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Investigation on Impact of Magnetic Field on the Corona Discharge Activity in Punga Oil Using Fluorescent Fiber and UHF Sensor Techniques

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ABSTRACT This paper reports the experimental investigation of the corona discharge activity of punga oil under the influence of a local magnetic field and different voltage profiles (AC and DC voltages) using fluorescent fiber sensor as well as UHF sensor technique. The corona inception voltage (CIV) of punga oil is higher under negative DC voltage followed by positive DC and AC voltage, with a marginal reduction in its CIV magnitude observed on the impact of external magnetic field. The dominant frequency of the UHF signal obtained under AC voltage shifted towards lower frequency (0.6 GHz) with the influence of magnetic flux density to about 85 mT. The rise time, pulse width and energy content of the fluorescent signal formed due to corona activity under AC voltage is found to vary under high magnetic fields confirming the inception results. The fluorescent signals formed due to corona discharge under both AC and DC voltages have its dominant frequency at 1 MHz with no shift observed in the presence of magnetic field. Also, there is no variation in the phase resolved partial discharge (PRPD) pattern observed due to corona discharge (with and without magnetic field) signal using both UHF sensor and the fluorescent sensor. The fluorescent fiber-based technique provides a better accuracy on detecting the corona discharges in punga oil at an early stage compared to conventional UHF sensor. The breakdown voltage of punga oil under different voltage profiles with and without the effect of magnetic field follows normal distribution. The dielectric dissipation factor and electrostatic charging tendency (ECT) of punga oil is observed to be higher than the limit set for insulating fluids towards power transformer operation.

INDEX TERMS Corona discharge, magnetic field, fluorescent fiber, UHF sensor, rise time, streaming current.

I. INTRODUCTION

The insulation design of oil-filled power transformers is vital for their longevity and reliable operation in a power system network. Mineral oils have been traditionally used as an insulant and coolant in the power transformers. However, with the recent shortfall of the global oil supply and a general depletion of non-renewable sources, a serious shortage may be expected in the near future [1]. While installing the transformers, fire protection is a primary concern, as they are frequently positioned in high-risk situations such as within buildings and underground installations. Nevertheless, the higher thermal class of ester fluids [2] compared to mineral oil makes them suitable to be placed closer to the buildings, resulting in lower power losses. In view of this, alternative insulants such as vegetable oils (soybean, sunflower, punga) are now being tested for transformer applications [3]. In comparison to the conventional mineral oil, these ester-based fluids derived from various plant seeds have shown better fire class properties with increased

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electronics

MDPI

Review

Electric Vehicles Charging Stations' Architectures, Criteria, Power Converters, and Control Strategies in Microgrids

Dominic Savio Abraham [1], Rajesh Verma [2], Lakshmikhandan Kanagaraj [3], Sundar Rajan Giri Thulasi Raman [4], Narayanamoorthi Rajamanickam [1], Bharatiraja Chokkalingam [1,*], Kamalesh Marimuthu Sekar [5] and Lucian Mihet-Popa [6]

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Abstract: The usage of electric vehicles (EV) has been increasing over the last few years due to a rise in fossil fuel prices and the rate of increasing carbon dioxide (CO_2) emissions. EV-charging stations are powered by existing utility power grid systems, increasing the stress on the utility grid and the load demand at the distribution side. DC grid-based EV charging is more efficient than AC distribution because of its higher reliability, power conversion efficiency, simple interfacing with renewable energy sources (RESs), and integration of energy storage units (ESU). RES-generated power storage in local ESU is an alternative solution for managing the utility grid demand. In addition, to maintain the EV charging demand at the microgrid levels, energy management and control strategies must carefully power the EV battery charging unit. In addition, charging stations require dedicated converter topologies, control strategies, and need to follow set levels and standards. Based on EV, ESU, and RES accessibility, different types of microgrid architecture and control strategies are used to ensure optimum operation at the EV-charging point. Based on the above said merits, this review paper presents different RES-connected architecture and control strategies used in EV-charging stations. It highlights the importance of different charging station architectures with current power converter topologies proposed in the literature. In addition, a comparison of microgrid-based charging station architecture with its energy management, control strategies, and charging converter controls are also presented. The different levels and types of charging stations used for EV charging, in addition to controls and connectors used, are also discussed. An experiment-based energy management strategy was developed to control power flow among the available sources and charging terminals for the effective utilization of generated renewable power. The main motive of the EMS and its control is to maximize the usage of RES consumption. This review also provides the challenges and opportunities in EV-charging, and parameters in selecting appropriate charging stations.

Keywords: microgrid; electric vehicle; energy management controls; renewable energy sources; energy storage unit

1. Introduction

Electric vehicles are becoming popular due to their less emissions and lower fossil-fuel dependency [1]. The renewable energy sources used in distribution networks, in

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Article

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Gaussian Support Vector Machine Algorithm Based Air Pollution Prediction

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Abstract: Air pollution is one of the major concerns considering detriments to human health. This type of pollution leads to several health problems for humans, such as asthma, heart issues, skin diseases, bronchitis, lung cancer, and throat and eye infections. Air pollution also poses serious issues to the planet. Pollution from the vehicle industry is the cause of greenhouse effect and CO2 emissions. Thus, real-time monitoring of air pollution in these areas will help local authorities to analyze the current situation of the city and take necessary actions. The monitoring process has become efficient and dynamic with the advancement of the Internet of things and wireless sensor networks. Localization is the main issue in WSNs; if the sensor node location is unknown, then coverage and power and routing are not optimal. This study concentrates on localization-based air pollution prediction systems for real-time monitoring of smart cities. These systems comprise two phases considering the prediction as heavy or light traffic area using the Gaussian support vector machine algorithm based on the air pollutants, such as PM2.5 particulate matter, PM10, nitrogen dioxide (NO2), carbon monoxide (CO), ozone (O3), and sulfur dioxide (SO2). The sensor nodes are localized on the basis of the predicted area using the meta-heuristic algorithms called fast correlation-based elephant herding optimization. The dataset is divided into training and testing parts based on 10 cross-validations. The evaluation on predicting the air pollutant for localization is performed with the training

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RESEARCH ARTICLE

WILEY

Combination of Side-Blotched Lizard and Chaos Game Optimization based distributed energy management for microgrid system

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Abstract

In the last decade, numerous energy management techniques have been presented. All of them have common objectives of minimizing the cost, PAR, and carbon emissions. In this manuscript, an optimal energy management (EM) on grid connected micro grid (MG) choosing energy scheduling with low emission and cost using hybrid technique is proposed. The proposed system is combination of Side-Blotched Lizard Algorithm (SBLA) and Chaos Game Optimization (CGO) Algorithm; thus it is called SBLA-CGO technique. The micro grid system consists of Photo-Voltaic (PV) system, Wind Turbine (WT), Battery Storage (BS), and Fuel cell (FC). The needed load demand of the grid connected MG system is continuously measured by SBLA method. Perfect combination of MG is increased via CGO along forecasted load demand circumstance. Moreover, the renewable energy (RE) predicting errors are assessed twice by micro grid EM to diminish the control. Several renewable energy source (RES) are considered by MG scheduling process to reduce the cost of electricity utilizing first method. The second method consists of balancing the power flow (PF) and reducing the effects of forecast errors according to rule given as programmed power reference. The major purpose of proposed method is assessed through the incorporation of FC, variation of hourly power of electrical network, cost of operation through preservation of system of microgrid linked to the network. According to RES, the power requirement and SOC of storage elements are the conditions. Batteries are

List of Symbols and Abbreviations: η_{PV}, efficiency of comparative units of PV; p_{PV}, PV array of output power; p_{MPV}, under standard condition the rated power of PV; n, maximum size of PV panels; gt, faculty of global irradiance of tilted plane; p_{WG}, optimum unit of wind power; v_{Rated}, v_{cut} and v_{Ci}, rated wind speed, minimal wind speed, cut out and cut in wind speed; η_{Charge}, efficiency of battery charging; $e_{\text{RES}}(T)$, the overall energy produced; e_{Load}, overall provided energy; c_{PV}, c_{WT}, c_{FC}, annualized cost of system is expressed as c, the annual cost of the PV, WT and FC; c_{GS}, c_{GP}, overall cost of electricity; C_{wt}, unit cost of the WTs; A_{wt}, wind turbine generator blades swept area; C_{Mnt-wt}, each WT annual maintenance cost; C_{wt}, sum of the WT installation fee and the WT price; C_{Mnt-FC}, FC annual maintenance cost; C_{HM-FC}, hourly maintenance cost of FC; N_{Bt}, number of batteries; C_{Mnt-Bt}, annual maintenance cost of battery; ACO, Ant Colony Optimization; ANFIS, adaptive neuro fuzzy inference system; BESS, Battery Energy Storage System; BFA, Bacteria Foraging Algorithm; BS, Battery Storage; CGO, Chaos Game Optimization; DER, Distributed energy resource; DR, demand response; EDE, Enhanced Differential Evolution; EM, energy management; FC, Fuel cell; GA, Genetic Algorithm; GSA, Gravitational Search Algorithm; GWO, Grey Wolf Optimization; HSA, Harmony Search Algorithm; j, rate of interest; LC, line capacity; LF, Load Forecasting; MG, micro grid; MGA, microgrid aggregator; n, life of the system; Ni-MH, nickel-metal-hydride; PF, power flow; PI, proportional-integral; PSO, Particle Swarm Optimization; PV, Photo-Voltaic; RE, renewable energy; RES, renewable energy source; SBLA, Side-Blotched Lizard Algorithm; SOFC, solid oxide fuel cell; UC, unit commitment; WT, Wind Turbine.

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Fuzzy Logic Control for Solar PV Fed Modular Multilevel Inverter Towards Marine Water Pumping Applications

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ABSTRACT This paper presents the design and implementation of Modular Multilevel Inverter (MMI) to control the Induction Motor (IM) drive using intelligent techniques towards marine water pumping applications. The proposed inverter is of eleven levels and has the ability to control the speed of an IM drive which is fed from solar photovoltaics. It is estimated that the energy consumed by pumping schemes in an onboard ship is nearly 50% of the total energy. Considering this fact, this paper investigates and validates the proposed control design with reduced complexity intended for marine water pumping system employing an induction motor (IM) drive and MMI. The analysis of inverter is carried out with Proportional-Integral (PI) and Fuzzy Logic (FL) based controllers for improving the performance. A comparative analysis has been made with respect to better robustness in terms of peak overshoot, settling time of the controller and Total Harmonic Distortion (THD) of the inverter. Simulations are undertaken in MATLAB/Simulink and the detailed experimental implementation is conducted with Field Programmable Gate Array (FPGA). The results thus obtained are utilized to analyze the controller performance, improved inverter output voltage, reliable induction motor speed control and power quality improvement by reduction of harmonics. The novelty of the proposed control scheme is the design and integration of MMI, IM drive and intelligent controller exclusively for marine water pumping applications.

INDEX TERMS Field programmable gate array, fuzzy logic controller, induction motor drive, modular multilevel inverter, proportional-integral, total harmonic distortion.

I. INTRODUCTION

In worldwide, considerable efforts been taken by the maritime and shipping industries to deteriorate the level of atmospheric emissions and energy consumption. The deterrence of pollution in the marine environment and accidental causes are strictly followed by certain rules which are framed by International Convention for the Prevention of Pollution from Ships organization (MARPOL) [1], [2]. Due to climate change and global greenhouse gas emissions, the shipping contribute about 3% of global CO_2 emissions from diesel engines involved in marine sectors [3].

The marine shipping diesel engines emits 2.8% of Carbon dioxide (CO_2), 15% of Nitrogen Oxides (NO_X), 13% of

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A Non-Isolated High-Gain DC to DC Converter Connected Multi-level Inverter for Photo-Voltaic Energy Sources

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The high-gain DC to DC Converter widely used in industrial and power system applications. In particular, the non-isolated converters are highly prepared due to their size and cost. The application such as photo-voltaic (PV) and wind power system, the combination of non-isolated converter and inverter are used. These converters are selected for the specific applications depend on the circuit complexity, reliability and cost. With respect to PV applications, the simple boost wider range voltage gain DC to DC converter is better choice to meet the DC-link voltage of the PV inverters. Comparing with conventional inverters, multi-level inverters (MLIs) are the worthy option, as it has a superiority to suppress the voltage and current harmonics. Even though the reduced switch MLIs are well-established for medium voltage PV system, still the challenges beside to improve voltage harmonic, voltage enhancement, increasing the inverter efficiency etc. Hence, in this paper proposes the PV Power system with single switch non-isolated high-gain DC to DC converter and reduced switch seven-level MLI inverter. The proposed converter is developed with the mixtures of boost and cuk converter; hence it has wider range of control with good efficiency. The experimental study of 400W PV system is established. The experimental results are conformed the theoretical investigation.

Keywords: DC - DC Converter, Multilevel Inverter, PV Powered power converter, Integrated DC – DC Converter

http://dx.doi.org/10.6180/jase.202106_24(3).0017

1. Introduction

The photo-voltaic (PV) power structure, power electronics converters role is unavoidable to converter electrical power DC-DC-AC. There are varieties of converter (DC to DC) and inverter (DC to AC) is recommended by the researchers including with basic boost converter and conventional two-level inverter [1]. Usually, the energy conversion from the photo-voltaic system is implicit to be in a close-fitting area of the maximum power point (MMP) in the PV voltage-current characteristic due to the maximum power point tracking (MPPT). Therefore, this is a significant point to be well-thought-out in the identification of the PV equivalent parameters of a typical model for the voltage- current characteristic. Several of methods of MPPT method are used in several applications. Subjected to the PV converters and its applications, different aspects are considered to enhancing the PV power [2, 3]. In additional more accurate MPPTs techniques and more sensors are essentials. Generally, in PV to measure the voltage sensing is easier than current. The temperature sensors or irradiance sensors are very expensive and unusual.

The MPPTs techniques might be dependent (indirect) or independent (direct) on PV array parameters. In the direct measurement methods uses the voltage and/or current

REVOLT

14.09.2020

To

HoD
Department of Electrical and Electronics Engineering,
Kongu Engineering College,
Perundurai,
Erode.

Respected Sir,

Sub: - Internship offer letter

Below listed students from your department are selected to do internship with our company. So, we request you to provide them with on duty as per the need till December 2020. Also, we intended to use your lab equipment for development of our new product during the same time.

Revanth M(17EER078) 1

Sanjeevkumar K(17EER084) 2

Sinduja B(17EER093) 3

Subiksha S(17EER099) 4

Regards

N. Naveen kumar

Naveen Kumar

Director at Revoltaxe India Private Ltd.,

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Regards

N. Naveen kumar

Naveen Kumar

Director at Revoltaxe India Private Ltd.,

WIZAARD SYSTEM

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www.wizaardsystems.in

CERTIFICATE

This is to certify that **Mr. DINESHKUMAR S D** (Reg No.17EER016) pursuing final year, B.E Electrical & Electronics Engineering at Kongu Engineering college has undergone an internship programme for a period of 20 days (02.03.2021 to 23.03.2021) at **WIZAARD SYSTEM**, Coimbatore.

During this programme, he has gained knowledge in Embedded Systems, PCB Designing and received hands on experience in Assembling and Quality Control.

During the above period he had a sincere attitude and took keen interest in learning. His character and attendance can be certified as **GOOD**.

R.S. Venkatachalam

R.S.Venkatachalam B.E, M.S.,
Managing Director.
Wizaard System.

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Office : +91 40 4918 0000
Fax : +91 40 4017 2017
CIN : U23203TG2006FTC051142

Date: 4th January 2021

To,

Mr. S MUKESH
22/2, Minna Kadu,
Ingur Road, Chennimalai,
Tamil Nadu - 638051,

Dear Mr. S MUKESH,

Sub: Offer for the post of " Operator"

With reference to the interview you had with us on 24th December 2020, for the post of " Operator," We are pleased to offer you an appointment in our organisation, on the following terms & conditions.

A) SALARY & OTHER ALLOWANCES

1) You shall be paid a Salary of Rs. 20000/- (Rupees Twenty Thousand and Paise Zero Only) per month, which is subjected to statutory deductions viz., PF/Professional Tax etc. The salary is inclusive of food, conveyance, Medical (other than group medical) and Accommodation hence no other separate allowance will be provided.A Detailed breakup of the CTC allowance is given in Annexure 1, attached to this.

2) In addition to the above salary, you are also eligible for the Group Personal Accident Policy and Mediclaim Policy, as per the rules of the Company.

B) Terms of Offer:

1) Place of Posting:
At present you will be positioned at " South Region " However, you may be transferred anywhere in India depending upon the requirement of the job.

2) Probation:
Your Probation Period with the Company shall be for One Year, from the date of your joining the duties of our company. On successful completion of your probation period to the satisfaction of management, your services in the company will be confirmed & you will be eligible for any other allowances.

3) Date Of Joining:
You shall join the company latest by Immediately.

4) Fitness:
Appointment and continuation of your service is subject to your being found and remaining Medically (physically and mentally) fit. Also note that the Management is engaged in the O & M of LPG and it will be your responsibility to take necessary safeguards for your safety. The Management will not be responsible for any accident due to negligence. You are also asked to submit Medical fitness certificate at the time of joining.

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GST No. 33AAHCS3288E1ZC | CIN No. U27104TZ2003PTC010573

11-04-2021

To whomever it may concern

Mr. B.BHUVANESHWARAN (17EER008) studying B.E in Electrical and Electronics Engineering final year in KONGU ENGINEERING COLLEGE as gone under Internship during 26-03-2021 to 10-04-2021 in our company, during training period his Conduct was found good.

We wish him success in his all endeavors.

For

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S.Logasai

Corporate Off. : No.99, Sankari Main Road, Salem - 636 002.

Phone : 2270235 to 2270237 Fax : 0427-2274000

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GST No. 33AAHCS3288E1ZC | CIN No. U27104TZ2003PTC010573

11-04-2021

To whomever it may concern

Mr.K.KAMALEESHWARAN (17EER027) studying B.E in Electrical and Electronics Engineering final year in KONGU ENGINEERING COLLEGE as gone under Internship during 26-03-2021 to 10-04-2021 in our company, during training period his Conduct was found good.

We wish him success in his all endeavors.

For

SREE RENGARAJ ISPAT INDUSTRIES (P) LTD

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Rengaraaj TMT 500

Ph : (04294) 234241, 234245 Fax : 04294-234242 Cell : 98424-55491

GST No. 33AAHCS3288E1ZC | CIN No. U27104TZ2003PTC010573

11-04-2021

To whomever it may concern

Mr. **V.KARTHIKEYAN** (17EER032) studying **B.E** in **Electrical and Electronics Engineering** final year in **KONGU ENGINEERING COLLEGE** as gone under Internship during 26-03-2021 to 10-04-2021 in our company, during training period his Conduct was found good.

We wish him success in his all endeavors.

For

SREE RENGARAJ ISPAT INDUSTRIES (P) LTD

S.Logasai

Corporate Off. : No.99, Sankari Main Road, Salem - 636 002.

Phone : 2270235 to 2270237 Fax : 0427-2274000

Email : sripl05@yahoo.co.in

SREE RENGARAJ ISPAT INDUSTRIES (P) LTD

Groups

Plot No. MM 1, 2 & 5

SIPCOT INDUSTRIAL GROWTH CENTRE, PERUNDURAI - 638 052. ERODE Dt.

Rengaraaj

Ph : (04294) 234241, 234245 Fax : 04294-234242 Cell : 98424-55491

GST No 33AAHCS3288E1ZC | CIN No. U27104TZ2003PTC010573

11-04-2021

To whomever it may concern

Mr.S.KAVIYARASU (17EER036) studying B.E in Electrical and Electronics Engineering final year in KONGU ENGINEERING COLLEGE as gone under Internship during 26-03-2021 to 10-04-2021 in our company, during training period his Conduct was found good.

We wish him success in his all endeavors.

For

SREE RENGARAJ ISPAT INDUSTRIES (P) LTD

S.Logasai

Corporate Off. : No.99, Sankari Main Road, Salem - 636 002.

Phone : 2270235 to 2270237 Fax : 0427-2274000

Email : sripl05@yahoo.co.in

SREE RENGARAJ ISPAT INDUSTRIES (P) LTD
Plot No. MM 1, 2 & 5
SIPCOT INDUSTRIAL GROWTH CENTRE PT RUNDURAI - 638 052 ERODE DI
Ph: 04294-231241 234245 Fax: 04294 234242 Cell: 98424 66491
Rengaraaj

11-04-2021

To whomever it may concern

Mr. T.OMPRAKASH (17EEL127) studying B.E in Electrical and Electronics Engineering final year in KONGU ENGINEERING COLLEGE as gone under Internship during 26-03-2021 to 10-04-2021 in our company, during training period his Conduct was found good.

We wish him success in his all endeavors.

For

SREE RENGARAJ ISPAT INDUSTRIES (P) LTD

S.Logasai

Corporate Off. : No.99, Sankari Main Road, Salem - 636 002.
Phone : 2270235 to 2270237 Fax : 0427-2274000
Email : sripl05@yahoo.co.in

Cognizant

03-Mar-2021
Bharanidharan K L
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Bharanidharan,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.
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You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.
The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.
Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.
Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
- There would be zero tolerance to plagiarisms and misconduct during the internship.
- You would be required to ensure timely completion and submission of assignments, project work and preparation required prior to the sessions.
- You may be required, to travel to other locations within India if there is a business need as per your internship plan
- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.
You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa

Cognizant

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.
We wish you good luck.
Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

S. Bethavandu

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: **Date:**

Letter of intent - Trainee VLSI - Test and Verification Solutions [a subsidiary of Tessolve Semiconductor]

1 message

Sivakumar Krishnamoorthy <sivakumar.krishnamoorthy@tessolve.com> Mon, 14 Sep, 2020 at 4:45 pm
To: deepankumar2602@gmail.com <deepankumar2602@gmail.com>
Cc: HOD_Electronics and Comm. Engineering <hod_ece@kongu.ac.in>, Placement <placement@kongu.ac.in>, Dr.G.Murugesan <gmece@kongu.ac.in>, Karthik Nagappan <karthik.nagappan@tessolve.com>, Sumathi Kota <sumathi.kota@tessolve.com>

Dear DEEPAN KUMAR S,

Sub: Provisional Offer – Trainee – VLSI

We are pleased to inform you that you have been Selected by Test and Verification solutions [A SUBSIDIARY OF TESSOLVE SEMICONDUCTOR] as a "Trainee- VLSI" for our VLSI Program. It will be guided by T&VS and run by Kongu Engineering College, after your Completion of ME VLSI Design program without any arrears, you will automatically secure your employment with T&VS starting from 1st June 2023 onwards. On Successful Completion of the Training Program your performance will be promoted to "Engineer" for which the compensation benefits are

- **Full Time Employment with Gross salary details are :**
    - **INR 25,000 / Month + Health Insurance Benefits [From 1-June-2023 to Customer Project Start Date]**
    - **INR 420000 / Year + Health Insurance Benefits [From Customer Project Start Date in 1st Year] Including COE Training Cost Reimbursement**
    - **INR 5,40000 / Year + Health Insurance Benefits (2nd Year)**
    - **INR 7,80000 / Year + Health Insurance Benefits (3rd Year)**
    - **INR 10,20,000 / Year + Health Insurance Benefits (4th Year)**
- Your "Training Program" with T&VS will start on **05-07-2021**
- You will be trained and be given opportunities to work on cutting edge technologies.
- At the end of the training Period you will be absorbed as full-time employee and be paid the above full-time employment benefits and your work location will be one among the following Locations
    - Chennai
    - Bangalore
    - Hyderabad
    - Noida

Each year pay will be communicated as per the above T&C's to you after Appraisal on Annual Performance. You will be requested to sign a Mutual agreement with us till 31st May 2027 .

If you have any questions, please contact at +91 8147758189 or by email:
sumathi.k@testandverification.com

Thank you.

Regards

Cognizant

03-Mar-2021
Gobikrishnan T
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Gobikrishnan,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.
Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.
You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.
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Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.
Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
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At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.
You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa

Cognizant

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.
We wish you good luck.
Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: **Date:**

Cognizant

03-Mar-2021
Logeshwaran D
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Logeshwaran,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
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Please do not hesitate to call us for any information you may need.
We wish you good luck.
Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: **Date:**

Cognizant

03-Mar-2021
Narenthiran K M
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Narenthiran,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
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Please do not hesitate to call us for any information you may need.
We wish you good luck.
Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Date:

Signature:

Freedom Bio Pharma Pvt., Ltd.,

CIN: U33110TN2012PTC083883

INTERNSHIP CALL LETTER

MR.PRASANTH S

Designation: Electrical Maintenance -Bio Pharma

Employee ID: 1054

Dear S.Prasanth your internship has been approved and scheduled in Freedom Bio Pharma Pvt., Ltd., from 22.02.2021 to 22.05.2021.The candidate is requested to attend the internship and learn the work process.

The candidate reporting time morning 9am to evening 6pm .For the internship period of three months candidate will get Rs.7000/ per month (*The candidate will have to repay the total stipend amount, , if they fail to complete the internship period completely and fail to join the company as an employee after 3 months of internship period).

The candidate is requested to bring this call letter while reporting at Freedom Bio Pharma Pvt Ltd.

Thank you

Please do not hesitate to call us for any information you may need. We wish you good luck.

I accept the terms and conditions of the offer as mentioned above.

Signature: Date:

Authorized signature,

For Freedom Bio Pharma Pvt., Ltd.,

Plot No. 21, Phase 1, SIPCOT Industrial Complex, SIPCOT, HOSUR, Krishnagiri Dt., Tamil Nadu, Pin # 635126, INDIA.
Tel: +91-4344-277062, email: info@freedombiopharma.com, TIN No: 33263325351, CST No. 1111944 / 28-04-2012.
GST NO 33AABCF8794L1Z3

Cognizant

03-Mar-2021
Priya V
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Priya,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
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Please do not hesitate to call us for any information you may need.
We wish you good luck.
Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature:

Date:

Cognizant

03-Mar-2021
Robin G
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Robin,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
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We wish you good luck.
Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: **Date:**

Cognizant

03-Mar-2021
Suganeshwaran S
B.Tech/B.E. Electronics and Electrical Engineering
Kongu Engineering College ,Erode

Dear Suganeshwaran,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.
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Yours sincerely,
For **Cognizant Technology Solutions India Pvt. Ltd.,**

Suresh Bethavandu
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: **Date:**

CERTIFICATE

of Completion

UNIVERSITI TEKNOLOGI PETRONAS

This is to certify that

AARTHI .V

from

KONGU ENGINEERING COLLEGE, INDIA

has successfully completed

Virtual Research Attachment Program

from 20 January 2021 to 19 March 2021

at

Universiti Teknologi PETRONAS

Topic:

Flow Monitoring In Drip Irrigation Using Arduino

Dr. Mohd Fahmizan Bin Romlie
Supervisor
Electrical & Electronic Engineering
Universiti Teknologi PETRONAS

Assoc. Prof. Dr. Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Teknologi PETRONAS

CERTIFICATE
of Completion

UNIVERSITI TEKNOLOGI PETRONAS

This is to certify that

DEVASENA .S .M

from

KONGU ENGINEERING COLLEGE, INDIA

has successfully completed

Virtual Research Attachment Program

from 20 January 2021 to 19 March 2021
at
Universiti Teknologi PETRONAS
Topic:
Post Tsunami Cleaning Mechanism

Dr. Illani Bt Mohd Nawi
Supervisor
Electrical & Electronic Engineering
Universiti Tekndogi PETRONAS

Assoc. Prof. Dr. Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Tekndogi PETRONAS

UNIVERSITI
TEKNOLOGI
PETRONAS

CERTIFICATE
of Completion

This is to certify that

R. LALITHA

from

KONGU ENGINEERING COLLEGE, INDIA

has successfully completed

Virtual Research Attachment Program

from 20 January 2021 to 19 March 2021
at
Universiti Teknologi PETRONAS
Topic:

Analysis of Hybrid Energy Harvesting for Smart Home Applications

Radzi

Dr. Mohamad Radzi Bin Ahmad
Supervisor
Electrical & Electronic Engineering
Universiti Tekndogi PETRONAS

Assoc. Prof. Dr. Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Tekndogi PETRONAS

UNIVERSITI
TEKNOLOGI
PETRONAS

Name: **Predeep B**
Institution: **Kongu Engineering College, India**

Ref. : UTP/CSD/SMO/VRAP/KEC/43/2021
Date : 15th January 2021

Dear student,

OFFER LETTER: UTP VIRTUAL RESEARCH ATTACHMENT PROGRAMME (VRAP)

We are pleased to inform that your application to participate in Universiti Teknologi PETRONAS Virtual Research Attachment Programme has been accepted.

Details of program are as follow:

Name of Supervisor	:	**AP Dr Fawnizu Azmadi Bin Hussin**
Topic	:	**Comparative Analysis of Post-Quantum Cryptographic Algorithms**
Course	:	**Electrical & Electronics Engineering**
Duration	:	**20 January 2021 – 19 March 2021**

This offer is subject to the following conditions:

1. **Rules and work expectations.**
   - 1.1 While working remotely, students must adhere to all the terms and conditions.
   - 1.2 Student may be eligible to work if their duties can be met through basic hardware and software agreed with Supervisor, they have proven to be trustworthy, disciplined, and self-motivated, and have been given permission by the institution.
   - 1.3 Students must follow the work schedules provided to them, be sure to meet deadlines, uphold high-quality standards, and submit the requested reports.
   - 1.4 Flexibility is allowed, but the students must agree to work set hours as much as possible, five days a week. Performance and progress will be measured weekly.
   - 1.5 Tools will be made available by Supervisor to students for managing time and tasks, communicating, logging, and tracking projects, and accessing resources.

2. **Communication.**
   - 2.1 Students are to be online and accessible during agreed time set by Supervisor.
   - 2.2 Any correspondence must be answered as per requested and tools for communicating with team on projects shall be decided earlier with Supervisor.
   - 2.3 Meetings shall be scheduled for at least once a week. Times are to be discussed and agreed upon between the Supervisor and student.

3. **Insurance and liability.**
   3.1 Students are advised to choose a safe and secure location to work from, and to maintain high levels of safety.
   3.2 UTP is not liable for injuries suffered in the pre-defined workspace during work hours.

4. **Intellectual Property Right**
   4.1 UTP asserts and claims the right, title and/or interest to all Intellectual Property created by Students during VRAP as detailed out in **UTP Intellectual Property and Commercialisation Policy.**

5. **Security and confidentiality.**
   5.1 Upon start, securing data and research information should be students' utmost concern. Any breaches in security protocol will lead to strict and swift disciplinary action.
   5.2 Information and documents furnished to UTP must be true and correct.
   5.3 Students shall not disclose, divulge, and make public, for whatever purpose or reason any information received from UTP, without specific written permission from UTP. "Confidential Information" shall mean any and all information, data, design, memoranda, models, prototypes, and/or other material whether of scientific, technical, commercial, financial or other nature, furnished to or obtained by the students from UTP, in written, oral or other tangible form clearly marked or designated as "Confidential" or orally or visually obtained during VRAP.

6. **Cancellation of Offer**
   6.1 UTP reserves the rights to withdraw the offer in the event:
      a. Any information/document(s) furnished to UTP was found to be untrue.
      b. Student fail to meet programme requirements, terms, and conditions.

This offer is made subject to you being given approval by your Institution and been accepted by UTP researchers to supervise you with the agreed topic.

Please confirm your acceptance by fill in the online acceptance form provided in your email by **22nd January 2021**. If we do not receive reply from you by then, this offer will be automatically considered void.

Thank you.

Yours sincerely,

Assoc Prof Dr Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Teknologi PETRONAS

UNIVERSITI TEKNOLOGI PETRONAS

Name: **Preethi M**
Institution: **Kongu Engineering College, India**

Ref. : UTP/CSD/SMO/VRAP/KEC/68/2021
Date : 15th January 2021

Dear student,

OFFER LETTER: UTP VIRTUAL RESEARCH ATTACHMENT PROGRAMME (VRAP)

We are pleased to inform that your application to participate in Universiti Teknologi PETRONAS Virtual Research Attachment Programme has been accepted.

Details of program are as follow:

Name of Supervisor	:	**Dr Mohamad Radzi Bin Ahmad**
Topic	:	**State of charge Circuit Analysis for Battery Management System**
Course	:	**Electrical & Electronics Engineering**
Duration	:	**20 January 2021 – 19 March 2021**

This offer is subject to the following conditions:

1. **Rules and work expectations.**
   - 1.1 While working remotely, students must adhere to all the terms and conditions.
   - 1.2 Student may be eligible to work if their duties can be met through basic hardware and software agreed with Supervisor, they have proven to be trustworthy, disciplined, and self-motivated, and have been given permission by the institution.
   - 1.3 Students must follow the work schedules provided to them, be sure to meet deadlines, uphold high-quality standards, and submit the requested reports.
   - 1.4 Flexibility is allowed, but the students must agree to work set hours as much as possible, five days a week. Performance and progress will be measured weekly.
   - 1.5 Tools will be made available by Supervisor to students for managing time and tasks, communicating, logging, and tracking projects, and accessing resources.

2. **Communication.**
   - 2.1 Students are to be online and accessible during agreed time set by Supervisor.
   - 2.2 Any correspondence must be answered as per requested and tools for communicating with team on projects shall be decided earlier with Supervisor.
   - 2.3 Meetings shall be scheduled for at least once a week. Times are to be discussed and agreed upon between the Supervisor and student.

3. **Insurance and liability.**
   3.1 Students are advised to choose a safe and secure location to work from, and to maintain high levels of safety.
   3.2 UTP is not liable for injuries suffered in the pre-defined workspace during work hours.

4. **Intellectual Property Right**
   4.1 UTP asserts and claims the right, title and/or interest to all Intellectual Property created by Students during VRAP as detailed out in **UTP Intellectual Property and Commercialisation Policy**.

5. **Security and confidentiality.**
   5.1 Upon start, securing data and research information should be students' utmost concern. Any breaches in security protocol will lead to strict and swift disciplinary action.
   5.2 Information and documents furnished to UTP must be true and correct.
   5.3 Students shall not disclose, divulge, and make public, for whatever purpose or reason any information received from UTP, without specific written permission from UTP. "Confidential Information" shall mean any and all information, data, design, memoranda, models, prototypes, and/or other material whether of scientific, technical, commercial, financial or other nature, furnished to or obtained by the students from UTP, in written, oral or other tangible form clearly marked or designated as "Confidential" or orally or visually obtained during VRAP.

6. **Cancellation of Offer**
   6.1 UTP reserves the rights to withdraw the offer in the event:
      a. Any information/document(s) furnished to UTP was found to be untrue.
      b. Student fail to meet programme requirements, terms, and conditions.

This offer is made subject to you being given approval by your Institution and been accepted by UTP researchers to supervise you with the agreed topic.

Please confirm your acceptance by fill in the online acceptance form provided in your email by **22nd January 2021**. If we do not receive reply from you by then, this offer will be automatically considered void.

Thank you.

Yours sincerely,

Assoc Prof Dr Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Teknologi PETRONAS

UNIVERSITI
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PETRONAS

Name: **Priya .V**
Institution: **Kongu Engineering College, India**

Ref. : UTP/CSD/SMO/VRAP/KEC/41/2021
Date : 15th January 2021

Dear student,

OFFER LETTER: UTP VIRTUAL RESEARCH ATTACHMENT PROGRAMME (VRAP)

We are pleased to inform that your application to participate in Universiti Teknologi PETRONAS Virtual Research Attachment Programme has been accepted.

Details of program are as follow:

Name of Supervisor	:	**AP Dr Mohd Haris Bin Md Khir**
Topic	:	**Development of 2 Axis MEMS Micro Actuator**
Course	:	**Electrical & Electronics Engineering**
Duration	:	**20 January 2021 – 19 March 2021**

This offer is subject to the following conditions:

1. **Rules and work expectations.**
   - 1.1 While working remotely, students must adhere to all the terms and conditions.
   - 1.2 Student may be eligible to work if their duties can be met through basic hardware and software agreed with Supervisor, they have proven to be trustworthy, disciplined, and self-motivated, and have been given permission by the institution.
   - 1.3 Students must follow the work schedules provided to them, be sure to meet deadlines, uphold high-quality standards, and submit the requested reports.
   - 1.4 Flexibility is allowed, but the students must agree to work set hours as much as possible, five days a week. Performance and progress will be measured weekly.
   - 1.5 Tools will be made available by Supervisor to students for managing time and tasks, communicating, logging, and tracking projects, and accessing resources.

2. **Communication.**
   - 2.1 Students are to be online and accessible during agreed time set by Supervisor.
   - 2.2 Any correspondence must be answered as per requested and tools for communicating with team on projects shall be decided earlier with Supervisor.
   - 2.3 Meetings shall be scheduled for at least once a week. Times are to be discussed and agreed upon between the Supervisor and student.

3. **Insurance and liability.**
   3.1 Students are advised to choose a safe and secure location to work from, and to maintain high levels of safety.
   3.2 UTP is not liable for injuries suffered in the pre-defined workspace during work hours.

4. **Intellectual Property Right**
   4.1 UTP asserts and claims the right, title and/or interest to all Intellectual Property created by Students during VRAP as detailed out in **UTP Intellectual Property and Commercialisation Policy**.

5. **Security and confidentiality.**
   5.1 Upon start, securing data and research information should be students' utmost concern. Any breaches in security protocol will lead to strict and swift disciplinary action.
   5.2 Information and documents furnished to UTP must be true and correct.
   5.3 Students shall not disclose, divulge, and make public, for whatever purpose or reason any information received from UTP, without specific written permission from UTP. "Confidential Information" shall mean any and all information, data, design, memoranda, models, prototypes, and/or other material whether of scientific, technical, commercial, financial or other nature, furnished to or obtained by the students from UTP, in written, oral or other tangible form clearly marked or designated as "Confidential" or orally or visually obtained during VRAP.

6. **Cancellation of Offer**
   6.1 UTP reserves the rights to withdraw the offer in the event:
      a. Any information/document(s) furnished to UTP was found to be untrue.
      b. Student fail to meet programme requirements, terms, and conditions.

This offer is made subject to you being given approval by your Institution and been accepted by UTP researchers to supervise you with the agreed topic.

Please confirm your acceptance by fill in the online acceptance form provided in your email by **22nd January 2021**. If we do not receive reply from you by then, this offer will be automatically considered void.

Thank you.

Yours sincerely,

Assoc Prof Dr Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Teknologi PETRONAS

KONGU ENGINEERING COLLEGE

SUGANESHWARAN S 17EER101 <suganeshwarans.17eee@kongu.edu>

(no subject)

2 messages

SUGANESHWARAN S 17EER101 <suganeshwarans.17eee@kongu.edu>
To: "M Khairul Anam B Che Mat (SAA/UTP)" <khairulanam.chemat@utp.edu.my> Fri, Jan 22, 2021 at 1:10 PM

KONGU ENGINEERING COLLEGE

SUGANESHWARAN S 17EER101 <suganeshwarans.17eee@kongu.edu>

UTP-VRAP Offer Letter : Kongu Engineering College, India - January 2021 Intake

M Khairul Anam B Che Mat (SAA/UTP) <khairulanam.chemat@utp.edu.my>
To: "suganeshwarans.17eee@kongu.edu" <suganeshwarans.17eee@kongu.edu>
Cc: "Noor Iffah Bt Mehat (SAA/UTP)" <iffah.mehat@utp.edu.my> Tue, Jan 19, 2021 at 11:23 PM

Greetings from UTP Student Mobility Office

Dear Suganeshwaran,

We are pleased to inform that your application to participate in Universiti Teknologi PETRONAS Virtual Research Attachment Programme has been accepted.

Attached is your offer letter. Please confirm your acceptance by filling in this online Acceptance Form and reply to this email by providing below documents:

1. Nomination Letter from your institution
2. Photo

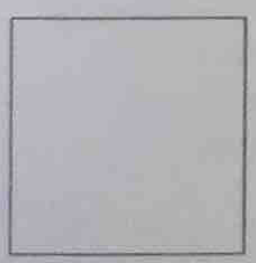
Please respond to all requirement before 22nd January 2021. Should you have any inquiries, feel free to contact us. If we do not receive any reply from you, this offer will be automatically considered void.

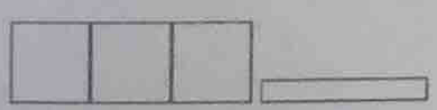
#StaySafe #StayHealthy
#FightAgainstCOVID-19

Thanks & Regards,

MOHAMMAD KHAIRUL ANAM BIN CHE MAT
Student Mobility Office (SMO)
Centre for Student Development (CSD)
UNIVERSITI TEKNOLOGI PETRONAS (UTP)
32610 Bandar Seri Iskandar, Perak, MALAYSIA

Direct Line : +605 – 3688398
Fax : +605 – 3688386
Email : khairulanam.chemat@utp.edu.my





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UTP-VRAP Offer Letter Suganeshwaran S.pdf
165K View as HTML Download

7 attachments

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5K

Outlook-ihd4w2l1.png
192K

Outlook-1hgckff4.png
4K

Outlook-v4box5xw.png
3K

Outlook-tqi2jz3l.png
3K

UTPOFFICIAL **Outlook-305nfi03.png**
3K

Nomination.pdf
1604K

SUGANESHWARAN S 17EER101 <suganeshwarans.17eee@kongu.edu> Fri, Jan 22, 2021 at 1:14 P
To: "M Khairul Anam B Che Mat (SAA/UTP)" <khairulanam.chemat@utp.edu.my>

This is the attachments for the Internship I would like change my mail ID from suganeshwarans.17eee@kongu.edu to sugs797@gmail.com , I also sent the mail from my personal email id to You , Contact me with that mail id . Thank you
[Quoted text hidden]

2 attachments

Suganeshwaran.S_EEE.jpg.jpg
5K

UNIVERSITI
TEKNOLOGI
PETRONAS

Name: **Vinodh S. R**
Institution: **Kongu Engineering College, India**

Ref. : UTP/CSD/SMO/VRAP/KEC/51/2021
Date : 15th January 2021

Dear student,

OFFER LETTER: UTP VIRTUAL RESEARCH ATTACHMENT PROGRAMME (VRAP)

We are pleased to inform that your application to participate in Universiti Teknologi PETRONAS Virtual Research Attachment Programme has been accepted.

Details of program are as follow:

Name of Supervisor	:	**AP Ir Dr Nursyarizal Bin Mohd Nor**
Topic	:	**Augmented Reality (AR) Virtual Electrical Machine Experiment**
Course	:	**Electrical & Electronics Engineering**
Duration	:	**20 January 2021 – 19 March 2021**

This offer is subject to the following conditions:

1. **Rules and work expectations.**
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Please confirm your acceptance by fill in the online acceptance form provided in your email by **22nd January 2021**. If we do not receive reply from you by then, this offer will be automatically considered void.

Thank you.

Yours sincerely,

Assoc Prof Dr Nurlidia Bt Mansor
Senior Director
Centre for Student Development
Universiti Teknologi PETRONAS

REVOLT

11th November 2021

To
HoD
Department of Electrical and Electronics Engineering,
Kongu Engineering College,
Perundurai,
Erode

Respected Sir,

Sub: Internship offer letter

Below listed students from your department are selected to do internship with our company. So, we request you to provide them with on duty as per the need till December 2022. Also, we intended to use your lab equipment for development of our new product during the same time.

N.S.KAVIN (19EER043)
SHIBI S P (19EER086)
PRASANNA V (19EER066)

Thanking You.

Regards

Naveen Kumar

Director at Revoltaxe India Private Ltd.,

REVOLT

11th November 2021

To
HoD
Department of Electrical and Electronics Engineering,
Kongu Engineering College,
Perundurai,
Erode

Respected Sir,

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N.S.KAVIN (19EER043)
SHIBI S P (19EER086)
PRASANNA V (19EER066)

Thanking You.

Regards

Naveen Kumar

Director at Revoltaxe India Private Ltd.,

REVOLT

11th November 2021

To
HoD
Department of Electrical and Electronics Engineering,
Kongu Engineering College,
Perundurai,
Erode

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N.S.KAVIN (19EER043)
SHIBI S P (19EER086)
PRASANNA V (19EER066)

Thanking You.

Regards

Naveen Kumar

Director at Revoltaxe India Private Ltd.,

vuram

Services, Redefined.

Registered Office
185, Third Main Road, Natesa Nagar
Virugambakkam Chennai 600 092 TN India
+91 44 4910 2200
CIN U72900TN2010PTC077255

September 28, 2021

Dear Manivannan G,

Welcome to the Vuram family!

We have the pleasure of offering you a job at Vuram as a **"Associate Technical Consultant"**. We at Vuram are keen on providing an excellent environment for work, a great learning environment, a friendly workplace, an organization driven by its values and principles. We work together to deliver the highest quality service to our customers. We hope that you will have a rewarding, successful and enjoyable time working with us.

Please find enclosed your detailed appointment letter. A copy of the same is to be signed and submitted by you on your date of joining. This offer is subject to providing all the required documents and agreeing to all the offer terms and conditions.

We look forward to you having a long and fruitful relationship with us.

Warm Regards,

R. Prabhavathi

Prabhavathi Macheri Shanker
Director, Vuram

vuram

Services, Redefined.

Registered Office
185, Third Main Road, Natesa Nagar
Virugambakkam Chennai 600 092 TN India
+91 44 4910 2200
CIN U72900TN2010PTC077255

September 28, 2021

Dear Sri Charan,

Welcome to the Vuram family!

We have the pleasure of offering you a job at Vuram as a **"Associate Technical Consultant"**. We at Vuram are keen on providing an excellent environment for work, a great learning environment, a friendly workplace, an organization driven by its values and principles. We work together to deliver the highest quality service to our customers. We hope that you will have a rewarding, successful and enjoyable time working with us.

Please find enclosed your detailed appointment letter. A copy of the same is to be signed and submitted by you on your date of joining. This offer is subject to providing all the required documents and agreeing to all the offer terms and conditions.

We look forward to you having a long and fruitful relationship with us.

Warm Regards,

R. Prabhavathi

Prabhavathi Macheri Shanker
Director, Vuram

Zoho Corporation Private Limited
Plot 140, 151, Estancia IT Park, Vallancheri,
Chengalpattu District, Tamilnadu, 603 202.
Ph: +91 - 44 - 6744 7070
www.zohocorp.com
SEZ Unit

Date: 24-Sep-2021

To

Mr.MEENATCHI SUNDARAM U,
93B, SUNDARA VINAYAGAR KOVIL STREET,
VALLIOOR, RADHAPURAM TALUK,
TIRUNELVELI-627117, TAMIL NADU.

Dear **Mr.MEENATCHI SUNDARAM U,**

OFFER OF EMPLOYMENT

We are pleased to offer you employment for the position **MEMBER TECHNICAL STAFF** with **ZOHO CORPORATION PRIVATE LIMITED.**

INTERNSHIP AND STIPEND

You are expected to do the final semester project of your curriculum in our organization. We expect you to work on the project on a full time basis for a period of 5-6 months. During this period you will be paid a monthly stipend of **Rs.15000/- (RUPEES FIFTEEN THOUSAND ONLY)**. The following offer is valid, subject to successful completion of your project.

(Note: The above may not apply to you if your college does not permit internships)

REMUNERATION

Your annual Cost to Company will be **Rs.480000/- (RUPEES FOUR LAKH EIGHTY THOUSAND ONLY)**. The break-up of your gross salary and information specific to bonus and gratuity are set out in Annexure A. Salary will be paid by the last day of each month. All additional benefits that Zoho currently provides employees are set out in Annexure B.

DATE OF JOINING

Your date of appointment is effective from your date of joining after successful completion of your curriculum.

PROBATION

You will be on probation, at a minimum, until completion of the performance review cycle that immediately follows completion of six months from your date of joining, provided that your performance is determined to be satisfactory. If your performance is not satisfactory, your probation may be extended until your performance is determined to be satisfactory. Upon completion of the probation period you will be confirmed on the rolls of the company.

SALARY REVISION

Revision to your compensation will be after one year from the date of joining, subject to satisfactory completion of the probation by you. Zoho operates a Pay-for-performance Policy and any salary revision will take your performance into account.

MAERSK

Dear Manikandan A,

Date: 21 May 2021

We are pleased to confirm your Internship with Maersk Global Service Centers (India) Pvt. Limited (hereinafter referred as "Company") on the following terms and conditions with effect from **31 May 2021** for a period of six months. Accordingly, your internship will come to an end on **30 November 2021**.

1. **Scope**: You will perform internship in **PMA** on **Daily team tasks,** and such other scope of work as intimated by the Company from time to time.

2. **Location:** Your location for Internship with the Company will be **Bangalore**.

3. **Intern Mentor:** An employee from **Manos Sochorakis's** team will act as your 'Mentor' during the tenure of your internship with the Company and will supervise all aspects of your internship. If for any reason, the assigned Mentor is unable to continue to serve as your Mentor, the Company shall appoint another person as the Mentor under whose aegis you shall continue your internship. Your assignment and schedule would be as per the discussions with your Mentor.

4. **Business hours:** Unless otherwise agreed upon, the working hours during your internship would be from 9:30 a.m. to 6:30 p.m. from Monday to Friday.

5. **Review meetings**: The Intern Mentor along with such other individuals as deemed appropriate by the Company may conduct periodic review meetings (as needed) with you to discuss on progress of various parameters agreed upon, assessment of milestones as well as any issues arising from your internship.

6. On completion of your internship you will be required to submit the project report (if applicable) to your Mentor and the HR team, basis which the Company will issue the internship completion certificate.

7. You will perform your assignments in an independent capacity, and nothing in this offer/ Agreement shall be construed to give you the power or authority to act for, bind, or commit on behalf of the Company in any way. Nothing herein shall be construed to create the relationship of partners, employer and employee, or principal and agent.

8. **Stipend**: In consideration of your performance during the internship, the Company agrees to pay a fixed sum of **INR 40,000** per month as Stipend with effect from the Effective Date, subject to deduction of applicable taxes. The above sum represents the entire compensation for your internship with the Company for the tenure agreed upon.

MAERSK

Dear Sakthi G,

Date: 17 May 2021

We are pleased to confirm your Internship with Maersk Global Service Centers (India) Pvt. Limited (hereinafter referred as "Company") on the following terms and conditions with effect from **31 May 2021** for a period of six months. Accordingly, your internship will come to an end on **30 November 2021**.

1. **Scope**: You will perform internship in **Athena** on **Developing codes,** and such other scope of work as intimated by the Company from time to time.

2. **Location:** Your location for Internship with the Company will be **Bangalore**.

3. **Intern Mentor:** An employee from **Lakshmi Sivakumar's** team will act as your 'Mentor' during the tenure of your internship with the Company and will supervise all aspects of your internship. If for any reason, the assigned Mentor is unable to continue to serve as your Mentor, the Company shall appoint another person as the Mentor under whose aegis you shall continue your internship. Your assignment and schedule would be as per the discussions with your Mentor.

4. **Business hours:** Unless otherwise agreed upon, the working hours during your internship would be from 9:30 a.m. to 6:30 p.m. from Monday to Friday.

5. **Review meetings**: The Intern Mentor along with such other individuals as deemed appropriate by the Company may conduct periodic review meetings (as needed) with you to discuss on progress of various parameters agreed upon, assessment of milestones as well as any issues arising from your internship.

6. On completion of your internship you will be required to submit the project report (if applicable) to your Mentor and the HR team, basis which the Company will issue the internship completion certificate.

7. You will perform your assignments in an independent capacity, and nothing in this offer/ Agreement shall be construed to give you the power or authority to act for, bind, or commit on behalf of the Company in any way. Nothing herein shall be construed to create the relationship of partners, employer and employee, or principal and agent.

8. **Stipend**: In consideration of your performance during the internship, the Company agrees to pay a fixed sum of **INR 40,000** per month as Stipend with effect from the Effective Date, subject to deduction of applicable taxes. The above sum represents the entire compensation for your internship with the Company for the tenure agreed upon.

Classification: Confidential

TERZO TECHNOLOGIES PRIVATE LIMITED

Date: 2nd Aug 2021

Dear Ahamed Riyas

We are delighted to offer you an opportunity to join our team as an Intern. Your internship will start from Aug 16th 2021. You will be paid Rs 15,000/month during the internship period. Your responsibilities will be given at the start of the internship.

Upon successful completion of degree, you will be given a full time opportunity to join us and your annual package will range between 4.5 LPA to 7 LPA depending on your performance during internship period.

We will work closely with your college to ensure that all the appropriate steps have been taken to make this an exciting and positive experience for you.

Looking forward to having you part of the Terzo family..!!

Thanks,

T. Pradeep

(Terzo technologies Pvt Ltd)

M-12, ANNA NAGAR KOOTTAPPALLI COLONY, TIRUCHENGODE, NAMAKKAL,
TAMILNADU- 637214

06 September 2021

Yazhini M.
Kongu Engineering College,
Erode

Dear Yazhini,

This is further to your project assignment in our organization as a part of your academic curriculum requirement with our design and development center at **Trivandrum** from **06 September 2021 to 31 May 2022** under the following terms and conditions.

1. You will be paid all inclusive stipend of **Rs. 15,000/-** per month for the period of **9 Months and w.e.f. 06 September 2021 to 31 May 2022.**
2. During the period of assignment you shall administratively report to **Mr. Shahid K.** and carry out all aspect of project assigned to you.
3. Information pertaining to the company's operations shall remain secret and safeguarded by you both during and after your tenure of assignment with us.
4. Breach of any of the above conditions will render you liable to termination of your assignment without notice.
5. The company is not obliged to offer you permanent employment on the completion of the assignment and you shall not be entitled to or can claim any benefits applicable to employees of the company.

Please sign the duplicate copy of this letter in token of your acceptance of the terms & conditions contained herein.

We wish you all success in your assignment.

Cordially,

For Tata Elxsi Limited,.
Rajagopalan S.
Head – Human Resources

YAZHINI M

Re: Internship for Kongu Engineering College Student

Eureka Pumps <eurekapumps@gmail.com>
Sat 9/25/2021 7:17 PM

To: Sethupathi P. <sethupathi.eee@kongu.ac.in>
Cc: HOD_Electrical and Electronics Engineering <hod_eee@kongu.ac.in>

Dear Professor,

We are glad to participate in the academic activities of the College.
I am happy to offer an Industrial Project for Mr.S.Aswath with a stipend of Rupees 4000/-(Four thousand only) per month
He has to report on 01.10.2021 Friday 9.00 AM.

Thanking you
Best Regards
for marlboro engineering works
Proprietor
(T.S.KRISHNASWAMY M.E.,)

On Sat, 18 Sep, 2021, 11:42 AM Sethupathi P., <sethupathi.eee@kongu.ac.in> wrote:

Dear Sir,

Greetings from Kongu Engineering College!!!!

Kongu Engineering College is one of the foremost multi professional research-led Institutions is internationally a recognized leader in professional and career-oriented education. Department of Electrical and Electronics Engineering provide uniquely rich and diverse learning and teaching environment for the students.

As a part of the curriculum, the final year M.E students are required to undergo internship work in the industry. We feel that it will be fruitful if our students with good academic performance undergo internship to strengthen their knowledge and skills.

As per the telephonic conversation, I have referred one student named S. Aswath based on his interest. Currently he is doing final year M.E - Power Electronics and Drives.

I request you to kindly accord permission to the above-mentioned student to undergo internship in your esteemed organization. We assure you that our student will strictly adhere to rules and regulations of your organization and will give their contributions to the industry.

Thanks and Best Regards,

P.Sethupathi
Assistant Professor Senior Grade
Department of Electrical and Electronics Engineering
Kongu Engineering College
Perundurai - 638060

SAINT-GOBAIN

SEFPRO

September 20, 2021

SEPR-PER/HR/IA/04/21

To

The Chief Co-oridnator, IIP Cell

Kongu Engineering College

Erode - 638060

Sub: Approval for Internship

Ref: Your letter dated 18th September 2021.

Dear Sir / Madam,

Greetings from Saint Gobain India Pvt Ltd – SEPR, Perundurai - Refractories Business!

With reference to your letter cited above, we would like to inform you that Ms. N Monika of final year M.E - PED of your Institution is permitted for Internship in our Organization for a period of 5 months starting from 01st October to 31st March 2022.

Note:

1. Students are advised to come in formal dress code during these days with Safety shoes.
2. Submit Original bonafide certificate to HR Department on your first day.
3. Helmet is must for two wheelers to enter into our organization along with your Insurance and RC

During internship students will have to abide by the rules and regulations of our Organization.

Thanking you,

for Saint Gobain India Pvt Ltd

Hemanandhini U

Team Member – HR Operations

MEKHOS | TECHNOLOGY
MEKHOS TECHNOLOGY SERVICES PRIVATE LIMITED
CIN NO: U29248KA2015PTC081609

Ref: MTS/HR/2021/22

Date: 14th Nov 2021

From

MEKHOS Technology Services Pvt Ltd

Plot No 185, 3rd Phase,

Bommasandra Indl Area, Bommasandra,

Bangalore-560099, Karnataka, India

To

Prithiviraj T(18EEL127)

Contact No: +918072225399

Sub: Letter of Internship and placement training Acceptance

We are pleased to offer you an internship programme with MEKHOS Technology Services Pvt Ltd for a period of four months that is from 06/12/2021 to 06/04/2022.

You should note that any information & data collected from you during the course of your internship should be kept confidential at all times.

We appreciate your interest in MEKHOS Technology Services Pvt Ltd

Thanking you,

For MEKHOS TECHNOLOGY SERVICES PVT. LTD.

HR,

Authorized signatory

Department of Electrical Engineering
राष्ट्रीय प्रौद्योगिकी संस्थान कालिकट
National Institute of Technology Calicut
एन.आई.टी. कैंपस (पी.ओ), कालिकट, केरल-673 601, भारत • NIT Campus (P.O.), Calicut, Kerala-673 601, India
Phone: +91-495-2286303 (O) | Website: www.nitc.ac.in

60

11.11.2021

TO WHOM IT MAY CONCERN

This is to certify that Ms. Vaishnavi M, a student of Bachelor of Technology (Electrical and Electronics Engineering) Kongu Engineering college, Erode, has completed Summer Research Internship Program (June 9th - July 27, 2021), under the guidance of Dr.KM Arun Neelimegham, Assistant Professor, Electrical Engineering Department, NIT Calicut.

During the time of the internship, she worked on the topic: "Analysis on multiple output contactless inductive power transfer system for electric vehicle battery charging station".

During her internship Ms. Vaishnavi showed remarkable engagement with the topic. Her conduct, behavior and performance during the internship period were really good.

Dept. Of Electrical Engineering ★ National Institute Of Technology Calicut ★
Calicut -673 601

Dr. Rijil Ramchand
Professor and HOD
EED, NITC

Dr. RIJIL RAMCHAND
Professor & Head
Dept. of Electrical Engineering
National Institute of Technology Calicut
NIT Campus P.O. 673 601, Calicut

Calibraint Technologies - Offer of Employment

2 messages

Rini JB <rini@calibraint.com> Mon, 11 Oct 2021 at 1:25 p.m.
To: gopinath6112@gmail.com
Cc: HR TEAM <hr@calibraint.com>

Dear Gopinath,

Thank you for your interest in working for our organization. Having successfully passed the interviews we are pleased to offer you a position with Calibraint Technologies. It is my pleasure to extend the following offer of employment to you on behalf of Calibraint Technologies. If you accept this offer you will be designated as an **Associate Software Developer - Trainee** and you will join us at our Chennai office.

Your joining date for training will be on 18th October 2021.

Please find the below details we would like to put forward

- We are expecting you to join on the date we mention where you will be having one to two month training to prove yourself where you will be receiving a stipend of Rs.10,000/-per month in the second month training.
- Once after the completion of your training, you will be offered as the employee with the compensation of **3.5 Lakhs Per Annum** based on the performance during the probation period.

If you are unable to report for joining on the said date you are requested to inform the company in writing. If there's any changes from our side it will be informed to you through mail or call. The following documents are required to be produced at the time of joining. Please provide originals and self-attested photostat copies; originals will be returned after verification.

1. Proof of Academic Qualification (Class 10th Equivalent and above):
   - 10th & 12th mark lists
   - Undergraduate/degree mark list and degree certificates
   - Post-graduation mark list and degree certificates (if any)
   - Other qualifications - mark lists and certificates (if any)
2. Proof of identity photocopy i.e. PAN card, Aadhar Card, Driving license/Voter ID
3. Photographs (2 copies)

We take great pleasure in welcoming you to our Organization and sincerely hope that your period of service with us will be long, pleasant and of mutual benefit. We hope you will find this offer acceptable and wait to welcome you to the Calibraint Technologies family.

Venue: TICEL Bio Park
Block II, 5th floor
Taramani Road, Taramani,
Chennai,
Tamil Nadu 600113

Map: https://goo.gl/maps/TWKnFpJZW1y

Office Timing: 9:00AM to 6:30PM

If There's any doubt or emergency contact :

Rini : 9790748922

For hostel guidance you can contact
Kesav : 7397711246
Anni : 9566322978

If you need any clarification you can reach me through mail or call.

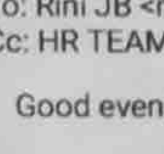
Thanks & Regards

RINI J B

Manager - Human Resource

Calibraint Technologies
TICEL Bio Park, II Block, 5th Floor,
CSIR Road, Taramani, Chennai,
Tamil Nadu 600113.

+91-98846 60140
044-22540140
rini@calibraint.com
www.calibraint.com



Calibraint

GOPINATH N <gopinath6112@gmail.com> Mon, 11 Oct 2021 at 4:46 p.m.
To: Rini JB <rini@calibraint.com>
Cc: HR TEAM <hr@calibraint.com>

Good evening sir,

I am Gopinath.N.I accept the offer from your company. I will be there on 18th october to join the company for internship and training.

Thanks regards

[Quoted text hidden]

INTERSECT IQ
Strategise Transform Disrupt

people@intersectiq.com
www.intersectiq.com

Date: 13-NOV-2021

Ms. Charan Ganesh Shanmugapriyan,
4/131, Ponnagar,
Gorimedu,
Salem, Tamil Nadu - 636 008.

Dear Mr. Charan Ganesh,

Sub: Offer of Internship cum Employment

Congratulations! With regard to our recent discussions with you, we are pleased to invite you to accept the offer on the following terms:

Designation	: **Internship**	**– Digital Intern**
	Probation period	**– Project Trainee**
	FTE	**– Associate Product Engineer – Digital Platforms**
Internship Period	: **1 December 2021 to 31 May 2022**	
Employment Starts	: **1 Jun 2022**	
Location	: Due to the extant ongoing pandemic you will be working virtually until further notice. Company will communicate the date when you should report to our office in Bangalore, Karnataka	

You will be receiving academic credit during internship, you will be paid a stipend of Rs. 5,000 per month, During probationary period, your revised stipend will be Rs. 25,000/- per month. On successful completion of probation, **the FTE starts and your consolidated CTC including compensation and benefits will be Rs. 4,00,000/PA (Rupees Four lakh per Annum)**

You will be directly reporting to the Product Manager or the Line manager which will be communicated to you at the time of joining for all job tasks assigned to you.

You will be deemed to be on probation in the services of the company until confirmed in writing. The initial period of probation is 6 months. The probationary period will also be your training period. Owing to the cost of the training incurred by the Company, you agree to sign an employee bond for a period for Two (02) years from the date of completion of the training.

Upon your acceptance of this Offer Letter, we will be issuing the appointment letter to you which will have the terms of your employment.

We take great pleasure in welcoming you to our company and sincerely hope that your period of service with us will be long, pleasant and of mutual benefit.

Please self-attest the copy of this letter as an acceptance and return the same within three (3) days from the date of the receipt of this document, failing which this offer shall stand withdrawn.

Sincerely,
For Intersect Innovations Private Limited

Sinduja K
Head - People Function

schnell

SEEPL/HRD/offer/09
4/10/2021

Dear Soundhara Velan,

Welcome to Schnell !

Schnell is leader in innovative products and solution to promote energy efficiency and automation. We offer wonderful growth prospects and limitless career opportunities for employees within the company.

We were impressed with your background and skills and we can't wait to see you in action.

We are delighted to inform you that you have been selected for the position of **Intern - R&D**

Your Stipend is Rs.10000/-per month (Consolidated)

For Schnell Energy Equipments Pvt Ltd

Vivek . A
VP-HR & Marketing

Schnell Energy Equipments Pvt. Ltd
#6/4, Ranganayaki Nagar, Periyanaickenpalayam,
Coimbatore 641020 Tamilnadu

+91 9500295005
schnell@schnellenergy.com

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FPGA based design and implementation of power conditioning unit for fuel cell powered vehicle using adaptive vector reference control method

K. Prithivi [a,*], L. Ashok Kumar [b]

[a] Department of EEE, Kongu Engineering College, Erode, India
[b] Department of EEE, PSG College of Technology, Coimbatore, India

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PEMFC

ABSTRACT

The output of renewable energy is the power of low voltage and high current rated designs. Due to the output voltage being too low it does not meet the required maximum voltage load requirements. Therefore, in order to meet the high voltage load, the required limit of the power converter (DC-DC) is used to increase the voltage to the maximum. . The DC output voltage from a renewable energy source is given as input to a DC-DC converter, and the output generated from the converter is used to drive a load. KY boost converter is one of the recently developed DC-DC converters to reduce output voltage ripple. It is suitable for operation in equipment to below low ripple conditions. The disadvantage of this converter is that the boost voltage is a very low design parameter. To obtain the desired boosted voltage, and also to reduce the output voltage ripple, an optimized algorithm is used. Compared with the existing Drosophila optimization technology, the proposed Adaptive Vector Reference Control (AVRC) Method has higher convergence characteristics and lower output ripple. The simulation results are verified by MATLAB simulation with hardware results. The hardware is developed using the Xilinx FPGAs SPARTAN 6A controller, which simplifies the XC3S500E development board prototype in addition to providing additional flexibility for further improvements. The results clearly show improved performance and validate the model.

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1. Introduction

The discovery of oil pollutants and greenhouses gases affecting supply, legalization needs to expand new innovations for transportation as a real-time alternative that is primarily based on internal combustion engines [1]. Fuel cells guarantee their best pace of work more skilled than usual and with less radiation.

A hybrid propulsion system combines two sources, such as fuel cell and battery. The fuel cell converts the chemical energy into electrical energy. The stack has an expansion that isn't permitted by a unique moderate reaction or a fast diminishing in yield power, and energy recuperation. The battery is used as a storage source. In addition, during vehicle startup, and also when power requirements are high, the battery acts as an additional source.

The alteration of the voltage level between the two sources and the load on the vehicle requires a converter (KY boost converter) to persistently keep up the voltage of the DC transport allowing the applied power or the current required by the load, for instance appeared in Fig. 1. The other converter is an inverter, which is used to change the voltage level between the DC association and Permanent Magnet Synchronous Motor (PMSM). In a stationary express, the vitality that the energy component stack must convey is relied upon to move the electric vehicle. Power devices will transform into the key vitality hotspot for the exceptional age electric vehicles [2].

This article proposes a KY boost converter with minimum voltage ripple operation between batteries used as HEVs and part of the inverter-fed PMSM. The advantages of the proposed innovation [3], for instance, decrease the size of detached parts, lessen input current ripple, make the framework progressively dependable in high power applications, extend the proficiency of the converter, diminish voltage and power gadgets Device evaluated current.

The aforementioned advantageous cases of the proposed converter make it more reliable in the application of high-power hybrid electric vehicles. Broad simulation results affirm that the FPGA control conspire gives a successful method for altering the yield voltage of the Polymer Electrolyte Membrane Fuel Cell (PEMFC) in light of changes in load request. An enormous number of

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Power Quality Improvement in Solar Fed Cascaded Multilevel Inverter With Output Voltage Regulation Techniques

ALBERT ALEXANDER STONIER[1], (Senior Member, IEEE), SRINIVASAN MURUGESAN[1], RAVI SAMIKANNU[2], (Senior Member, IEEE), SAMPATH KUMAR VENKATACHARY[3], SENTHIL KUMAR S.[4], AND PRAKASH ARUMUGAM[5]

[1]Department of Electrical and Electronics Engineering, Kongu Engineering College, Erode 638060, India
[2]Faculty of Engineering and Technology, Electrical, Computer and Telecommunications Engineering, Botswana International University of Science and Technology, Palapye, Botswana
[3]Grand Thornton, Gaborone, Botswana
[4]Department of Electrical and Electronics Engineering, National Engineering College, Kovilpatti 628503, India
[5]Department of Electrical and Electronics Engineering, QIS College of Engineering and Technology, Ongole 523272, India

Corresponding author: Albert Alexander Stonier (ootyalex@gmail.com)

This work was supported by the Department of Science and Technology (Government of India) through the ASEAN-India Science, Technology and Innovation Cooperation (AISTIC) Scheme for the Project Design and Development of Smart Grid Architecture With Self-Healing Capability Using Intelligent Control Techniques-A Smart City Perspective under Grant CRD/2018/000075.

ABSTRACT The presence of harmonics in solar Photo Voltaic (PV) energy conversion system results in deterioration of power quality. To address such issue, this paper aims to investigate the elimination of harmonics in a solar fed cascaded fifteen level inverter with aid of Proportional Integral (PI), Artificial Neural Network (ANN) and Fuzzy Logic (FL) based controllers. Unlike other techniques, the proposed FLC based approach helps in obtaining reduced harmonic distortions that intend to an enhancement in power quality. In addition to the power quality improvement, this paper also proposed to provide output voltage regulation in terms of maintaining voltage and frequency at the inverter output end in compatible with the grid connection requirements. The simulations are performed in the MATLAB / Simulink environment for solar fed cascaded 15 level inverter incorporating PI, ANN and FL based controllers. To exhibit the proposed technique, a 3 kWp photovoltaic plant coupled to multilevel inverter is designed and hardware is demonstrated. All the three techniques are experimentally investigated with the measurement of power quality metrics along with establishing output voltage regulation.

INDEX TERMS Harmonics, intelligent control, multilevel inverter, photo voltaic's, power quality, voltage regulation.

I. INTRODUCTION

Providing electrical energy access to rural zones is a fundamental requirement as a means of improving sustainable living standards topping the agenda in many developing countries [1]–[4]. Energy efficiency, electricity supply and sustainability are the most important research topics in society. The energy that is sustainable, renewable, cost-effective, reliable and secure is the fundamental requirement for economic growth, human and industrial development of a country. Ecological concerns, exhausting petroleum reserves and expanding reliance on fossil fuels from unstable locales have expanded the significance for more efficient use of energy. Sources like thermal, nuclear that has been used for some time now for the generation of electricity has its own merits and demerits. The developing attention to decrease the carbon footprint (CO_2) has added to the expanding interest for research on non-fossil based fuel as a source of energy. Thus, a more sustainable energy supply is required across all sectors viz. residential, transportation, industrialisation

The associate editor coordinating the review of this manuscript and approving it for publication was Alfeu J. Sguarezi Filho.

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Economics and impact of recycling solar waste materials on the environment and health care

Sampath Kumar Venkatachary [a], Ravi Samikannu [b,*], Srinivasan Murugesan [c], Narasimha Rao Dasari [d], Ragupathy Uthandipalayam Subramaniyam [e]

[a] Grant Thornton, Acumen Park, Fairgrounds, Gaborone, Botswana
[b] Department of Electrical Computer and Telecommunications Engineering, Botswana International University of Science and Technology, Botswana
[c] Department of Electrical and Electronics Engineering, Kongu Engineering College, Erode, Tamilnadu, India
[d] Department of Electrical Power Engineering, College of Engineering, Defence University, Bishoftu, Ethiopia
[e] Department of Electronics and Instrumentation Engineering, Kongu Engineering College, Erode, Tamilnadu, India

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Environmental
Policies
Solar PV
Waste

ABSTRACT

The growth of the renewable energy sector with solar energy resources playing a pivotal role, the proliferation of waste generated from the industry is a cause for concern. Globally the installed solar capacity is over 500 GW and is expected to rise further to 5000 GW by 2050. This phenomenal growth is expected to generate huge solar waste of up to 15% given the anticipated life span of 25 years. While the recent trends in solar research are aimed at improving little efficiency importance is given to waste disposal of dismantled solar power panels. Though recycling is an option, few companies are capable of handling recycling efficiently. To address this problem while ensuring environmental conservation and resource availability & recycling, the technologies adopted in the field are discussed and reviewed in this article. By 2050 60 million tons of solar waste will be there if it is not recycled properly. There view provides an in-depth assessment and the various technical aspects of the solar panel waste recycling and recovery, environmental protection, waste management. The economics of solar power recycling, impact on health and environmental and policies are discussed to ensure feasible and non-toxic technology for further development.

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1. Introduction

The growth of the renewable energy sector offers numerous benefits in the form of safety, reliability, efficiency, effects on the environment and so on. Solar energy technology has witnessed tremendous growth in the recent past, with investments ranging over billions of dollars. The user of solar power has also contributed tremendously towards the reduction in emissions, and it is this feature that has attracted governments across to spend, invest and attract investments in the sector. It is expected that the solar power will make up and replace a significant amount of energy generated by non-renewable energy sources (Bakhiyi et al., 2014) worldwide and is likely to aid in meeting energy demands across households. The entire world is working together in the process of implementing large scale solar power plants to satisfy the energy demand (Chi et al., 2014). According to world data (Table 1), the total solar energy generated accounted for

* Corresponding author.
E-mail addresses: sampathkumaris123@gmail.com (S.K. Venkatachary), ravis@biust.ac.bw (R. Samikannu), msrinieee@gmail.com (S. Murugesan), dasarinarasimharao@gmail.com (N.R. Dasari), usr@kongu.ac.in (R.U. Subramaniyam).

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Design of a Novel Boomerang Trajectory for Sliding Mode Controller

Kamalesh MS*, Senthilnathan Nattuthurai, and Bharatiraja Chokkalingam

Abstract: Sliding Mode Controllers (SMC) is widely known for its robustness and controllability for a non-linear system during transient conditions. The main advantage of SMC is that of sliding a control variable along the trajectory and converges to zero or nearest to zero and make the system to attain a stable condition. Various methodologies and approaches like discontinuous controllers, second-order sliding modes, twisting algorithms, etc. are available for the SMC implementation. However, every algorithm is facing the problem of convergence and error tracking in a finite amount of time. The primary purpose of this paper is to formulate and design an SMC with a new trajectory which overcomes the drawback of the existing methodologies. This paper proposes a novel boomerang trajectory, which omits the reaching phase and follows a semi-elliptical and semi-circular path for a quick convergence. SMC with boomerang trajectory is analyzed for its stability at transient conditions, and the results show significant improvement in terms of convergence time when compared to the existing trajectories and also it is asymptotically stable. The entire system is simulated in Matlab / Simulink and the same prototypical setup has been designed, and implemented for evaluation purpose using dSPACE-MicroLabBox-ACE-DS1202 platform.

Keywords: Boomerang trajectory non-linear system, sliding mode control, trajectory control, twisting algorithm.

1. INTRODUCTION

SMC evolved from Variable Structure Control (VSC) consisting of many sub-systems, changing its structures based on some control criteria. Also, an essential feature of SMC is that of having an undeviating system for any uncertain disturbances. SMC's are widely employed for the stabilization and control of various linear and non-linear systems such as satellite-carrying shuttle vehicles, underwater submarine vehicles, robotic manipulators and actuators, aircraft, satellites in the orbit, electrical motor control, etc. [1, 2]. SMC features are as follows; 1) stabilized dynamics even under uncertain perturbations, 2) robust control law for switching states on the desired sliding surface, 3) gain of the transfer function may be dynamically changed, contributing the continuity in the sliding plane or surface [3]. SMC design is a state space approach [4], consists of two significant steps, i.e.,

Step 1: designing a state trajectory for the system on the hyperplane.

Step 2: deriving a control law for the system to slide and follow the trajectory and reach a stable condition with minimum or zero reaching time (t_r).

The problem in designing a state trajectory starts with the declaration of state variables and their parametric variations. Always the state trajectory begins with an initial condition of the state variable and tracks towards the sliding surface. The sliding variable $\sigma(x)$, derived from the state variables x_1, x_2, …, x_n tries to achieve the compensated dynamics based on the control law. The first and foremost property of $\sigma(x)$ is to have a stable differential equation, which converges to zero with respect to change in error. There are many approaches discussed in the literature like adaptive linear sliding control [5,6], integral sliding surface [7], multi-segment SMC [4, 8], fuzzy-based gain scheduling SMC [9], fuzzy-based state feedback system [10], adaptive fuzzy sliding control law [11], etc. Most of the above-said techniques employ a linear sliding surface with different control laws based on the application requirement. The literature mentioned above with the linear sliding surface suffers from exponential convergence and compromises the inclusion of reaching phase and reaching time leading to increased control gain. In such systems, a variable starting from any initial position moves monotonically towards the switching hyperplane and converges after the required reaching time. These complications were addressed by employing a non-linear curvature-based trajectory like parabolic tra-

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Investigation and validation of an eleven level symmetric modular multilevel inverter using grey wolf optimization and differential evolution control algorithm for solar PV applications

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Abstract

Purpose – This paper aims to examine the design and control of a symmetric multilevel inverter (MLI) using grey wolf optimization and differential evolution algorithms.

Design/methodology/approach – The optimal modulation index along with the switching angles are calculated for an 11 level inverter. Harmonics are used to estimate the quality of output voltage and measuring the improvement of the power quality.

Findings – The simulation is carried out in MATLAB/Simulink for 11 levels of symmetric MLI and compared with the conventional inverter design. A solar photovoltaic array-based experimental setup is considered to provide the input for symmetric MLI. Field Programmable Gate Array (FPGA) based controller is used to provide the switching pulses for the inverter switches.

Originality/value – Attempted to develop a system with different optimization techniques.

Keywords Solar cells, Harmonics, Power converter, Differential evolution (DE), Grey wolf optimization (GWO), Field programmable gate array (FPGA), Maximum power point tracking (MPPT), Modulation index (m_a), Total harmonic distortion (THD)

Paper type Research paper

Introduction

The modern generation system having the power demand for electrical energy to the public and expanding applications in industrial and residential needs. The challenging task to meet the developing force request could be to expand the producing limit of a power plant. It involves thousands of crores as the venture and expands the number of years for its power generation (Umer Akram *et al.*, 2018).

The energy of natural fuel such as coal or gas has not a worthy resource to address completely the requirements of today's human beings. Fossil fuel has caused major environmental damage and enervation. This issue has imitated the alternate energy source radically (Liming Liu *et al.*, 2014). Other great arrangements would be the utilization of non-conventional or renewable sources are the most successful technology to furnish the above challenge for power demand. One best discovery of more popular technology is solar photovoltaic (SPV) systems (Leon *et al.*, 2016; Samadaei *et al.*, 2016). Modern renewable power generation has variable nature of power flow from such as solar and wind becoming very popular demanding. SPV and wind energy have two extremely developing renewable energy sources, exclusively solar has attained more acceptance due to the dramatic reduction in its price over the past decade. There are many advantages such as noiseless process and low preservation compared to other non-renewable energy sources. It also provides eco-friendly and zero pollution for an environment. The fundamental of the multilevel inverter (MLI) is divided into three main configurations, namely, neutral point clamped MLIs (NPC-MLI), flying capacitor MLIs (FC-MLI) and cascade H-bridge MLIs (CHB-MLI). In 1981, the NPC-MLI has introduced the first MLI for medium voltage applications.

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