

AI based Computation for Hybrid Precoding/Combining in Millimeter-Wave Massive MIMO Systems

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Abstract: Millimeter-wave (mm-Wave) have emerged as a potential leading technology for the 5G cellular systems due to the enormous availability of high radio-frequency spectrum, which can deliver extreme data speed and enhance spectral efficiency (SE). An economical architecture of hybrid precoder (HP) is widely used in mm-Wave massive MIMO systems (mm-WmM) to recompense for the severe propagation loss of the mm-Waves. This paper examines the design of the hybrid precoder and combiner (HPC) in mm-WmM by integrating Artificial Intelligence (AI) based optimization algorithm. AI is going to be a key component to enhance the performance of 5G wireless communications and beyond. The emerging AI based computation using Hierarchical Particle Swarm Optimization technique (HPSO) is proposed to design a HPC to maximize the SE in mm-Wave massive MIMO systems. Results obtained from simulations demonstrate the improved performance of the HPSO algorithm in contrast to the existing algorithms and can accomplish close to the optimal performance.

Index Terms – Hybrid precoding/combining, mm-Wave, SNR; Spectral efficiency, PSO

1. Introduction

Every new generation of cellular system takes a significant step towards higher capabilities compared to existing ones. The mm-Wave communication with very high speeds and low latency makes it a suitable and an eminent candidate for 5G cellular systems [1]-[4]. In mm-Wave massive MIMO systems achieving high-quality communication requires the use of large antenna arrays at both the base station and mobile stations [5]. One of the important problems for mm-Wave communications is the huge direction and penetration losses at these frequencies. Beamforming compensates for any signal loss by switching automatically to the strongest beam, and the switching of the beam is done instantaneously to achieve a wide coverage using mm-Wave spectrum. Many industries are committed to improve the speed and connectivity in 5G cellular mobiles to meet the drastic growth in the traffic [6]. Recently, mm-Wave with a spectrum of 30GHz to 300GHz has gained huge attention as a prominent part of 5G and may also be an integral part of future generation 6G as well. The mm-Waves and also sub-mm-Waves or TeraHertz waves that are 1/10th of the mm-Waves are in enormous research by the industries around the globe.



Renewable power sharing to grid through novel dual buck interleaved bidirectional converter operating at high frequency

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Abstract—

In this paper a grid interconnected renewable source through dual buck interleaved bidirectional converter operated at high frequency switching is introduced. The renewable source considered is PVA module along with booster converter and MPPT connected in parallel to the BESS. The dual buck interleaved bidirectional converter has six high frequency operating switches (MOSFET) by which the power transfer is done from renewable to grid and from grid to battery storage. Along with the switches, four energy storage inductors are also used for bucking operation. The grid considered here is a single phase source to which the dual buck interleaved bidirectional converter is connected through LC filter. Different operating conditions are considered for sharing of power from PVA to grid, PVA to battery and grid to battery. The inverter and rectifier stages of the proposed circuit topology are shown with graphical representation using MATLAB Simulink software.

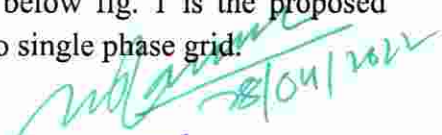
Keywords: PVA (Photo Voltaic Array), MPPT (Maximum Power point tracking), BESS (Battery Energy Storage System), MOSFET (Metal Oxide Semi-conductor Field Effect Transistor), MATLAB (Matrix Laboratory).

I. INTRODUCTION

Utilization of renewable sources in modern power system has become mandatory so as to decrease environmental pollution and decrease global

warming. As the power generation from the renewable sources is not stable and uncertain it is very vital to use efficient circuits to get maximum power at stable voltages during generation. It is also very important to store the excess power into energy storage devices [1] so that they can be utilized later during deficit conditions. In previous researches for the energy conversion different and separate circuit topologies are utilized which include booster converter for voltage boosting from PVA [2], bidirectional converter for battery storage system which has the capability to charge and discharge the battery, single or three phase inverter for converting DC to AC voltage [3]. Each circuit is operated separately with its individual control and operates for one condition. This utilization of multiple circuit topologies for the power conversion leads to power loss decreasing the efficiency of the system. A novel topology needs to be adopted in order it operates as multiple types of conversion circuits [4] as per the control given to it.

In this paper a novel bidirectional interleaved dual buck converter is proposed which can operate as inverter and also as rectifier as per the requirement and conditions. The below fig. 1 is the proposed topology connected to single phase grid.


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Advances in Laparoscopic Surgeries and CFD Perspective of Suction-Irrigation Devices

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Abstract. The need for suction-irrigation devices in almost every surgery i.e., from an open incision to Laparoscopic, is well recognized by all different kinds of surgeons. This paper significantly highlights several problems of pneumoperitoneum, blocking, and other inefficiencies like misplacement of sponges, etc., while using suction and irrigation devices during surgeries. An irrigation device is studied for cleaning wounds or blood inside a human body. The citation has been counted as one of the most imperative factors in comprehending the quality of Laparoscopic instruments and their use during surgery. It helps to solve inefficiencies caused by separate suction and irrigation systems in surgeries such as suctioning the wound while irrigating and then simultaneously cauterizing to seal the tissue. Computational Fluid Dynamics or CFD evaluation is one of the key analysis strategies used to forecast fluid flow, heat transfer, and chemical reactions occurring among various materials which consists of fluid. Computational analysis is performed in the present study using ANSYS FLUENT as a commercial package. After evaluation of the modeled layout, the acquired outcomes for pressure, mass flow rate, and velocity at the inlet and outlet of the tube are cautiously studied, and essential optimizations are made in the design to prevent any undesired outcomes. The pressure drop in the instrument and the pipe is determined, and flow rates are compared subsequently. The objective of this paper is to determine the mass flow rate across an instrument for different pressures and to suggest improvements in the Suction-Irrigation device by enhancing additional features to make it as multi-functional instrument that can be used for minimally invasive surgeries.

Keywords: CFD, Suction, Irrigation, Laparoscopy, Instruments, Patients, surgery.

INTRODUCTION

Background

In 1812, when the New England journal of medicine and surgery first started to publish, medical knowledge in the U.S. and in other parts of the world was limited. At that point of time, life loss due to infections caused post surgeries was very high. Surgeries were performed in those days under relatively less hygienic conditions and without anaesthesia. Before the introduction of ether based anaesthesia, surgeries were brutal and gruesome. In 1846, William Morton, a Boston dentist persuaded Dr. John Collins Warren to use ether based anaesthesia to relieve pain during surgeries. In 1860s Luis Pastore developed the theory which suggested that, infections may be due to micro-organisms. Two centuries later, people have longer span of life due to the development of various healthcare measures and developments in various surgical procedures.

During the 19th Century, people realized the hygiene benefits. Before and after surgery, doctors as well make themselves sure to sterilize the equipment and wash their hands. Such a minor transformation brought about a drop in mortality rates. Different approaches were being made by the doctors to overcome the patient's death by a careful and persistent approach towards disinfection. This, together with the commencement of the Industrial Revolution,

A low power low ripple Schmitt trigger based PWM Boost Converter for Energy Harvesting Applications

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Abstract—The design of monolithic power management circuits is critical in energy harvesting applications. A Pulse width modulation (PWM) boost converter with feedforward and feedback control mitigates the changes in input-output parameters and avoids the use of compensation circuit. However, the conventional design of a clock generator in feedback path employs power hungry comparators and latches. This paper proposes an improved design of clock generator replacing comparators and latches with a schmitt trigger circuit. As a result, a low power and a low ripple PWM was achieved. The design was implemented in UMC 180 nm CMOS technology generating a stable output of 3.3 V for an input range of 1.2 V - 1.6 V. Due to the application of the proposed technique, a reduced power consumption of 60.19 mW and low ripple voltage of 18.29 mV was achieved, for a maximum load current of 100 mA at an efficiency of 98%. Thus making the design suitable for energy harvesting applications.

Index Terms—Energy Harvesting, Power management, PWM Boost Converter, Schmitt Trigger

I. INTRODUCTION

Energy harvesting is emerging as the key research area for low-power applications in battery driven devices used in medical equipments, consumer electronics, wearable electronics and military applications. The design of power management unit for energy harvesting applications is heavily dependent on the efficient design of the boost converter. Pulse width modulation (PWM) based boost converters have been widely implemented due to the simplicity and compactness of design [1]–[3]. These PWM based converters can be classified into voltage, current and hysteresis controlled converters. The converters based on current control technique are complicated and are difficult to stabilize. Whereas, the voltage controlled boost converters are relatively straight-forward but the output stability is dependent on the compensation circuit [2]. This compensation circuit is circumvented by using a feedforward and feedback loop control thus making the circuit more agile. Using this compensation free technique, a boost converter was designed employing a ramp based clock generator consisting of two hysteresis comparators and one SR latch [3]. Yet, this circuit gives a ripple of 36.52 mV with 93% efficiency and power dissipation of 348 mW. Even though this work is able to eliminate the compensation circuit, it has a power consumption of the order of hundreds of milli watts and is also area hungry.

The problem of area and power can be resolved by using a schmitt trigger for designing ramp based clock generator [4]. In this paper, it is proposed to use the aforementioned ramp based clock generator to design a PWM based boost converter which consumes low power and low area. The effective power consumption is reduced to the order of 10's of milliwatts, with good line and load regulation. The proposed boost converter is designed for an input voltage range of 1.2 V - 1.6 V generating a stable output voltage of 3.3 V with a load current of 100 mA. Design aspects that are commonly used is the provision of the back gate diode which is connected across the switching transistor [5]. Ripple voltage and efficiency are also key factors governing the design of a low power DC-DC converter [6]. Any changes in the input voltage results in a corresponding change in the output voltage which is balanced by the feedback mechanism to bring stability to the output. The generation of a ramp signal from a fixed duty cycle clock pulse was described in [7] and has been further enhanced in [8] and the same is applied in the proposed design. These specifications are suitable for the design of an energy harvesting circuit aimed at driving a wireless sensor node [9]. The detailed circuit description of feedforward and feedback circuit along with the proposed design of boost converter using ramp based clock generator with Schmitt trigger circuit is elucidated in section II. The design results are discussed in section III and conclusion is presented in section IV.

II. CIRCUIT DESCRIPTION OF FEEDFORWARD AND FEEDBACK CONTROL OF BOOST CONVERTER

The circuit consists of Ramp based Clock Generator, Hysteresis Comparator, Level Shifter and Non Overlapping Clock Buffer as per the schematic shown in Figure 1. It depicts the circuit design of the boost converter with feedforward and feedback control circuitry. The forward path consist of the power stage having inductor (L), MOS switches (MN0 & MP0) and load capacitance (C_L). The voltage divider circuit at the input stage consisting of R_{FF1} and R_{FF2} are used to generate voltage V_H given to the non inverting terminal of hysteresis comparator forming the feedforward path. The output of hysteresis comparator is given to a level shifter

Quantum Computing based Implementation of Full Adder

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Abstract—Quantum computing is the most advanced form of computing that is evolving today. Classical computers work on binary bits - 0 or 1, but quantum computers work on quantum bits or qubits which can be in the state 0 and 1 simultaneously and exhibit properties like superposition and entanglement. This paper proposes the implementation of a full adder with the concepts of quantum computing using quantum gates on IBM composer. IBM composer is the choice of tool for this paper, and the resultant speed of operation is calculated to be 6.064ms for 1024 shots (1 shot is 100 repetitions). By designing a full adder in this paper, it is contemplated that more complicated digital circuitry will be implemented on quantum computers in near future, thus paving the way for bringing high speed quantum computing in our daily lives to solve critical problems that are unresolvable by conventional computing.

Keywords— IBM composer, Quantum Computer, Qubit, Speed of Operation, Superposition.

I. INTRODUCTION

With humongous research and increasing speculations of Quantum computers replacing conventional computers, Quantum computing has taken a huge leap over the years. As cited in [1] Quantum computing and AI have already met in machine learning. Which means there are innumerable applications and future scope in this field. The research [2] talks about the freedom of qubits due to superposition which can be linked due to entanglement. As a consequence of which with enough qubits, a billion-year operation on classical computers can take days or hours on a quantum device. The research [3] mentions that companies like IBM, Microsoft, Google are hard at work to take this theory into practice which inspires us to believe that we are nearing quantum supremacy. The main purpose of this paper is to simulate full adder using a 5-bit quantum simulation interface provided by IBM. For readers who are not acquainted with quantum computing, a brief introduction is given. Along with that, a guide on IBM composer is given. It is hoped that this paper will serve as a pre-requisite for researchers who are looking forward to go deeper and design real time computers using quantum computing. At the end of this paper, a proposed circuit of a full adder using quantum gates is shown. This circuit is optimised to reduce garbage values.

II. BACKGROUND

There are numerous papers on full adders using quantum computing. The most relevant paper to this paper is [5] which uses Islam gate and generates some garbage values. The paper [6] does the same using a proposed Khan gate and

still generates some garbage values. In this paper the proposed implementation of full adder circuit using quantum gates helps generate the classical full adder circuit truth table, without obtaining any garbage values which makes the following simulation much more efficient. Section I gives a brief introduction about quantum computing, section II gives us an idea of an existing research about full adder and how the research done now optimizes it. Section III is a brief introduction about IBM composer and the gates used in it. Section IV explains how the program implements a full adder. Section V exhibits the circuit generated and the results obtained.

III. IBM COMPOSER

For the purpose of this research, we chose to use IBM's Quantum experience. IBM Q experience is an online simulator made available for research enthusiasts in an intuitive interface with guides to understand it and get started. In IBM composer (as is standard), the measurements are performed in the computational basis. After it is measured, we know a qubit loses its quantum properties and becomes a classical bit. The measurement either takes the value 0 if the qubit is in state $|0\rangle$ (pronounced as KET 0), and value 1 if the qubit is in state $|1\rangle$ (pronounced as KET 1). Each qubit will have a corresponding quantum register to store quantum information. Since measuring a qubit results in a classical bit, for each qubit there is also a classical register in which the classical information is stored. So a 5 qubit processor has 5 quantum registers and 5 classical registers. We also know that the probability that a superposed qubit will fall to 0 or 1 depends on the modulus square of their respective coefficients. The IBM composer, by default runs an experiment 100 times, each run of experiment is called a shot. If we were to measure a superimposed qubit, the results will show how many times out of 100 the qubit fell to 0 and how many times it fell to 1. The number of shots is also customizable. In this simulation the number of shots is taken as 1024 to increase the accuracy. For ease of understanding and readability, the results are always represented in form of histograms. For the purpose of this research we used the 5-qubit processor on IBM Q experience. This processor is housed in the cryoperm shield of the IBM quantum computer. It is from this initial $|0\rangle$, that we begin manipulating the qubits, thus giving us control over their generally random behaviour. All operations and behaviour of qubits and quantum computers from here on will be with regards to the construction and principles of IBM quantum computer and processor. An IBM composer has a number of gates like X gate, Hadamard gate, CNOT gate and Toffoli gate. Each gate serves its own purpose in the composer. The conditional gate used is

Legitimate-path Formation for AODV under black hole attack in MANETs

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Abstract—Mobile Ad-hoc Network (MANET) owing to their very open characteristics are being very attractive and adaptive. With the openness comes security issues to be dealt. The most usual attack in mobile ad-hoc network is the black-hole attack. It advertises false path as shortest and newest to the destined node. On gathering packets containing data will drop them and does not send it to the destination. This paper proposes an algorithm to overcome such an attack under Ad-hoc On-demand Distance Vector (AODV) routing protocol in MANETs. The proposal aims to detect and avoid black-hole attack by using the parameters of AODV routing protocol in its enhanced form of route recovery. The proposed algorithm has two different scenarios, where first comes the detection then the avoidance. The simulation results are obtained from NS-2 to authenticate the effectiveness of proposed technique in comparison with the existing protocols in the existence of black-hole attack with respect to change in simulation end time and active number of attackers. The implementation is assessed based on delay, delivery ratio, drop, overhead, throughput and packet forwarding ratio. The results obtained from network simulator are mapped to form a dataset, which is then validated on a modelled fuzzy inference system using MatLab software.

Keywords—Mobile Ad-hoc network, security, black-hole attack, AODV, detect, avoid, NS-2, fuzzy inference system, MatLab

I. INTRODUCTION

Mobile ad-hoc network (MANET) is a set of mobile nodes, which are actively and randomly positioned in a fashion that causes the link to change on a frequent basis. To provide communication between the nodes a through the routes routing protocol is used. Effective and accurate route establishment among set of nodes, so that data packets may be sent in a well-timed manner to serve the purpose of the routing protocol [1]. It is an ad-hoc network which is self-organized, without any pre-arrangement and self-configurable where the nodes move arbitrarily. Dynamic node movement in any direction causes link changes repeatedly [2]. MANET are appropriate for infrastructure-less or problematic or expensive to arrange or when network is required quickly. They are applicable in situations such as in emergency rescue processes during natural disasters, meetings, conferences, and combat zone communication between mobile vehicles and/or warriors.

Designing right and proper protocol to discover routes and handle frequent topology deviations in MANETs can boost the effectiveness of the network [3]. There are three broad classification of routing protocols. The first category is the proactive routing protocol which stores the routes for each node before the need. The second category is reactive routing protocol which finds route only when the need arises. The

third category is the hybrid which is the combination of both proactive and reactive. The Routing and management of network are the two significant operations of networking. All types of communication network have security as its major reason to worry about. Such networks are inclined towards spiteful attacks because of its unique characteristics [4]. Though the open- nature of MANET makes it very attractive and vulnerable to attacks. To avoid different types of attacks many different detection prevention techniques have been proposed. The paper proposes a mechanism that plants, detects and avoid black-hole attack in MANETs.

The proposal's key idea is that it uses insecure AODV routing protocol and add security in routing. The mechanism aims in obtaining a valid path from source to destination. Detection is done by using delay as a parameter and authentication is provided using the validity of route parameters. The comparison between existing AODV protocol and the proposed work is it has enhanced AODV with respect to various parameters that shows how the performance of the system is enhanced. Further, for reasoning the results obtained from simulator, which are analyzed on a modelled fuzzy inference system that determines whether the network is secure or not.

II. CONCEPTUAL INFORMATION

A. AODV Routing Protocol

Ad-hoc on-demand distance vector [5] is an on-demand routing protocol for MANETs that creates route to destination only when required. AODV works in two states that are route discovery and route maintenance.

In the Route Discovery state, the control messages used are Route Request (RREQ) and Route Reply (RREP). The initiation of route discovery process is done through the source node that sends RREQ packet to the next hop neighbors once the need to forward data packets towards the destination node arises or when a legitimate route to the destination is not available. The neighbor nodes further rebroadcast the RREQ to their neighbor's until it gets a path to the destination or reaches the destination. When destination gets RREQ it unicasts RREP packets backwards to the source. Source node on receiving RREP starts sending data packets to the destined node. Routing table is updated if a shorter route to the destined node is found.

In the figure 1- [6] the route discovery for AODV is performed where S denotes source node, D denotes destination node. Here when S desires to send data packets to D it initially performs Route Request (RREQ) by sending RREQ packets to

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Non-linear Optical Properties of Bi₂O₃-TeO₂-B₂O₃-GeO₂ Glasses

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Abstract: New bismuth tellurite boro-germanate glasses according to composition $x\text{Bi}_2\text{O}_3-(80-x)\text{TeO}_2-10\text{B}_2\text{O}_3-10\text{GeO}_2$ where ($x=40, 45, 50, 55, 60$ and 65 mol%) have been prepared by melt quench technique at 1150°C . The room temperature optical absorption spectra have been recorded. The indirect band gap energy E_g was determined and found to decrease with Bi_2O_3 content. The increase in Urbach energy with glass composition indicates the decrease in structural stability. The ionic and covalent bonding parameters were determined. The present glasses are found to be 99 % ionic in nature. The two-photon absorption coefficient was found to increase from 11.89 to 14 cm/GW. The non-linear optical properties such as non-linear refractive index, linear optical susceptibility and third order non-linear optical susceptibility were evaluated using optical data. The authors determined theoretically the optical band gap (E_g) and refractive index (n) of the present glasses using optical electronegativity data. The relationship between E_g and n followed the relation $E_g n^4 = 99$. The present glasses were found suitable for drawing optical fibers.

INTRODUCTION

It is known that B_2O_3 and GeO_2 are mostly used glass formers that comprises of boroxol rings, BO_3 units and GeO_4 and GeO_6 units to form two dimensional random network [1,2] Tellurium oxide based glasses attracted the scientific community due to their various applications like optical amplifiers and nonlinear optical devices. These glasses have large third-order nonlinear susceptibility, dielectric constants and refractive indices [3, 4].

Bi_2O_3 glasses also exhibit high second and third order non-linear optical susceptibility due to which they are used in up-conversion lasers and non-linear optical materials. Addition of Bi_2O_3 and TeO_2 to B_2O_3 and GeO_2 glasses shows remarkable changes in both physical and optical properties. The influence of Bi_2O_3 , TeO_2 have been observed in various glasses like $\text{B}_2\text{O}_3\text{-TeO}_2\text{-Li}_2\text{O-CoO}$, $\text{TeO}_2\text{-ZnO-B}_2\text{O}_3\text{-Bi}_2\text{O}_3$, $\text{TeO}_2\text{-Li}_2\text{O-B}_2\text{O}_3$, $\text{TeO}_2\text{-MoO}_3\text{-Bi}_2\text{O}_3$, $\text{TeO}_2\text{-ZnO-Nb}_2\text{O}_5\text{-Gd}_2\text{O}_3$ [5-10].

Hasegawa [11] and Saddeek *et al.* [12] developed $\text{Bi}_2\text{O}_3\text{-TeO}_2\text{-B}_2\text{O}_3$ ternary glass system and investigated their physical, linear and non-linear optical properties. Munoz-Martin *et al.* [13] prepared ternary tellurite-tungstate glass system with alkaline oxide, ZnO, Bi_2O_3 or Li_2O as third component and demonstrated that these ternary glasses are promising materials for developing broad band integrated optical amplifiers. Zhou *et al.* [10] prepared and characterized new tellurium quaternary $\text{TeO}_2\text{-PbO-Bi}_2\text{O}_3\text{-B}_2\text{O}_3$ glass system and explained the variations in thermal stability with the glass composition using FTIR measurements. The present glasses can be used for photonic devices and low melting point sealing glasses.

There are many reports on ternary and quaternary glasses with $\text{Bi}_2\text{O}_3/\text{TeO}_2/\text{B}_2\text{O}_3/\text{GeO}_2$. To the best of our knowledge, there are no proper reports on $\text{Bi}_2\text{O}_3\text{-TeO}_2\text{-B}_2\text{O}_3$ glasses containing GeO_2 . We have studied the effect of Bi_2O_3 content on non-linear optical properties of $\text{Bi}_2\text{O}_3\text{-TeO}_2\text{-B}_2\text{O}_3\text{-GeO}_2$ glass system. Further, the present study

Detection and Prevention of Blackhole node

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Abstract— Mobile Adhoc networks (MANETs) comprises of mobile devices or nodes that are connected wirelessly and have no infrastructure. Detecting malicious activities in MANETs is a challenging task as they are vulnerable to attacks where the performance of the entire network degrades. Hence it is necessary to provide security to the network so that the nodes are prone to attack. Selecting a good routing protocol in MANET is also important as frequent change of topology causes the route reply to not arrive at the source node. In this paper, R-AODV (Reverse Adhoc On-Demand Distance Vector) protocol along with ECC (Elliptic Key Cryptography) algorithm is designed and implemented to detect and to prevent the malicious node and to secure data transmission against blackhole attack. The main objective is to keep the data packets secure. ECC provides a smaller key size compared to other public-key encryption and eliminates the requirement of pre-distributed keys also makes the path more secure against blackhole attacks in a MANET. The performance of this proposed system is simulated by using the NS-2.35 network simulator. Simulation results show that the proposed protocol provides good experimental results on various metrics like throughput, end-to-end delay, and PDR. Analysis of the results points to an improvement in the overall network performance.

Index Terms— R-AODV, ECC, NS-2.35, Packet drop ratio (PDR), Throughput, End-to-end Delay, Blackhole Attack

I. INTRODUCTION

Mobile Adhoc Network is a wireless communication network that consists of a set of mobile nodes that are temporarily connected without any infrastructure. A MANET is formed using wireless hosts which may be mobile, hence leading to a rapid change in topology. In MANETs, communication can be done directly for nodes within the transmission range; however, outside the range, it will rely on other intermediate nodes for transmission. The complex nature of MANETs makes the network vulnerable i.e., unstable and accessible to attacks. Routing is one of the critical elements of any network. Every node should not only function for itself but should also cooperate with the other nodes. MANETs are vulnerable to various types of security attacks. But seeking a safe and trustworthy end-to-end path in a MANET is a real challenge.

MANETs do not define a physical boundary, due to which any node is allowed to enter and leave the network as per their need. In this process, an adversary node can enter the network and begin its attack. Types of attacks are Denial of Service attack, Blackhole attack, eavesdropping, tempering, Jellyfish attack, neighbor attack, etc.

There have been numerous techniques created to increase the security of a MANET; one of the ways is to secure the data that is to be transmitted over a hostile environment so the data remains secure despite the attack. To implement the mentioned technique, we have applied the ECC algorithm along with R-AODV and have shown the impact of a Blackhole Attack on the proposed method.

To ensure secure transmission, various encryption algorithms have already been used with a myriad of protocols. However, the frail nature of certain protocols does not let the MANET keep the transmission secure for a long period. Tarandeep Kaur et al. [1] observed performance evaluation of various protocols under a Blackhole attack and concluded that protocols like Ad Hoc on-demand Routing (AODV), Dynamic Source Routing (DSR), Optimized Link State Routing (OLSR) take a serious hit under an attack and their performance significantly degrades which leads to a great amount of loss in data. Harmandeep Singh et al. [2] deduced that the effect of the Blackhole attack is relatively higher on AODV when compared to other protocols. Mohan Kumar et al. [3] proposed the implementation of RSA for secure routing in the network, malicious nodes were detected since the hop count field and sequence numbers were encrypted. However, this proposal still needs to be expanded & tested for larger networks. In our proposed system, we focused on the encryption algorithm (ECC) and the implementation of R-AODV which decreases power consumption and communication delay when compared to AODV.

The rest of the paper is organized as follows: Section 2 contains the related work; Section 3 discusses the properties of the Blackhole attack, R-AODV protocol, and Elliptic Curve Cryptography (ECC), the reasons behind choosing R-AODV as the routing protocol, and ECC as encryption technique. Section 4 depicts the implementation of the system, Section 5 discusses the generated results, and lastly, section 6 portrays the conclusion and future enhancement.

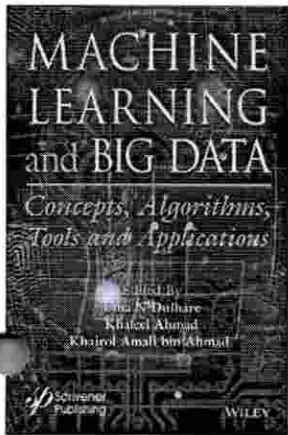
II. RELATED WORK

Some of the countering mechanisms of blackhole attack are overviewed as follows:

Jeenat Sultana et al., in "Elliptic Curve Cryptography Based Data Transmission against Blackhole Attack in MANET" [4], proposed an approach to secure data transmission against a blackhole attack in MANETs. They implemented a prevention protocol using ECC along with the AOMDV. The encrypted

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Machine Learning and Big Data: Concepts, Algorithms, Tools and Applications

Uma N. Dulhare (Editor), Khaleel Ahmad (Editor), Khairol Amali Bin Ahmad (Editor)

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DESCRIPTION

Currently many different application areas for Big Data (BD) and Machine Learning (ML) are being explored. These promising application areas for BD/ML are the social sites, search engines, multimedia sharing sites, various stock exchange sites, online gaming, online survey sites and various news sites, and so on. To date, various use-cases for this application area are being researched and developed. Software applications are already being published and used in various settings from education and training to discover useful hidden patterns and other information like customer choices and market trends that can help organizations make more informed and customer-oriented business decisions.

Combining BD with ML will provide powerful, largely unexplored application areas that will revolutionize practice in Videos Surveillance, Social Media Services, Email Spam and Malware Filtering, Online Fraud Detection, and so on. It is very important to continuously monitor and understand these effects from safety and societal point of view.

Hence, the main purpose of this book is for researchers, software developers and practitioners, academicians and students to showcase novel use-cases and applications, present empirical research results from user-centered qualitative and quantitative experiments of these new applications, and facilitate a discussion forum to explore the latest trends in big data and machine learning by providing algorithms which can be trained to perform interdisciplinary techniques such as statistics, linear algebra, and optimization and also create automated systems that can sift through large volumes of data at high speed to make predictions or decisions without human intervention

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Functional Encryption

M. J. Khan
20/04/2022

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Facilitating Aural-oral skills of Engineering Students through the Flipped Classroom

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Abstract

Higher education in India that remained traditional for relatively long time is now shifting towards more effective, active, flexible and student-centered teaching-learning process. One such novel pedagogical model that alleviates the restrictions of traditional lecturing method is the Flipped classroom. Recently the flipped classroom model has been recommended to scaffold this paradigm shift in higher education. A lot of researchers/teachers consider the traditional lecture method of teaching less effective compared to active learning methods. Nevertheless, research on the effectiveness of the flipped classroom in higher education is at a nascent. Very few studies have attempted to investigate students' perceptions of learning through the flipped classroom method. This research aimed at developing the aural-oral skills of engineering students through the flipped classroom method and to examine their learning experience of the designed OER (audio/video resources) as a learning tool. For the purpose of the study, 60 I year engineering students of MJCET, Hyderabad, India have been selected as a study group last year. Three components were taken into consideration to evaluate the influence of the flipped classroom model on students' learning experiences. 1) Effectiveness of the designed Open Education Resource in developing learners' listening and speaking skills and in minimizing errors in spoken English 2) the student's attitude and general perception of learning through this innovative flipped classroom model. 3) the student's experience of using audio/video lectures as a learning tool.

The study used two data collection methods: 1. The aural-oral skills test (pre-test and post-test in listening and speaking skills)

2. The questionnaire had two sections with 30 items in total. Section-1 had questions on learners' perceptions/ experiences of the flipped classroom and section-2 had questions on evaluation of students' learning experiences from audio/video resources and through the designed OER. The pre-tests were conducted before the participants underwent the designed course while the post tests were administered after the completion of the course. The post-test scores were then compared with the pre-test scores to measure the difference between them. However, the questionnaire was administered to the participants of the study after the completion of the course in Sept.2018. The study documented and analysed the data collected from the pre and post listening and speaking tests, as well as from the questionnaire.

A New Radio Frequency Harvesting System



Syed Mahmood Ali Mahboob, Shaik Qadeer and Ajaz Fatima

Abstract Converting readily available energies from the surroundings into usable electrical supply (current/voltage) is a trending topic of research. Due to more and more use of wireless technology, there is an abundance of electromagnetic signals and these signals can be harvested and electrical supply can be generated. In this paper, radio frequency (RF) energy is harvested and electrical energy is generated through various methods, such as step-up converter, flyback converter, and voltage amplifier with the feedback of power supply and detail comparison of the abovementioned methods are covered.

Keywords RF harvesters · Step-up converter · Flyback converter · Amplifiers · Power electronics

1 Introduction

Generation of electrical power through ambient energies is the most trending research topic among the research scholars. This topic does not only address the usage of nonrenewable fuels (such as coal, gasoline, diesel, etc.) but also the generation of electrical power from renewable energy sources. In this paper, the source considered for harvesting is a source which is not commonly used that is “Radio Frequency”. RF signals are abundantly available in the environment, these signals can be har-

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