been investigated. Two samples A and B of graphene ink are prepared with two different exfoliations times of 15 and 30 hours respectively. Prepared samples have been characterized by SEM, AFM, Spectrophotometer analysis, conductivity test and adhesion test. For SEM images it has been observed that sample-A has shown better/poor growth than sample B. The sample exfoliated for 15 hours showed chunk- type structure, having thicker chunks, high absorbance at a non-characteristic wavelength and average conductivity as well as adhesion. Conversely, sample exfoliated for 30 hours showed thinner-uniform layers of Graphene with lower absorbance on characteristic wavelength with good conductivity and adhesive properties.

**Keywords**—Graphene; Graphene; Ink; Ultra-sonication; conductivity; adhesion; absorbance; characteristic wavelength.

# The Cellphone Pitstop, Cellular networks Top-up and Cellphone power station

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**Abstract**—With the rapid progression in the field of technology, it was necessary to bring ease for users facing lack at basic necessities related to technology especially in the field of telecommunication, which nowadays no individual can afford to ignore. Therefore, by filtering out the problems faced by a regular cellphone user on daily basis it was found that the most prominent were lack of cellphone credit and shortage of battery power.

An automated system which could assist the users in such emergency situations is being proposed. Conceptually the project is to pay for the telecommunication services at the point where service is accessed or consumed. The project can assist in situations of low network credit or insufficient mobile battery in areas such as hospitals, airports, railways, banks and educational institutes. It will further accommodate the user with security features if he/she has to charge the phone for a prolonged period. Allowing the user to safely store the phone for charging and then granting access to the user to collect the phone after an interval.

Enormous number of individuals is currently using pre-paid services which are not available 24/7, therefore making this system a unique solution that can prove to be revolutionary on a large scale. Ultimately it can be easily commercialized and result in a highly profitable investment.

**Keywords**—Cellphone pit stop; Telecommunication services; Cellphone battery charging station; Safe transaction system; Cellphone credit top-up; Cellphone balance recharge; Secure charging station.

# Unmanned Fuel Dispensing System

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**Abstract**—The advancement in technology brings simpler and effective systems and solutions as a replacement to the existing ones. Conventionally at the petrol pumps the filling process has been manual and a dedicated individual is required to fill the automobile fuel tanks. Manual filling option is not only costly but also not suitable for the remote deserted areas where the traffic flux is lower.

A smart card based unmanned fuel dispensing system is being proposed in which the entire fueling mechanism would be automated with a direct card charge option in lieu of the quantity of the fuel filled. The major advantage of this system is that it has been designed as a standalone system without the need of any networked operation.

An efficient standalone solution always has an ability to attract the interest of the market and the business community which can ultimately prove to be a profitable future investment.

**Keywords**—Unmanned Fuel Dispensing System; networked environment; profitable future investment.

# Hand Geometry Biometric-Using NIR Hand Images

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**Abstract**— Hand Geometry Biometric is a proven biometric modality. It has been widely used in multi-modal biometric systems related to hand features. This modality is considered as extrinsic modality. Many researchers have extracted hand geometry features after processing images captured using normal camera. Extrinsic physical biometric modalities are more open to spoof attacks in comparison with intrinsic physical biometric modalities. The reason behind this is that, intrinsic modalities are found inside human body while extrinsic modalities are found outside. In this research, hand geometry is treated as intrinsic biometric modality. Here, we have used NIR hand images to locate inter-phalangeal joints for human hand. We are going to call this new biometric modality as ‘Phalangeal Biometric’, which is actually a deduced version of hand geometry biometric.

**Keywords**— NIR, Phalangeal; Biometric; Inter-phalangeal

# Intelligent Domestic Water Resource Management and Logging System Using Machine Learning

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**Abstract**—Domestic Water Resource Management benefits the residents of a house in a number of ways. It serves to provide protection from water leaks and irregular water flow patterns in the house which may cause significant damage to infrastructure. An intelligent system has been proposed for this purpose that collects data from the main water supply of the house and maintains a log of the water flow activities. This data is used to analyze and differentiate between normal water flow patterns and irregular flow patterns by using Machine learning algorithms. These can be used to detect water leaks, alert the residents and consequently shut down the main water supply of the house in order to prevent any damage. The system sends data online to a server and can adapt to changes in the water flow activities of the house. It can predict the future usage patterns based on activities of the past.

**Keywords**— Domestic Water Resource Management; Water flow patterns; Water leaks; Machine Learning Algorithms.

## Study and Implementation of HEVC Encoder on FPGA

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**Abstract**— The primary goal of the project is to study the specifications of the latest and state-of-the-art video compression technology HEVC (High Efficiency Video Coding), and to implement its encoder on the reconfigurable hardware such as FPGA. The specifications of HEVC have been approved by the standardization organizations in Spring-2013, and since then this algorithm has remained the center of interest in the field of video compression and coding for many researchers all around the globe, who have contributed a lot to this technology by proposing advanced, innovative and optimized software implementations of the algorithm. But still, there is a substantial scope in research and designing of HEVC encoder and decoder especially for real-time and embedded applications. The main focus of this project is to study the feasibility and design an HEVC encoder on hardware which can be used as a hardware accelerator for future high speed graphics processing.

**Keywords**— High Efficiency Video Coding (HEVC); Video Compression; Video Coding Technology; FPGA.

# Application of Digital Image Processing Algorithms for Automatic Segmentation of Liver: Review

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**Abstract**—The application of Digital Image Processing (DIP) for the efficient analysis of medical images is increasing drastically. Traditionally the patient's data is acquired by conducting MRI (Magnetic Resonant Imaging), Ultrasounds and CT (Computed Tomography) scans. The initial diagnosis of the liver health is done by the visual expertise of physicians and radiologists from the scans. It takes weeks for report generation and the treatment is delayed until the report is verified by the expert. DIP allows the design of an efficient machine learning algorithm that can be applied for early diagnosis. This study deals with the review of existing segmentation techniques applied to the medical data. The human liver is emphasized in the study due to the hazardous diseases associated with it. This piece of work will guide the researchers in the field of engineering about the various techniques adopted for the design of liver segmentation algorithm.

**Keywords**— Segmentation; liver; digital image processing; medical images; early diagnosis.

## Image Processing Based Path Planning

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**Abstract**—A visual localization of a static environment has developed for differential drive robot using a camera and one ultrasonic sensor is integrated for real time obstacle detection. This combined arrangement is simple and give satisfactory results in path planning and traversing from a given position to final destination. A modified A\* search algorithm is developed whereby the path is planned considering the diagonal motion that allows smooth movement of robot at corners. The planned path is traversed based on the PID control of orientation error of robot with respect to the next coordinate in planned path. On a low level, an ultrasonic sensor is continuously checking for real time obstacle that was absent during path planning so as to generate new path if any found.

**Keywords**—PID; Image Processing; A\*algorithm.

# Emotion Recognition for Visually Impaired Using Smart Cognitive Glasses

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**Abstract**— In this paper a new approach is discussed to help people with poor vision to see the world around them. Supervised machine learning based intelligent cognitive glasses are wearable smart glasses for visually impaired persons. Using Open CV library and python on Raspberry Pi facial expressions are analyzed. This helps the visually impaired people to get the reactions of other persons around them for effective communication. On click of a button a real-time image is captured using a Picam interfaced with the glass frame. First it detects the face, and then recognizes the facial expressions and gender of the person in the image. The device gives output through a headphone that is attached with the gadget. The proposed approach was tested on several images and was able to detect faces and their expressions with an accuracy of up to 95%.

**Keywords**— haar like features; adaboost algorithm; open cv; raspberrypi; facial detection; emotion; gender recognition.

# Energy Efficient Heterogeneous Networks Based on Throughput Measurement

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**Abstract**— The increasing significance of energy efficient networks with high data rates demands is the major concern for all network operators. The number of subscribers and high speed data traffic demand grew with evolution of new mobile data network standards that provide the required streaming of social sites in few seconds. The services provided by the network operators are required to meet the consumer satisfaction and for providing high data rates with good signal quality the small cells are deployed. In this paper, energy efficiency is improved by studying the small cell controlled scheme and extending it to throughput measurement based power control strategy. Further energy consumption is reduced by reducing the transmit power according to the traffic pattern i.e. if there is normal traffic power is 40% of the total power and if the traffic intensity increases 60% of the total power is supplied. This traffic intensity based power distribution scheme provided 13-15% increase in energy efficiency compared to the small cell controlled sleep mode.

**Keywords**— small cell; power control; energy efficiency.

# Power Efficient Highly Linear Negative Current Feedback OTA for Portable Biomedical Application

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**Abstract**— A fully differential operational transconductance amplifier (OTA) structure having a linear range which is improved using negative current feedback topology is presented. The proposed OTA circuit is biased in subthreshold regime because of the necessity of severe power limitation in integrated circuits. The overall transconductance ( $G_m$ ) of the OTA is  $92\text{nA/V}$ . It has a linear range of  $\pm 0.25\text{ V}$ . To examine the working of the proposed OTA, a third order Butterworth OTA-C low pass filter (LPF) is realized. The circuit is operated at a supply voltage of  $1\text{V}$  and the power consumption of the filter is  $487\text{nW}$ . The DC gain of the filter is  $-6.2\text{dB}$  with a cut-off frequency of  $250\text{Hz}$ . THD of  $-55.84\text{dB}$  of the OTA-C filter is obtained for a  $100\text{mVpp}$  signal with  $100\text{Hz}$  frequency. The circuit shows the best THD performance with less pass band attenuation for fully differential filter circuit. The circuit is simulated in cadence environment using LFoundry  $150\text{nm}$  CMOS process technology.

**Keywords**—Operational transconductance amplifier; subthreshold; negative current feedback; linear range; power efficient.