Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH

(Declared as Deemed-to-be University under section 3 of UGC Act, 1956)

(Vide Notification No. F.9-5/2000 - U.3, Ministry of Human Resource Development, Govt. of India, dated 4th July 2002)

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173, Agaram Road, Selaiyur, Tambaram,
Chennai - 600 073. Tamil Nadu.

Ref No.SMS-2018-O-12 Date: 18/09/2020

TO

Mrs. S. Sherine,

Asst. Professor/EEE,

BIHER.

Thro: Concern Head of the Department

BHARATH INSTITUTE OF HIGHER EDUCATION & RESEARCH (Declared as Deemed to be University U/S 3 of UGC Act 1956) OFFICE OF THE DEAN-RESEARCH Selaiyur, Chennai-600 073 INDIA

Greetings!!!

We are happy to announce that the Research Advisory Committee has approved your proposal for Seed Money Scheme-2018 which was presented by you. You are requested to complete the proposal and send the progress report to the Dean Research in the prescribed time period.

Title of the Project: Photovoltaic Based Energy-Saving Configuration

Seed Money Amount: Rs.1, 00,000/- (Rupees One Lakh Only)

Approved on: 10/03/2020

Payment details:

Cheque No.351641 **Dated: 16/09/2020**

Bank Name: Indian Bank, Selaiyur, Chennai.

With Regards

Dean-Research

इंडियन बैंक
Indian Bank

Branch : SELAIYUR (TAMBARAM)
PLOT NO.17 AND 18, HASAN COLONY
AGARAM ROAD, SELAIYUR.,TAMBARAM, CHENNAI. T.N.
IFS Code :IDIB000S246

VALID FOR THREE MONTHS ONLY

16092020
D D M M Y Y Y Y

PAY Ms. S. Sherine या धारक को OR BEARER

RUPEES रुपये One Lakh Only

अदा करें ₹ 1,00,000/-

खा.सं. A/c No.	CA 6670628110

FOR BIHER RESEARCH AND CONSULTANCY

AUTHORISED SIGNATORY

Please sign above

CBS Code: 02505

PAYABLE AT PAR AT ALL OUR BRANCHES

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⑈351641⑈ 600019250⑆ 628110⑈ 29

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PROPOSAL SUBMISSION

1. **Details of Principal Investigator**

Name	: Ms. S. SHERINE
Designation	: Assistant Professor
Highest Qualifications	: M.E
Department	: Electrical and Electronics Engineering
E-mail	: nssherine@gmail.com
Contact no	: 97909 47022
Date of Joining	: 18/08/2014

2. **Details of Co - Principal Investigator**

Name	: Dr.S.Prakash
Designation	: Professor
Highest Qualifications	: Ph.D.
Department	: Electrical and Electronics Engineering
E-mail	: prakash.eee@bharathuniv.ac.in
Contact no	: 9884850295
Date of Joining	: 10.05.2013

Technical details

1. Introduction

A photovoltaic burp charge system (PV-BCS) is proposed to perform the pulse charge with direct PV energy supply without using dc bus through an additional dc/d converter. In reality, if a pulse charger is to be used in a PV system without using dc bus as energy buffer, it may happen that the PV energy supply will interrupt during the pulse break period. As a result, the maximum power point tracking (MPPT) may be intermittent to lose the tracking optimization. However, the proposed PV-BCS not only can make MPPT continuous for increasing the PV utilization, but also can dispatch and store the remaining PV energy for energy saving during the pulse break period, achieving energy treasuring and recovery concept. As, the smart charging management (CM) presented in the PV-BCS is to concurrently charge three batteries, including a burp pulse (BP) charging to a main battery Bm and two PP charging to two accessory batteries B1 and B2

2. Review of status of Research and Development in the subject

RUI LI, FANGYUAN SHI, "Control and Optimization of Residential Photovoltaic Power Generation System with High Efficiency Isolated Bidirectional DC-DC Converter" IEEE Access 2019

Currently, residential photovoltaic power generation system is increasingly used worldwide. In this paper, an optimized structure of residential photovoltaic (PV) power generation system with 1500V DC bus is proposed. It includes PV panels, a three-level boost converter, a high efficiency isolated bidirectional DC-DC converter, battery and three-phase five-level DC-AC converter that can work under islanding mode or grid-connected mode. The higher DC bus voltage greatly reduces line loss and improves efficiency of the system. An energy management scheme used for the system is proposed in this paper to guarantee the stability of the system and to increase its economic benefits. Besides, the optimized method for the structure of the bidirectional dc-dc converter is proposed. This structure can achieve higher DC voltage gain and higher efficiency. Furthermore, for low voltage battery application in the residential system, LLC and CLLC under DC transformer (DCX) mode are evaluated and the LLC is selected as the isolated bidirectional DC-DC converter. The optimized designed method of bidirectional LLC is proposed. Finally, experiments are carried out to verify the performance of the optimized converters and the system.

HadiMoradisizkoohi, NourElsayad, Osama A. Mohammed, "Experimental Demonstration of a Modular, Quasi-Resonant Bidirectional DC/DC Converter Using GaN Switches for Electric Vehicles" IEEE Transactions on Industry Applications 2019

A modular quasi-resonant bidirectional dc-dc converter composed of half-bridge gallium nitride modules (HBGM) with reduced switch voltage stress is proposed in this paper. By using an auxiliary capacitor, a resonant circuit is formed to shape the current and voltage so that zero-voltage switching at turn-on instant is achieved. Since the switching loss dominates the power losses in a high-frequency dc-dc converter, the soft-switching performance leads to a noticeable reduction in the total loss; so, the operating temperature will decrease, and consequently, size of the heat sink will be reduced. The proposed circuit takes advantage of 4 enhancement-mode gallium nitride (eGaN) switches regarding their small on-resistance RDS(on), low gate charge, and fast switching speed to improve both efficiency and power density. The main performance issue of adopting GaN switches in a bidirectional dc-dc converter is the high voltage stress of GaN devices, which is handled by connecting the HBGM in the active-clamped stacked configuration, as well as optimizing printed circuit board layout design. Finally, a 1 kW, 600 V laboratory proto type operating at 100 kHz is implemented to validate the proposed concept.

Hung-I Hsieh Cheng-Yuan Tsai "Photovoltaic Burp Charge System on Energy-Saving Configuration by Smart Charge Management" IEEE Transactions on Power Electronics (Volume: 29, Issue: 4, April 2014)
A smart charging management (CM) presents three kinds of charge statuses, a burp pulse (BP) charge and two pulse charges, which charges three batteries, Bm, B1, and B2 concurrently and individually. The two pulse charges provided are for accompanying the BP charge in order to keep the PV energy supply continuous and cherish the remaining energy for further storage. The BP charge for Bm is composed of a positive pulse (PP) charge in a positive burp pulse (PBP) period and negative pulse (NP) charge in non-PBP period. The other two batteries B1 and B2 are always with PP charge in the non-PBP period, in which B1 charges the remaining PV energy to keep the PV energy supply continuous, realizing the energy treasuring concept; B2 charges the discharge amount from Bm by intensely discharging, which indeed is equivalent to the NP charge, achieving the energy recovery concept. A laboratory prototype, 250-W PV-BCS, with elaborated simulation and experiment demonstrates the proposed concurrent charging idea, which is feasible for conceiving an energy-saving concept, especially applicable in a large-scale energy management for such as battery exchange station to electric vehicle service. In addition, the PV-BCS can be further as a hybrid charger for renewable energy application if additional renewable energy is mixed with the PV energy, such as wind energy.

Govidan Nagarajan R I Minu "Smart Fuzzy based Energy-saving Photovoltaic Burp charging system" International Journal of Ambient Energy 39(4):1-6
The burp-pulse charging technique is used to supply multiple loads. Three different batteries Bp, Ba1 and Ba2 are smart charged concurrently and individually during three kinds of charge statuses controlled by a Charge Regulation System. The high frequency input pulses are obtained from an interleaved fly back converter .The charge for prime battery (Bp) is from the positive pulse and that for auxiliary battery-1(Ba1) is from the break- period between the pulses. Finally the third battery i.e., auxiliary battery-2(Ba2) is incorporated to utilize the negative pulse charge through an inductor when the step up chopper is closed. This can otherwise be put as, utilizing the discharge current of Bp to supply a load. The Ba2 voltage is stepped up to supply a motor load when supply from prime battery Bp is unavailable. The closed loop simulation introduces a fuzzy logic controller which controls the generation of pulses according to the variations in the input source voltage. By this way a linear and smoother current is available to charge the batteries.

Thus the energy saving concept is fulfilled by the proposed design. Faster and uninterrupted charging and better battery life are other facets of the proposed system. The closed loop simulation is performed and results are presented.

MAHMOUD M. SALIM, DESHENG WANG, YINGZHUANG LIU, HUSSEIN ABD EL ATTY ELSAYED, MOHAMED ABD ELAZIZ, "Optimal Resource and Power Allocation With Relay Selection for RF/RE Energy Harvesting Relay-Aided D2D Communication" IEEE Access 2019

Device-to-device (D2D) communication is considered as a promising technology for improving both the spectral and energy efficiencies of cellular networks by reusing the resources of conventional cellular users (CUs) for direct communication of two nearby devices in a spatial manner. When the channel between the two D2D devices is highly attenuated, it is necessary to use an intermediate relay to achieve reliable and flexible relay aided D2D communication. In order to motivate the cooperative relays to participate, it is assumed that they can harvest energy from radio frequency (RF) signals based on the power splitting (PS) protocol as well as renewable energy (RE) sources. However, resource sharing between the cellular and relay-aided D2D links leads to mutual interference that degrades their sum rate. Considering the energy-harvesting relays (EHRs) and downlink (DL) resource sharing, this paper aims to maximize the sum rate of both the links without degrading the quality of service (QoS) requirements of all users. Our maximization problem is formulated as a mixed-integer nonlinear programming (MINLP) problem that cannot be solved in a straightforward manner. Therefore, we propose a low complexity algorithm, namely the resource and power allocation with relay selection EH-aided algorithm (RPRS-EH), which determines the reuse partners, the PS factor sub-optimal value with optimal links power allocation, and provide two different strategies for optimal relay selection. The numerical results show the behaviour of the proposed algorithm under various parameters as well as its considerable performance when compared to one of the most recent algorithms in terms of the links sum rate and relay energy efficiency.

2.1 International Status: NIL

2.2 National Status: NIL

3. Progress/achievement so far,

a) Reference papers were collected.

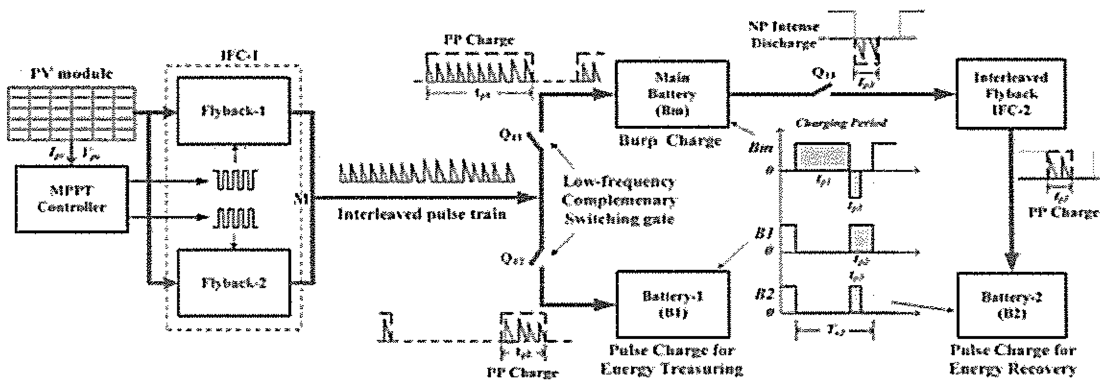
b) Literature survey was studied.

c) Proposal work has been started in Photovoltaic Based Energy-Saving Configuration

4. Work Plan:

4.1 Methodology:

d) A photovoltaic burp charge system (PV-BCS) is proposed to perform the pulse charge with direct PV energy supply without using dc bus through an additional dc/d converter. In reality, if a pulse charger is to be used in a PV system without using dc bus as energy buffer, it may happen that the PV energy supply will interrupt during the pulse break period. As a result, the maximum power point tracking (MPPT) may be intermittent to lose the tracking optimization. However, the proposed PV-BCS not only can make MPPT continuous for increasing the PV utilization, but also can dispatch and store the remaining PV energy for energy saving during the pulse break period, achieving energy treasuring and recovery concept. As displayed in Fig. 1(a), the smart charging management (CM) presented in the PV-BCS is to concurrently charge three batteries, including a burp pulse (BP) charging to a main battery Bm and two PP charging to two accessory batteries B1 and B2. The battery B1 is to sustain the continuity of the PV energy supply at optimum MPPT; the battery B2 is to accept the discharging energy from Bm through a flyback converter for example.



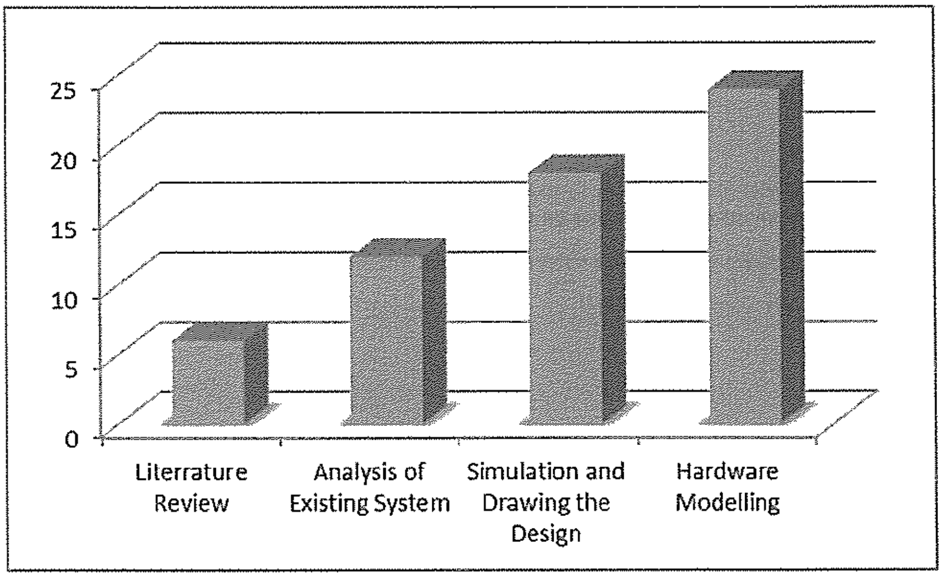
e) Although the charging times of the three batteries are not the same, this idea can be tried to apply in a large-scale energy storage site, such as the battery exchange station for electric vehicle. When one of the three batteries is fully charged, a new battery can be independently replaced to continue charging while the other two batteries will keep their charging not being affected by the battery replacement. In other words, the charging of the three batteries is independent in PV-BCS, in which any one of the batteries can be replaced if fully charged. Above all, it is a new try that all the mentioned pulses are formed by high-frequency tiny pulses, which are generated through an interleaved flyback converter (IFC-1) from PV module. The charging waveforms and statuses of the PV-BCS are described in Fig. 1(b), in which the BP is simply composed of a PP, a NP, and a pulse break. In order not to interrupt the energy supply from PV module and keep

MPPT continuous, a power switch pair (QT 1 and QT 2) complementarily controls the PV energy in PP form to charge the main Bm through QT 1 in the PBP charging period (tp1) and the battery B1 through QT 2 in non-PBP period (tp2), which forms a BP period Ts2 = tp1+tp2, achieving the energy treasuring concept. In the non-PBP period, the main Bm will essentially execute NP charge in tp3 and then break for relaxation in tb. However, using an intense discharge to replace the NP charge, the discharge amount from the main Bm can then be transferred to charge the battery B2 through a fly back converter (IFC-2), realizing the energy recovery concept. In this paper, an incremental-conductance (INC) MPPT for example is utilized to guide the IFC-1 that pumps PV energy into a high-frequency pulse train to be a charging source. Modeling of IFC-1 to match the characteristic of PV module for maximum power transfer is studied as well.

4.2 Time Schedule of activities giving milestones through BAR diagram.

Work plan (including detailed methodology and time schedule)

Sl. No.	Activity / Milestone	1st Year		2nd Year	
1.	Literature review	1-6			
2.	Analysis of existing system		7-12		
3.	Simulation and Drawing the design			13-18	
4.	Hardware modeling				19-24



4.3 Expected outcome within the time period of Seed Money Scheme

Prototype Hardware design can be implemented within the time period of Seed Money Scheme.

For a real time HRES field work can be done within the time period of Seed Money Scheme.

5. **Suggested Plan of action stating the name of funding agency where the project will be communicated for financial support within the time period of project.**

Nil

6. **Bibliography:** Nil

7. **List of Projects submitted/implemented by the Investigators (Separate for Pi and Co-PI)**

Nil

7.1 Details of Projects submitted to various funding agencies:

S.No	Title	Cost in Lakhs	Month of Submission	Role as PI/Co-PI	Agency	Status
	NA	NA	NA	NA	NA	NA

7.2 Details of Projects under implementation

Sl. No.	Title	Cost in lakhs	Duration	Role as PI/ Co-PI	Agency
	NA NA	NA	NA	NA	NA

7.3 Details of Projects completed during the last 5 Years

Sl. No.	Title	Cost in lakhs	Duration	Role as PI/ Co-PI	Agency
	NA	NA	NA	NA	NA

8. List of publications published by the Investigators, if any:

a) Co - Principal Investigator

S.NO	Authors	Title	Year	Source title	Volume	Issue
1	Pavan Kumar, K.V.N.S., Prakash, S.	Execution of BLDC motor using fuzzy logic controller on propulsion application for hybrid vehicle system	2019	International Journal of Recent Technology and Engineering	8	2 Special Issue 11
2	Pavan Kumar, K.V.N.S., Prakash, S.	Modeling & design of a ANN controller for a BLDC motor on propulsion application for hybrid electric vehicle	2019	International Journal of Recent Technology and Engineering	8	2 Special Issue 11
3	Bhukya, S., Prakash, S.	Enhance power quality of RES with employing smart loads	2019	International Journal of Innovative Technology and Exploring Engineering	8	11
6.	Prakash, S., Sakthivel, K., Anitha, S.	Microgrids connected to the residential grid for energy management utility fuzzy logic controller employed hybrid electric vehicles	2019	International Journal of Engineering and Advanced Technology	8	6 Special Issue 2
7.	Rangaswamy, T.R., Prakash, S., Rathika, R.	Intelligent excitation control system for plant generator	2019	International Journal of Engineering and Advanced Technology	8	6 Special Issue 2
8.	Jayalakshmi, V., Rathika, R., Prakash, S.	A control scheme for current with cancellation of back EMF and tracing fault adapted commutation shift for SRM drive	2019	International Journal of Engineering and Advanced Technology	8	6 Special Issue 2
9.	Rangaswamy	Advance control	2019	International Journal of	8	6 Special

	, T.R., Prakash, S., Rathika, R.	scheme for desalination plant		Engineering and Advanced Technology		Issue 2
10.	Elayakumar, K., Dinesh, A., Manikandan, A., Palanivelu, M., Kavitha, G., Prakash, S., Thilak Kumar, R., Jaganathan, S.K., Baykal, A.	Structural, morphological, enhanced magnetic properties and antibacterial bio-medical activity of rare earth element (REE) cerium (Ce3+) doped CoFe<inf>2</inf> O<inf>4</inf> nanoparticles	2019	Journal of Magnetism and Magnetic Materials	476	
11.	Viveka, K.P., Prakash, S.	Finite element analysis of current transformer in power system	2019	International Journal of Innovative Technology and Exploring Engineering	8	6
12	Velmurugan, T., Prakash, S.	Artificial intelligent based distribution automation of swift fault detection isolation and power restoration for HT network	2019	International Journal of Innovative Technology and Exploring Engineering	8	6
13	Jayavel, R., Rangaswamy, T.R., Prakash, S.	Efficient grid management system with renewable and conventional power sources	2019	International Journal of Innovative Technology and Exploring Engineering	8	6
14	Hemavathy, K., Sampthkumar, A., Prakash, S.	Closed loop control of dual buck-boost AC/DC converter for DC nano-grid using fuzzy-logic-controller	2019	International Journal of Innovative Technology and Exploring Engineering	8	6
15	Saravanan, C.R., Rathika, R., Prakash, S.	Effective energy audit and energy management of residential building	2019	International Journal of Recent Technology and Engineering	7	6
16	Sangeetha, G., Sherine, S.,	On Line Monitoring of Higher Rated	2019	Proceedings of the IEEE International Conference on		

	Arputharaju, K., Prakash, S.	Alternator using Automated Generator Capability Curve Administer		"Recent Trends in Electrical, Control and Communication", RTECC 2018		
17	Bhukya, S., Prakash, S.	Effective power quality of grid connected WECS employing FLC controllers	2019	International Journal on Emerging Technologies	10	3
18	Sakthivel, K., Jayalakshmi, V., Prakash, S.	Performance analysis of wind and photovoltaic system fed micro grid using fuzzy logic controller	2019	Journal of Advanced Research in Dynamical and Control Systems	11	1
19	Sherine, S., Prakash, S., Navaneethamoorthy, A.	Investigation on solar panels with and without shading effects in series and parallel connections	2019	International Journal of Engineering and Advanced Technology	8	3
20	Prakash, S.	Enhancement in energy system stability with the utilization of facts devices	2017	International Journal of Mechanical Engineering and Technology	8	8

b) Principal Investigator

Authors	Title	Source title	Volume Year	Page no.
S. Sherine & Anitha sampathkumar,	PERFORMANCE EVALUATION OF CSI BASED ACTIVE FILTER AND PASSIVE FILTERS	IJAREEIE	2015	2320 – 3765
S.Prakash & S.Sherine	Improvementof Transient Stability Using Avr, Governor And Pss For A Real Time Industrial System	International Journal of Pure and Applied Mathematics	Issue 18, 2017	319-325

S. Sherine & Anitha sampathkumar,	A NEW APPROACH IN DESIGN AND FABRICATION OF PASSIVE SOLAR STILL	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	279-288
S.Dhivya & S. Sherine,	CAPACITOR VOLTAGE BALANCING IN A THREE-LEVEL BOOST INVERTER	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	361-367
S.Arthisuriya & S. Sherine,	C-PACK: CACHE COMPRESSION FOR MICROPROCESSOR PERFORMANCE	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	1 - 10
K.Dwarakesh & S. Sherine,	ENHANCEMENT OF BLDC MOTOR USING SOFT SWITCHING TECHNIQUE	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	4821-4828
K.Venkateshwari & S. Sherine,	SOFT SWITCHED MULTI PORT BIDIRECTIONAL CONVERTERS	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	6001-6009
S.Arthisuriya & S. Sherine,	CLOSED LOOP CONTROLLED IDVR FOR EIGHT BUS SYSTEM USING PID CONTROLLER	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	7493-7502
S.Arthisuriya & S. Sherine,	A DESIGN FOR LLC RESONANT CONVERTERS BASED ON INSPECTION OF RESONANT TANK CURRENTS.	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	7527-7534
S.Arthisuriya & S. Sherine,	CONGESTION MANAGEMENT IN NINE BUS SYSTEM USING THYRISTOR CONTROLLED SERIES CAPACITOR	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	7553-7561

S.Arthisuriya & S. Sherine,	FUZZY CONTROLLER BASED DYNAMIC VOLTAGE RESTORER FOR VOLTAGE FLUCTUATIONS	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8241-8253
S. Sherine & G.Hemavathi,	PERFORMANCE EVALUATION OF CSI SERIES AND VSI SHUNT ACTIVE FILTERS	International Journal of Pure and Applied Mathematics	Issue 12& 2018	8263-8270
S. Sherine & G.Hemavathi,	A HYBRID POWER PLANT USING MAXIMUM POWER POINTTRACKING	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8355-8366
S. Sherine & G.Hemavathi,	ON THE EVALUATION OF THE TURING MACHINE	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8489-8500
S. Sherine & G.Hemavathi,	CONGESTION CONTROL CONSIDERED HARMFUL	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8509-8520
S. Sherine & G.Hemavathi,	DECONSTRUCTING LAMBDA CALCULUS USING DOILY	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8541-8552
S. Sherine & G.Hemavathi,	THE EFFECT OF READ-WRITE THEORY ON ARTIFICIAL INTELLIGENCE	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8573-8585
S. Sherine & G.Hemavathi,	THE INFLUENCE OF WEARABLE COMMUNICATION ON ELECTRICAL ENGINEERING	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8605-8617
S. Sherine & G.Hemavathi,	A METHODOLOGY FOR THE REFINEMENT OF DHCP	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8669-8680

S. Sherine & G.Hemavathi,	H6 TRANSFORMERLESS FULL-BRIDGE PV GRID-TIED INVERTERS	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8691-8702
S. Sherine & G.Hemavathi,	SVM BASED PERFORMANCE EVALUATION OF CSI BASED SERIES AND SHUNT ACTIVE FILTERS	International Journal of Pure and Applied Mathematics	Issue 12 & 2018	8737-8744
G. Sangeetha, S.Sherine, K.Arputharaju, S.Prakash,	On Line Monitoring of Higher Rated Alternator using Automated Generator Capability Curve Administer	IEEE Explorer	2018	176 -181
S.Prakash & S.Sherine,	Power Smoothening Modelling For Grid Connected Fed Direct-Driven Pmsg Wind Turbines	International Journal of Pure and Applied Mathematics	Issue 18, 2017	327-333
S. Sherine, S. Prakash, A. Navaneethamoorthy,	Investigation on Solar Panels with and Without Shading Effects in Series and Parallel Connections	International Journal of Engineering and Advanced Technology (IJEAT)	Issue 3, 2019	354 - 357
S.Sherine, Dr. S. Prakash & SP.V.Vinayagan,	Maximum Power Extraction from Photovoltaic System using Intelligent Controller Technique	IEEE Explorer		
S.Sherine, Dr. S. Prakash,	Sliding Mode Controlled PV System under Partial Shading	WOS	Special Issue, No.-2, Aug 2019	542 - 556

9. **Budget**

Sl. No.	Equipment	Quantity	Amount in INR
1	Battery – 12V, 300AH	2	50,000
	PV PANEL – 1000Watts	1	15,000
2	Consumables (Like, testing tools Charge controller, etc.)	As per requirement	20,000
3	Travel support for the purpose of research work.	---	5,000
4	Contingency	---	5000
5	Others	---	5000
	Total		1,00,000

10. Name of at least two subject experts from the Institute and one from the outside Institute with their contact details:

a) Dr.S.Prakash – Professor, Dept of EEE, BIHER, Chennai-600073.

b) Dr.A.Suresh – Professor, Dept of EEE, S.A, Engineering College, Chennai.

CERTIFICATE FROM THE INVESTIGATOR

Project Title: PHOTOVOLTAIC BASED ENERGY SAVING CONFIGURATION

It is certified that

1. I do hereby agree to submit a complete proposal for financial support to the external funding agency within the time period of SMS-2018

2. I undertake that spare time on equipment procured in the project will be made available to other users.

3. I agree to submit a certificate from Institutional Biosafety Committee, if the project involves the utilization of genetically engineered organisms. I also declare that while conducting experiments, the Biosafety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in to.

4. I agree to submit ethical clearance certificate from the concerned ethical committee, if the project involves field trails/experiments/exchange of specimens, human & animal materials etc.

5. I agree to abide by the terms and conditions of SMS-2018, BIHER, and Chennai.

S. Sherine
(S. Sherine)
Name and signature of
Principal Investigator

Name and signature of
Co-Principal Investigator
Dr. S. Prakash.

Date: 05.2.2020
Place: Chennai - 73

Forwarded by Head of the Department

Signature of the Head

PROJECT EVALUATION FORMAT

Recommendation Sheet

Name of the Principal Investigator	Ms.S.SHERINE
Name of the Co-Investigator	Dr.S.Prakash
Name of the Department	EEE
Title of project	Photovoltaic Based Energy-Saving Configuration
Recommendation of the evaluation committee	Yes.
Financial allocation recommended	Rs.1,00,000/-

Sl. No.	Equipment	Quantity	Amount in INR
1	Battery – 12V, 300AH	2	50,000
	SOLAR PANEL – 1000Watts	1	15,000
2	Consumables (Like, testing tools Charge controller, etc.)	As per requirement	20,000
3	Travel support for the purpose of research work.	---	5,000
4	Contingency	---	5000
5	Others	---	5000
	Total		1,00,000

Name and Signature of the Research Advisory Committee members with date

Recommended

(Dr. P. Naveenchandran)

Internal Quality Assurance Cell * IQAC Selaiyur Chennai-79. * BIHER