VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution

(Accredited by NAAC & NBA, Approved by AICTE New Delhi & Permanently Affiliated to JNTUH)

Aziznagar Gate, C.B. Post, Hyderabad-500 075

LIST OF R&D PROJECTS APPLIED BY THE DEPARTMENT

S. No.	Title of the R&D Project or Research Grant	Year of applying	Names of the Principal and Co Investigators	Quoted Amount Rs. In lakhs	Name of the Agency	Reference number
1.	Disposal and Recycling of solar Photovoltaic Modules	2020	Dr. A. Srujana Dr. C. N. Ravi B. Rajesh	5.49	DST- Waste Management Technologies Program	TPN / 57429
2.	Ujwala Samriddh Grameena Mahila Prerak Abhivrudh Prasthaan.	2020	Dr. D Aruna Kumari Dr. A Srujana Dr. K Vasanth Ms. Sree Devi J	67.32	DST - Women Technology Park	TPN / 57871
3.	AI Technique for optimization of waste disposal in electric power generation company	2020	Dr. C N Ravi Dr. A Srujana B. Rajesh	21.99	DST- Waste Management Technologies Program	TPN / 59786
4.	Smart system for waste management of electric power generation plant	2020	Dr. D Bala Gangi Reddy Mr. Vikram Chandha Harikrishnan R	21.99	DST- Waste Management Technologies Program	TPN / 58762
5.	Farmer friendly Automatic equipment for the extraction of coconut products	2019	Dr.K.Vasanth Dr.C.N.Ravi Dr.M.Vadivel Dr.V.G.Sivakumar Dr.P.Ganesan	24.86	DST _ young Scientist Scheme	SP/YO/2019 /960
6.	Low Cost Strip based Wearable Hearing aid for Children with Mild Hearing Impairment	2019	Dr.K.Vasanth Dr.C.N.Ravi Dr.M.Vadivel Dr.V.G.Sivakumar	49.26	DST-TIDE - 2019	TPN/42131
7.	Zobhana Surya Paka Nirmimite	2019	Dr.K.Vasanth Dr.C.N.Ravi Dr.M.Vadivel Dr.V.G.Sivakumar Dr.P.Ganesan	12.67	DST – Solar Cooking Challenge	SR/FST/2019 /57
8.	Development of IIOT based solar powered air conditioner in educational institute,	2017	Dr. C. N. Ravi Dr. D. Bala Gangi Reddy	46.44	DST- (AMT) Program	DST/TDT/148-AMT/2017
9.	Frequency Response of Transformer	2015-16	D. Bala Gangi Reddy	15	University Grants Commission Minor Research Project (MRP)	ROMRPSEROELEC2015 1688208

Head of the Department
Department of Electrical & Electronics Engg
Vidya Jyothi Institute of Technology

PRINCIPAL
Vidya Jyothi Institute of Technology
Himayatnagar (Vill), C.B. Post.,
Hyderabad-75.

Please use Go Back button in place of browser's Back button

Welcome **Dr. A Srujana**

You are logged in as: Principal Investigator

Last Login: 28/10/2020 11:27 AM

Submitted Projects Section

Draft Proposals Due for Submission (0)

Projects Under Consideration (1)

SNO	PROJECT TITLE [FILE NO]	SUBMIT DATE	PROJECT STATUS	ACTION
1	Disposal and Recycling of solar Photovoltaic Modules.... [TPN / 57429]	28/10/2020	Under Processing	View & Print Proposal View Uploaded Documents View Reviewers Comments

Projects Send Back By Division For Resubmission (0)

Ongoing Projects (0)

Project Needs Revision (0)

Undertaking from Principal Investigator

1. I have enclosed a print-copy and a soft-copy (PDF) of the Project Proposal titled: **Disposal and Recycling of solar Photovoltaic Modules** complete in all respect, along with (a) Endorsement from the Head of the Organisation (on letter head), and (b) Undertakings from the Collaborating Industries/Agencies
2. I have not submitted this Project Proposal titled: **Disposal and Recycling of solar Photovoltaic Modules** or similar work, elsewhere for financial support.
3. I shall ensure that if equipment is available for use in my Organization, it will not be proposed to be purchased under the Project.

Name & Designation: Dr. A. Srujana Professor and Head Department of Electrical and Electronics Engineering, Vidya Jyothi Institute of Technology, Hyderabad	Date: 20.10.2020
Signature: Apana	Place: Hyderabad
Stamp/ Seal: Vidya Jyothi Institute of Technology Hyd-75	

Endorsement from Head of Organization

1. Name of Agency: Vidya Jyothi Institute of Technology, Hyderabad
2. I, on behalf of the organization, welcome the participation of Dr. A. Srujana as the Principal Investigator (PI) and Dr. C.N. Ravi, Mr. B.Rajesh as the Co-PI for the Project Proposal titled:

   Disposal and Recycling of solar Photovoltaic Modules.
3. In the unforeseen and legitimate event of discontinuation by the PI, the Co-PI will assume full responsibility for completion of the Project. Information to this effect, endorsed by me, will be promptly sent to Waste Management Technologies Program
4. The equipment and facilities (including administrative) available with the institute and those being procured under the project will be made available to the Investigator(s) throughout the duration of the Project.
5. I will ensure that the financial and purchase procedures in the project will be as per the prevailing norms, and that the Organisation shall provide timely the Statement of Expenditure and the Utilization Certificate of the Funds under the Grant as required by Waste Management Technologies Program in the prescribed format.

Name & Designation: Dr. A. Padmaja Principal, Vidya Jyothi Institute of Technology, Aziz Nagar, Hyderabad – 500075.	Date: 20.10.2020
Signature: A. Padmaja	Place: Hyderabad
Stamp/ Seal: Vidya Jyothi Institute of Technology Hyd-75	

PROFUSE ENERGY & INFRASTRUCTURE (P) LTD.

Undertaking from collaborating Industries / Agencies

1. Name of Agency: PROFUSE ENERGY & INFRASTRUCTURE (P) LTD.

2. I have gone through the Project Proposal entitled "**Disposal and Recycling of solar Photovoltaic Modules**" submitted by **Dr. A. Srujana**, Professor and Head, Department of Electrical and Electronics Engineering of **Vidya Jyothi Institute of Technology**, Hyderabad for Management of waste from Power Industry funding and I hereby affirm that my Organization / Company is committed to participate in the Project to the full extent as indicated in the Project Proposal in technical commitments described in the project proposal.

Name & Designation: Mr. K. Surendra Phani Sarma Vice President, PROFUSE ENERGY & INFRASTRUCTURE (P) LTD., Plot No:28, Beside Bhaskara Hospital, Ameerpet, Hyderabad – 500 016, Telangana, India	Date: 24/10/20
Signature:	Place: Hyderabad.
Stamp/ Seal: Profuse Energy & Infrastructure Pvt. Ltd. Hyderabad	

DEPARTMENT OF SCIENCE AND TECHNOLOGY
POLICY ON CONFLICT OF INTEREST

FOR REVIEWER & COMMITTEE MEMBER or APPLICANT or DST OFFICER ASSOCIATED/ DEALING WITH THE SCHEME/ PROGRAM OF DST

Issues of Conflicts of Interest and ethics in scientific research and research management have assumed greater prominence, given the larger share of Government funding in the country's R & D scenario. The following policy pertaining to general aspects of Conflicts of Interest and code of ethics, are objective measures that is intended to protect the integrity of the decision making processes and minimize biasness. The policy aims to sustain transparency, increase accountability in funding mechanisms and provide assurance to the general public that processes followed in award of grants are fair and non-discriminatory. The Policy aims to avoid all forms of bias by following a system that is fair, transparent and free from all influence/ unprejudiced dealings, prior to, during and subsequent to the currency of the programme to be entered into with a view to enable public to abstain from bribing or any corrupt practice in order to secure the award by providing assurance to them that their competitors will also refrain from bribing and other corrupt practice and the decision makers will commit to prevent corruption, in any form, by their officials by following transparent procedures. This will also ensure a global acceptance of the decision making process adopted by DST.

Definition of Conflict of Interest:

Conflict of Interest means "any interest which could significantly prejudice an individual's objectivity in the decision making process, thereby creating an unfair competitive advantage for the individual or to the organization which he/she represents". The Conflict of Interest also encompasses situations where an individual, in contravention to the accepted norms and ethics, could exploit his/her obligatory duties for personal benefits.

1. **Coverage of the Policy**:

a) The provisions of the policy shall be followed by persons applying for and receiving funding from DST, Reviewers of the proposal and Members of Expert Committees and Programme Advisory Committees. The provisions of the policy will also be applicable on all individuals including Officers of DST connected directly or indirectly or through intermediaries and Committees involved in evaluation of proposals and subsequent decision making process.

b) This policy aims to minimize aspects that may constitute actual Conflict of Interests, apparent Conflict of Interests and potential Conflict of Interests in the funding mechanisms that are presently being operated by DST. The policy also aims to cover, although not limited to, Conflict of interests that are Financial (gains from the outcomes of the proposal or award), Personal (association of relative / Family members) and Institutional (Colleagues, Collaborators, Employer, persons associated in a professional career of an individual such as Ph.D. supervisor etc.)

2. **Specifications as to what constitutes Conflict of Interest**.

Any of the following specifications (non-exhaustive list) imply Conflict of Interest if,

(i) Due to any reason by which the Reviewer/Committee Member cannot deliver fair and objective assessment of the proposal.

(ii) The applicant is a directly relative# or family member (including but not limited to spouse, child, sibling, parent) or personal friend of the individual involved in the decision making process or alternatively, if any relative of an Officer directly involved in any decision making process / has influenced interest/ stake in the applicant's form etc..

(iii) The applicant for the grant/award is an employee or employer of an individual involved in the process as a Reviewer or Committee Member; or if the applicant to the grant/award has had an employer-employee relationship in the past three years with that individual.

(iv) The applicant to the grant/award belongs to the same Department as that of the Reviewer/Committee Member.

(v) The Reviewer/Committee Member is a Head of an Organization from where the applicant is employed.

(vi) The Reviewer /Committee Member is or was, associated in the professional career of the applicant (such as Ph.D. supervisor, Mentor, present Collaborator etc.)

(vii) The Reviewer/Committee Member is involved in the preparation of the research proposal submitted by the applicant.

(viii) The applicant has joint research publications with the Reviewer/Committee Member in the last three years.

(ix) The applicant/Reviewer/Committee Member, in contravention to the accepted norms and ethics followed in scientific research has a direct/indirect financial interest in the outcomes of the proposal.

(x) The Reviewer/Committee Member stands to gain personally should the submitted proposal be accepted or rejected.

The Term "Relative" for this purpose would be referred in section 6 of Companies Act , 1956.

3. **Regulation**:

The DST shall strive to avoid conflict of interest in its funding mechanisms to the maximum extent possible. Self-regulatory mode is however recommended for stake holders involved in scientific research and research management, on issues

pertaining to Conflict of Interest and scientific ethics. Any disclosure pertaining to the same must be made voluntarily by the applicant/Reviewer/Committee Member.

4. **Confidentiality**:

The Reviewers and the Members of the Committee shall safeguard the confidentiality of all discussions and decisions taken during the process and shall refrain from discussing the same with any applicant or a third party, unless the Committee recommends otherwise and records for doing so.

5. Code of Conduct

5.1 To be followed by Reviewers/Committee Members:

(a) All reviewers shall submit a conflict of interest statement, declaring the presence or absence of any form of conflict of interest.
(b) The reviewers shall refrain from evaluating the proposals if the conflict of interest is established or if it is apparent.
(c) All discussions and decisions pertaining to conflict of interest shall be recorded in the minutes of the meeting.
(d) The Chairman of the Committee shall decide on all aspects pertaining to conflict of interests.
(e) The Chairman of the Committee shall request that all members disclose if they have any conflict of interest in the items of the agenda scheduled for discussion.
(f) The Committee Members shall refrain from participating in the decision making process and leave the room with respect to the specific item where the conflict of interest is established or is apparent.
(g) If the Chairman himself/herself has conflict of interest, the Committee may choose a Chairman from among the remaining members, and the decision shall be made in consultation with Member Secretary of the Committee.
(h) It is expected that a Committee member including the Chair-person will not seek funding from a Committee in which he/she is a member. If any member applies for grant, such proposals will be evaluated separately outside the Committee in which he/she is a member.

5.2 To be followed by the Applicant to the Grant/Award:
(a) The applicant must refrain from suggesting referees with potential Conflict of Interest that may arise due to the factors mentioned in the specifications described above in Point No. 2.
(b) The applicant may mention the names of individuals to whom the submitted proposal should not be sent for refereeing, clearly indicating the reasons for the same.

5.3 To be followed by the Officers dealing with Programs in DST:
While it is mandatory for the program officers to maintain confidentiality as detailed in point no. 6 above, they should declare, in advance, if they are dealing with grant applications of a relative or family member (including but not limited to spouse, child, sibling, parent) or thesis/ post-doctoral mentor or stands to benefit financially if the applicant proposal is funded. In such cases, DST will allot the grant applications to the other program officer.

6. **Sanction for violation**

3.1 **For a) Reviewers / Committee Members and b) Applicant**
Any breach of the code of conduct will invite action as decided by the Committee.

3.2 **For Officers dealing with Program in DST**
Any breach of the code of conduct will invite action under present provision of CCS (conduct Rules), 1964.

7. **Final Appellate authority**:
Secretary, DST shall be the appellate authority in issues pertaining to conflict of interest and issues concerning the decision making process. The decision of Secretary, DST in these issues shall be final and binding.

8. Declaration
I have read the above "Policy on Conflict of Interest" of the DST applicable to the Reviewer/ Committee Member/ Applicant/ DST Scheme or Program Officer # and agree to abide by provisions thereof.

I hereby declare that I have no conflict of interest of any form pertaining to the proposed grant *
I hereby declare that I have conflict of interest of any form pertaining to the proposed grant *

* & # (Tick whichever is applicable)

Name of the Reviewer/ Committee Member or Applicant or DST Officer
(Strike out whichever is not applicable)

27/10/2020

(Signature with date)

Professor
Dept. Electrical & Electronics Engg
Vidya Jyothi Institute of Technology
Hyderabad-500 075

CERTIFICATE FROM THE INVESTIGATOR

PROJECT TITLE: Disposal and Recycling of Solar Photovoltaic Modules

1. We agree to abide by the terms and conditions of the DST grant.
2. We did not submit this or a similar project proposal elsewhere for financial support.
3. We have explored and ensured that equipment and basic facilities will actually be available as and when required for the purpose of the project. We shall not request financial support under this project, for procurement of these items.
4. We undertake that spare time on permanent equipment will be made available to other users.
5. We have enclosed the following materials:

	ITEMS	NUMBER OF COPIES
(a)	Endorsement from the Head of the Institution (on letter head)	One
(b)	Certificate from Investigator	One
(c)	Certificate from Investigator regarding conflict of interest	One
(d)	Name and address of experts/institution interested in the subject/ outcome of the project	One
(e)	Copies of the proposals	One hard Copy

Date : 27/10/2020

Place: Hyderabad

Name & Signature of Principal Investigator

Dr. A. Srujana.

Professor

Dept. Electrical & Electronics Engg.
Vidya Jyothi Institute of Technology
Hyderabad-500 075

Name & Signature Of Co-Investigator(s)

C.N. Ravi

Dr. C. N. Ravi

B. Rajesh

M. B. RAJESH

Contents

(1)

Department of Science & Technology

Project Proposal under
Waste Management Technologies Program

Project Title:	Disposal and Recycling of solar Photovoltaic Modules
Category	solid waste
Research Area	Management of waste from Power Industry
Principal Investigator	Dr. A. Srujana
Lead Institution	Vidya Jyothi Institute of Technology, Aziz Nagar Gate, Hyderabad-500 075
Date of Submission	20-10-2020

Professor
Dept. Electrical & Electronics Engg
Vidya Jyothi Institute of Technology
Hyderabad-500 075

Details of Collaborating Institutes and Industry

Partner-1

Name	Mr.K.Surendra Phani Sarma
Designation	Chief Executive Officer
Agency & address	PROFUSE ENERGY & INFRASTRUCTURE PVT. LTD., Block No:106, Babukhan Millennium Centre, Somajiguda, Hyderabad – 500 082
Telephones (Mobile; Landline)	9849987988
E-mail	info@ profusegroup.com
Date of birth	05-06-1975

Please give names of 5-6 Area Experts

1.4.1.
P.Chow Reddy,
Managing Director, Interleaved Multidisciplinary Research Centre
Ph: 9440404574,
Email: chowreddy25@gmail.com,

1.4.2.
Mr.Mehul,
Solar Power Lab, kWatt Solutions Pvt. Ltd. Mumbai.
Ph: 7718897036,
Email: info@ kwattsolutions.com

1.4.3.
K. Vijay kumar gupta,
Kwality Photonics Pvt. Ltd.,
Ph: 9000081171
Email: kvkgupta@kwalityindia.com

1.4.4.
Dr. Srinivas Kesavarapu,
Vice President & Head, Techical & Research, Ramky Enviro Engineers Limited,
Hyderabad,
Ph: 8978922664

1.4.5.
Mr.Naveen kumar,
Radiant Solar Pvt Ltd,
Ph: 9505195054
Email: naveen@radiantsolar.us

Section-1. Overview of the Project

Project Title: **Disposal and Recycling of solar Photovoltaic Modules**
Lead Investigators:

Principal Investigator (PI)

Name	Dr. A. Srujana
Designation	Professor and Head
Agency & address	Vidya Jyothi Institute of Technology, Aziz Nagar Gate, Hyderabad-500 075
Telephones (Mobile; Landline)	8985211094, 08413 235300
E-mail	eeehod@vjit.ac.in
Date of birth	23-07-1977

Co-Principal Investigators (Co-PI)

Name	Dr. C. N. Ravi
Designation	Professor
Agency & address	Vidya Jyothi Institute of Technology, Aziz Nagar Gate, Hyderabad-500 075
Telephones (Mobile; Landline)	9444425853, 08413 235300
E-mail	ravicn@vjit.ac.in
Date of birth	30-05-1978

Name	B. Rajesh
Designation	Assistant Professor
Agency & address	Vidya Jyothi Institute of Technology, Aziz Nagar Gate, Hyderabad-500 075
Telephones (Mobile; Landline)	9440377761, 08413 235300
E-mail	rajesheee@vjit.ac.in
Date of birth	10-10-1980

Endorsement from Head of Organisation

1. Name of Agency: Vidya Jyothi Institute of Technology, Hyderabad
2. I, on behalf of the organization, welcome the participation of Dr. A. Srujana as the Principal Investigator (PI) and Dr. C.N. Ravi, Mr. B.Rajesh as the Co-PI for the Project Proposal titled:
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Name & Designation: Dr. A. Padmaja Principal, Vidya Jyothi Institute of Technology, Aziz Nagar, Hyderabad – 500075.	Date:
Signature:	Place:
Stamp/ Seal:	

Section-2. Forwarding Letters

Undertaking from Principal Investigator

1. I have enclosed a print-copy and a soft-copy (PDF) of the Project Proposal titled: **Disposal and Recycling of solar Photovoltaic Modules** complete in all respect, along with (a) Endorsement from the Head of the Organisation (on letter head), and (b) Undertakings from the Collaborating Industries/Agencies
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3. I shall ensure that if equipment is available for use in my Organization, it will not be proposed to be purchased under the Project.

Name & Designation: Dr. A. Srujana Professor and Head Department of Electrical and Electronics Engineering, Vidya Jyothi Institute of Technology, Hyderabad	Date:
Signature:	Place:
Stamp/ Seal:	

2.4 Conflict of Interest

DEPARTMENT OF SCIENCE AND TECHNOLOGY

POLICY ON CONFLICT OF INTEREST

FOR REVIEWER & COMMITTEE MEMBER or APPLICANT or DST OFFICER ASSOCIATED / DEALING WITH THE SCHEME / PROGRAM OF DST

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2. **Specifications as to what constitutes Conflict of Interest**.

Undertaking from collaborating Industries / Agencies

1. Name of Agency: PROFUSE ENERGY & INFRASTRUCTURE PVT. LTD.,

2. I have gone through the Project Proposal entitled "**Disposal and Recycling of solar Photovoltaic Modules**" submitted by **Dr. A. Srujana** of **Vidya Jyothi Institute of Technology** for Management of waste from Power Industry funding and I hereby affirm that my Organization/ Company is committed to participate in the Project to the full extent as indicated in the Project Proposal in technical commitments described in the project proposal.

Name & Designation: Mr.K.Surendra Phani Sarma Chief Executive Officer, PROFUSE ENERGY & INFRASTRUCTURE PVT. LTD., Block No:106, Babukhan Millennium Centre, Somajiguda, Hyderabad – 500 082	Date:
Signature:	Place:
Stamp/ Seal:	

5. Code of Conduct

To be followed by Reviewers/Committee Members:

(a) All reviewers shall submit a conflict of interest statement, declaring the presence or absence of any form of conflict of interest.
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6. Sanction for violation

For a) Reviewers / Committee Members and b) Applicant

Any breach of the code of conduct will invite action as decided by the Committee.

Any of the following specifications (non-exhaustive list) imply Conflict of Interest if,

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(v) The Reviewer/Committee Member is a Head of an Organization from where the applicant is employed.

(vi) The Reviewer /Committee Member is or was, associated in the professional career of the applicant (such as Ph.D. supervisor, Mentor, present Collaborator etc.)

(vii) The Reviewer/Committee Member is involved in the preparation of the research proposal submitted by the applicant.

(viii) The applicant has joint research publications with the Reviewer/Committee Member in the last three years.

(ix) The applicant/Reviewer/Committee Member, in contravention to the accepted norms and ethics followed in scientific research has a direct/indirect financial interest in the outcomes of the proposal.

(x) The Reviewer/Committee Member stands to gain personally should the submitted proposal be accepted or rejected.

3. **Regulation**:

The DST shall strive to avoid conflict of interest in its funding mechanisms to the maximum extent possible. Self-regulatory mode is however recommended for stake holders involved in scientific research and research management, on issues pertaining to Conflict of Interest and scientific ethics. Any disclosure pertaining to the same must be made voluntarily by the applicant/Reviewer/Committee Member.

4. **Confidentiality**:

The Reviewers and the Members of the Committee shall safeguard the confidentiality of all discussions and decisions taken during the process and shall refrain from discussing the same with any applicant or a third party, unless the Committee recommends otherwise and records for doing so.

Section-3. Relevance of Proposed Project

Current Status of the technology

International

Recovering pure silicon from damaged or end-of-life PV modules can lead to environmental and economic benefits. The chemical processing is a very important stage of the recycling process in order to achieve these benefits. In this regard, a new de-metalization step of broken silicon cells and silicon cells production waste, which resulted in a reduction of waste and they receive salable products.

Solar photovoltaic panels' end-of-life material recycling:
End-of-life (EOL) solar panels may become a source of hazardous waste although there are enormous benefits globally from the growth in solar power generation. Global installed PV capacity reached around 400 GW at the end of 2017 and is expected to rise further to 4500 GW by 2050. Considering an average panel lifetime of 25years, the worldwide solar PV waste is anticipated to reach between 4%-14% of total generation capacity by2030 and rise to over 80% (around 78 million tonnes) by 2050. Therefore, the disposal of PV panels will become a pertinent environmental issue in the next decades. Eventually, there will be great scopes to carefully investigate on the disposal and recycling of PV panels EOL. The EU has pioneered PV electronic waste regulations including PV-specific collection, recovery and recycling targets. The EU Waste of Electrical and Electronic Equipment (WEEE) Directive entails all producers supplying PV panels to the EU market to finance the costs of collecting and recycling EOL PV panels in Europe. Lessons can be learned from the involvement of the EU in forming its regulatory framework to assist other countries develop locally apposite approaches. This review focused on the current status of solar panel waste recycling, recycling technology, environmental protection, waste management, recycling policies and the economic aspects of recycling. It also provided recommendations for future improvements in technology and policy making. At present, PV recycling management in many countries envisages to extend the duties of the manufacturers of PV materials to encompass their eventual disposal or reuse. However, further improvements in the economic viability, practicality, high recovery rate and environmental performance of the PV industry with respect to recycling its products are indispensable.

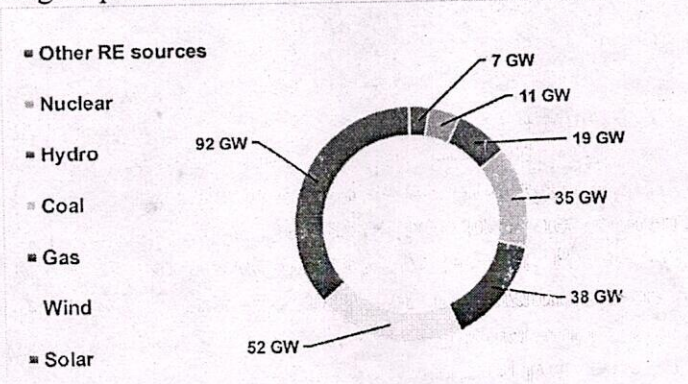

Fig1: Power generating capacity installed in 2017.

For Officers dealing with Program in DST

Any breach of the code of conduct will invite action under present provision of CCS (conduct Rules), 1964.

7. **Final Appellate authority**:

Secretary, DST shall be the appellate authority in issues pertaining to conflict of interest and issues concerning the decision making process. The decision of Secretary, DST in these issues shall be final and binding.

8. **Declaration**

I have read the above "Policy on Conflict of Interest" of the DST applicable to the Reviewer/ Committee Member/ Applicant/ DST Scheme or Program Officer # and agree to abide by provisions thereof.

I hereby declare that I have no conflict of interest of any form pertaining to the proposed grant

Dr. A. Srujana
(Signature with date)

Dept. Electrical & Electronics Engg.
Vidya Jyothi Institute of Technology
Hyderabad-500 075

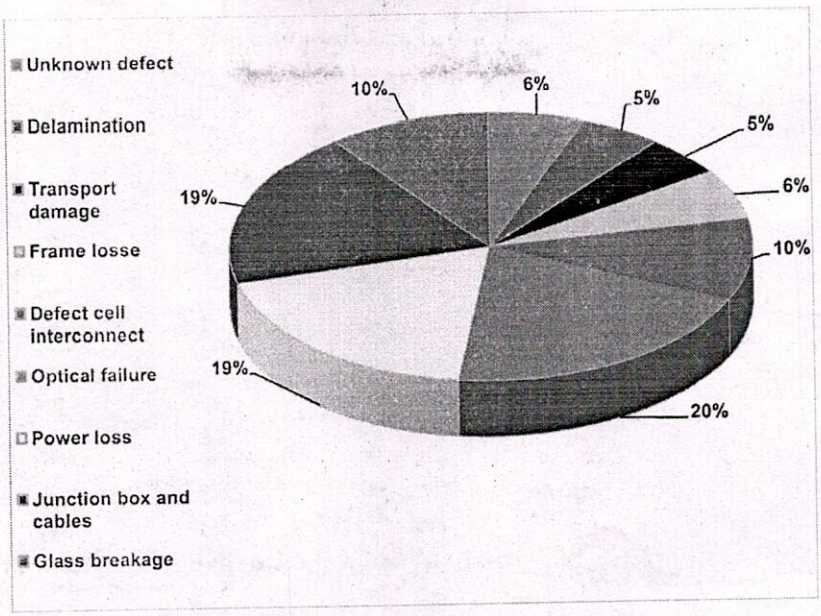

Fig 5: PV panel failure rate according to customer complaints

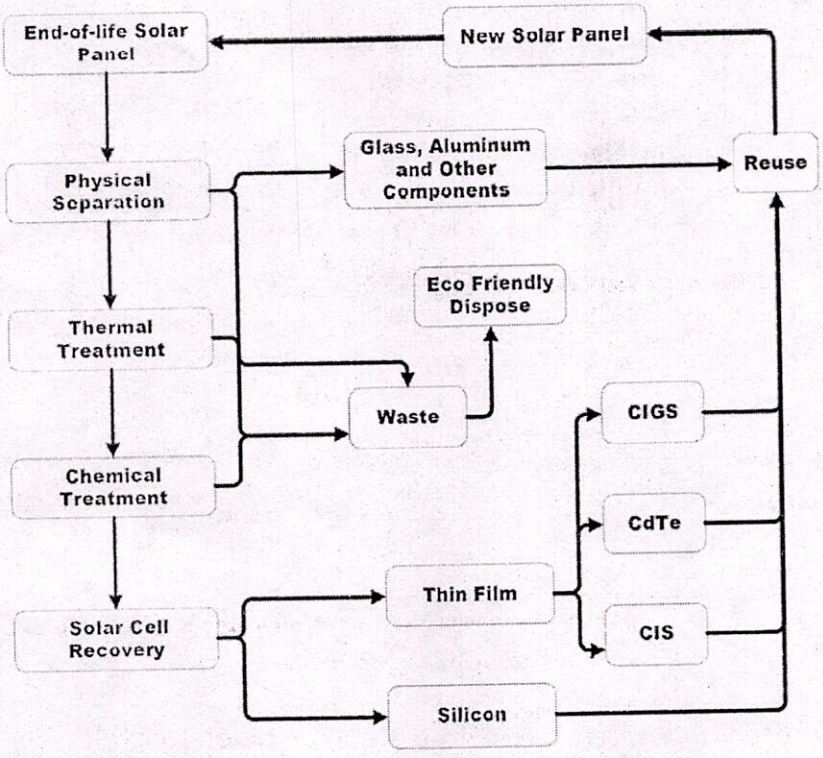

Fig 6: Different types of solar PV recycling processes

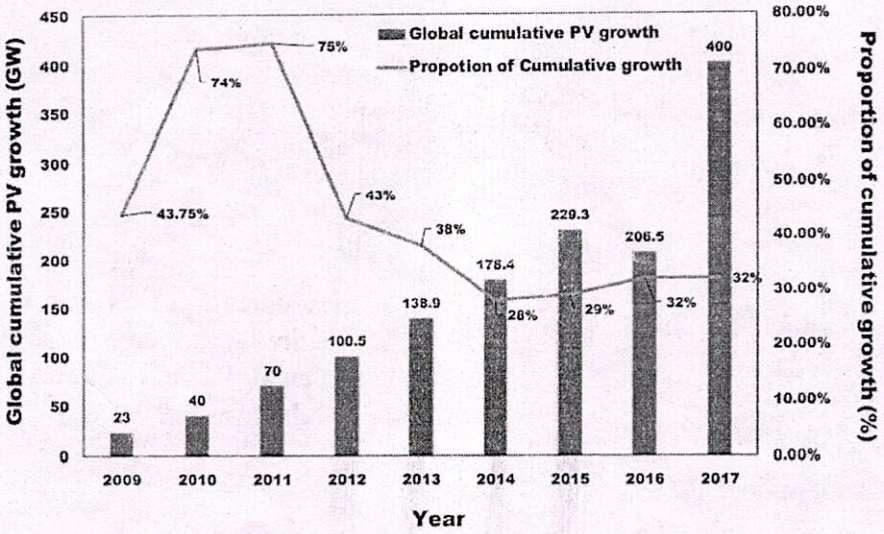

Fig2:Global growth of Solar PV Capacity

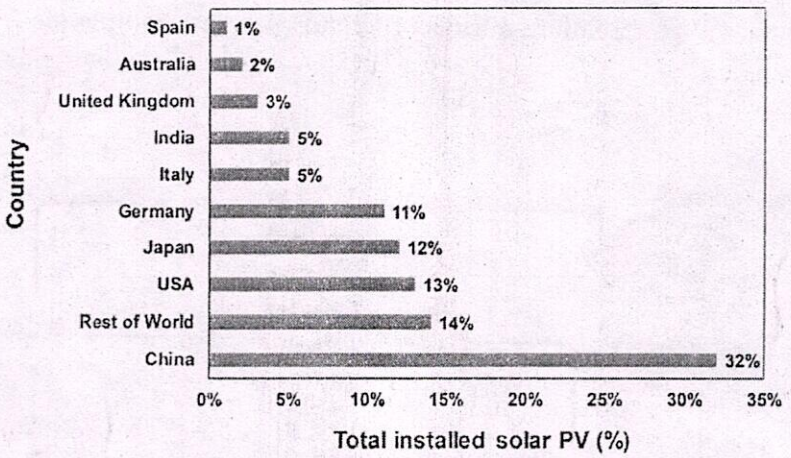

Fig3: The top 10 countries worldwide by total installed solar PV capacity at the end of 2017.

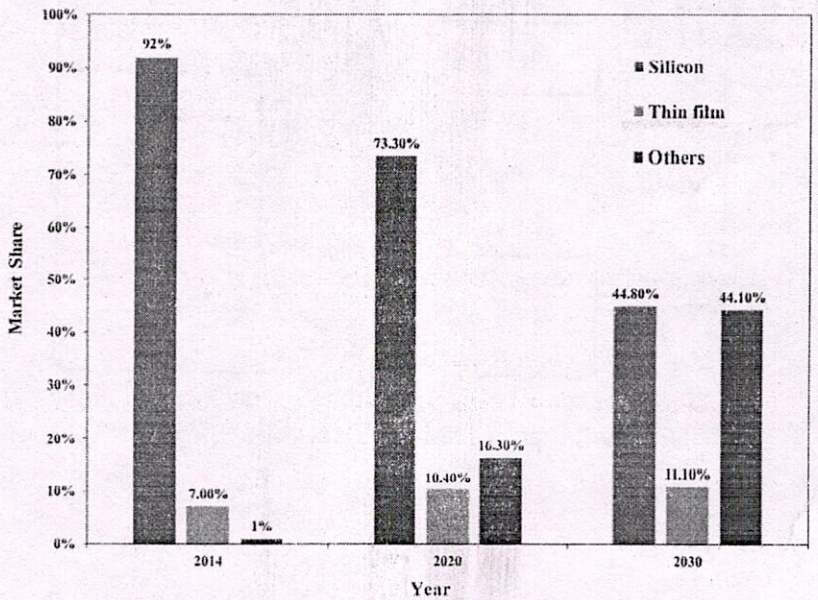

Fig 4: Market share of PV panels by technology type 2014-2030

Indian scenario and technological gap

Solar power may promise a bright future for India's energy requirements, but it produces mountain of waste. While the national government is pushing an ambitious solar power programme for India, it has, so far, failed to put in a mechanism to address the problem of waste, including environmentally hazardous materials, from solar photovoltaic panels that can be hazardous to the environment.

A recent report by renewable energy consulting firm Bridge to India (BTI) said that the solar photovoltaic panels' waste volume in India is estimated to grow to 200,000 tonnes by 2030 and around 1.8 million tonnes by 2050, it is almost 200 times the weight of the Eiffel Tower. As per the Indian government Ministry of New and Renewable Energy (MNRE), it is estimated that for each megawatt of solar power, 75 metric tonnes of photovoltaic modules are needed.

Solar photovoltaic panel is essentially made up of glass, metal, silicon and polymer fractions. While glass and aluminium, together constituting around 80 percent of the total weight, are non-hazardous, a few other materials used in the panel, like polymers, lead and cadmium compounds, are potentially environmentally hazardous. Hence, dispose off in an uncontrolled way, potential leaching of those hazardous materials at end-of-life can have negative environmental and health impacts.

Dispose of lead has a huge environmental impact which, decrease growth and reproductive rates in plants and animals, and several other health hazards. In human it affects kidney function, nervous, immune, reproductive and cardiovascular systems. Cadmium is a carcinogen with high toxicity as well as high accumulation potential.

The polymer component used in solar modules is difficult to recycle and can only be incinerated which again poses a significant health and environmental risk due to the formation of highly corrosive gases at the incineration stage.

Experts have been emphasizing that while solar installations are growing at a robust rate, attention has been paid to module recycling in India

Though all stakeholders recommend proper recycling for managing solar power waste, the report said that the reality is that the solar photovoltaic waste recycling is still at a nascent stage globally, both in terms of technical standards and physical infrastructure.

There are clear environmental and commercial benefits of properly disposing of solar waste. So, if you look at solar modules there is some amount of silver. While it is very small by weight, it is quite big in terms of commercial value. Then there is solar-grade silicon, which is about 40 percent by value. Because of the presence of such high-value materials, there are substantial commercial gains to be made. But the problem is that in India we don't have the requisite recycling facilities that can recover these materials. Right now we are not even able to separate glass from the metal frame, leave alone taking out silver or silicon from the modules.

If right practices are followed, there is a clear commercial and environmental gain. The right practices include using water efficiently in the cleaning of panels and proper recycling of solar panel waste.

PV recycling technology:

In recent years, R&D projects on PV recycling technology have been sponsored in **Europe, China, Japan and Korea,** and there has been significant patent activity for both crystalline silicon(c-Si) and thin-film PV module recycling technology in the same regions as well as in the United States. Recycling technology can be categorised as either bulk recycling (recovery of high-mass fraction materials such as glass, aluminum and copper) or high value recycling (recovery of both bulk materials and semiconductor and tracemetals). Bulk recycling is similar to existing laminated glass recycling technology in other industries, and may not recover environmentally sensitive (e.g., Pb, Cd, Se) or valuable (e.g., Ag, In, Te, solar-grade Si) materials in PV modules. High-value PV recycling consists of three main steps: pre treatment to remove theetal frame and junction box, delamination to remove the module encapsulant and recovery to extract glass and metals from the module. Some common goals in PV recycling technology are to maximise recovery yields, minimise impurities in the products of recycling and minimise capital and operating costs to be competitive with other disposal options Ensuring worker safety and environmental protection are additional priorities that are implemented through management systems such as OHSAS 18001 and ISO 14001, and air emissions controls and wastewater treatment technology.

In addition to technology, other related considerations that affect the viability of PV recycling are effective collection schemes, predictable waste volumes, customers for the products of recycling and regulations on the handling and transport of waste. These factors can affect commercial decisions on when and where to site PV recycling facilities and whether to operate them in a centralised or decentralised (mobile)manner.

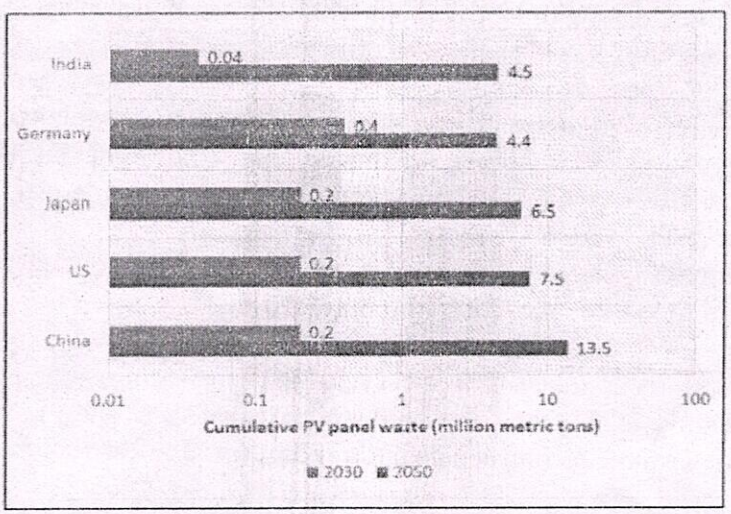

Fig 7. Estimated cumulative PV waste volumes in leading solar markets by 2030 and 2050 (regular loss scenario)

Finally thermal treatment and chemical treatment were used to recycling the materials from silicon base solar module. Two steps heating were used in the thermal treatment process. The glass plate could be recovered without breaking and could be directly used again as the module component when the temperature is well controlled. The silicon and Cu could be also recovered after chemical treatment. The recycling of materials from silicon based solar module is promising.

new materials or products are introduced in the market with little or no thought to its end of life management, finally passing the burden to society. Electronic waste is a case where in the country pushed ahead with digitization and connectivity but did not plan for the end of life management of waste and is now struggling to find a meaningful solution

Development status at the participating agencies

- Profuse Group is formed by a team of Young and Dynamic qualified professionals with the motto to serve Power sector especially Renewable Energy Sector (Solar, Wind, MSW & Biomass) providing end-to-end solutions. The company operates from Hyderabad. Profuse specialization ranges from core services to operations in solar energy space.
- Profuse strength stems from its knowledge based approach, highly experienced team and strong multi-disciplinary capabilities.
- PROFUSE GROUP fosters a culture of excellence and challenging environmental practices.
- PROFUSE GROUP designs and delivers energy solutions for customers by leveraging its domain and business expertise
- Profuse Group is formed by a team of Young and Dynamic qualified professionals with the motto to serve Power sector especially Renewable Energy Sector (Solar, Wind, MSW & Biomass) providing end-to-end solutions. The company operates from Hyderabad.

Significance of the project

Major applications of the proposed technology

- Companies where disposal and recycling of PV panels are executed

Target Beneficiaries & Expected Impact

- Individual people, Institute and industries want to dispose the used solar PV panel
- Lead in the PV panel has huge environmental impact which, need to be disposed safely without harming the environment.
- The polymer component used in solar modules is required to be disposed in a safe manner.

What further works will required after the project, for commercial exploitation of technology?

- Sharing the technology to the company who are willing to establish the setup for the solar PV disposal
- The companies willing to invest for setting up of disposal unit in VJIT institute campus.

Recently, the National Green Tribunal (NGT) was hearing a case regarding the use of "antimony-containing glasses in solar photovoltaic panels and the possible environmental risks or consequences at the end of life of such solar panels." Solar panels contain a substance called antimony, used to improve stability of the solar performance of the glass upon exposure to ultraviolet radiation or sunlight, which would leach from the glass when the waste panels were exposed to wet conditions.

Realising that there is no policy or rules on management of antimony-containing glass used in solar panels, the NGT in an order in February 2019 had directed the environment ministry to complete the exercise of preparing and declaring a policy or rules for management of antimony-containing solar glass panels within three weeks after the receipt of the blueprint from the MNRE. In March 2019, the MNRE had made public a draft of the blueprint to deal with antimony-containing solar panels.

The draft noted that solar panels with antimony-containing glass (SPACG) may be considered as a 'low effect' waste that needs to be regulated for environmentally safe handling, recycling or disposal. Antimony is a silvery-white metal that is found in the earth's crust. It is a type of heavy metal. Commercially, the most used compound of antimony is antimony trioxide (ATO), which is a white powder and slightly soluble in water, and the other compound is potassium antimony tartrate, which was used as an emetic (a medicine that induces nausea and vomiting) during the Middle Ages.

The MNRE draft blueprint noted that antimony in the form of potassium antimony tartrate is a toxic compound but the textured solar glasses used in solar photovoltaic modules contain antimony in the form of antimony trioxide, which is considered by the World Health Organization (WHO) to have very low toxicity, due to its low solubility in water and poor bioavailability. It also noted that that toxicological effects of antimony that may release from solar panel glass, even if it exceeds the specified WHO norms, will be less.
The MNRE's draft blueprint also noted that the recycling facilities for the solar panels with antimony-containing glass at the end of life is not yet available in the country. The draft is expected to be finalised soon after which environment ministry is expected to come out with a policy on it.

"Such facilities may be created by industry once the adequate quantity of photovoltaic waste is available for recycling and also a policy framework that stipulates the responsibility to the generator or producer for sending the waste for recycling," the draft added.

It also suggested that considering the leaching potential of antimony, the end-of-life solar panels may be treated as 'low effect waste' and handled as per the provisions under Hazardous and Other Wastes Management Rules, 2016.

Experts believe that there is no doubt regarding the benefits of solar power but they feel that to justify the 'green energy' tag, the solar sector needs to adopt a proper process to address critical issues like end-of-life recycling

In about 15 to 20 years from now, this waste could pose a serious threat on account of large volumes and the absence of an ecosystem comprising of policy framework and technology to manage this waste. The waste arising are not only solar panels but also connectors, cables, storage devices etc making it extremely complex to handle. It has always been the case that

- PV system operation - electricity production,
- dismantling the system,
- component recycling.

Methods of photovoltaic modules and cells recycling

PV modules recycling is becoming increasingly important with the higher demands for silicon. PV recycling process consists of two main phases (Park et al., 2015):

- Separating of PV cells. Using chemical or thermal procedure, the cells are separated in the recycling process.
- Cleaning the cell surface. During this phase, separated cells from PV modules are cleaned chemically or by laser techniques. The cleaning process removes unwanted layers (anti-reflective coating, metallization and PN junction and a silicon substrate which is prepared for its further use.

PV modules delamination is also required for the recycling process. EVA, glass, Tedlar, aluminium frame, steel, copper and plastics are removed and separated from each other in this step.

In the following section, three experiments for PV modules and PV cells recycling are presented and compared (chemical, thermal and mechanical methods) together with the laser method to obtain silicon wafers.

Technical Details

Targeted level of development under the project

There are two main types of solar panels, requiring different recycling approaches. Both types—silicon based and thin-film based—can be recycled using distinct industrial processes. Currently, silicon based panels are more common, though that does not mean that there would not be great value in the materials of thin-film based cells.

Research studies conducted on the topic of recycling solar panels have resulted in numerous technologies. Some of them even reach an astonishing 96% recycling efficiency, but the aim is to raise the bar higher in the future.

Silicon Based Solar Panel Recycling
The recycling process of silicon-based PV panels starts with disassembling the actual product to separate aluminium and glass parts. Almost all (95%) of the glass can be reused, while all external metal parts are used for re-molding cell frames. The remainder materials are treated at 500°C in a thermal processing unit in order to ease up the binding between the cell elements. Due to the extreme heat, the encapsulating plastic evaporates, leaving the silicon cells ready to be further processed. The supporting technology ensures that not even this plastic is wasted, therefore it is reused as a heat source for further thermal processing.

After the thermal treatment, the green hardware is physically separated. 80% of these can

Section-4. Project Work Summary

Detailed Objectives

Specific Objectives

- To develop guidelines and plan for recycling of PV modules.
- Develop a framework to ensure safe and efficient recycling of the waste solar PV modules used in various applications.

Scientific Basis and Methodology

1. Review Report on Existing Policy / Guidelines in India for Recycling of Solar Photovoltaic Modules

Under this task existing policy guidelines globally for recycling of solar PV modules will be reviewed. It is planned to review global prospective of recycling related to PV module and will identify gaps between what is currently happening in India and compare it with other countries.

2. Develop a framework and guidelines to ensure safe and efficient recycling of the waste solar panels

A detailed modeling and analysis of the complete system will be done for logistics (collection, transportation and safe disposal of end-of-life). This will be followed by the development of a prototype recycling plan for solar PV modules, which are currently being used in solar plants, micro-grids and in small-scale energy systems. This framework will be developed in consultation with Institutions such as, MoEF, MNRE, MOP, and the solar PV manufacturing and testing industry.

3. Knowledge sharing, dialogue and collaborations

This activity would focus on dissemination of the knowledge and build up capacity of various stakeholders on PV technologies and its applications.

The life cycle of the product includes all phases from raw material extraction, semi-finished products and finished products until the recycling or PV module at its end-of-life. Inputs of raw materials, semi-finished products, fuels and energy, waste and emissions, can be monitored at all stages. The following phases of the life cycle can be considered in the case of crystalline silicon photovoltaic modules:

- extraction of raw materials,
- manufacturing of metallurgical grade silicon (mg-Si),
- production of solar grade silicon (sog-Si),
- production of ingots and boards,
- manufacturing of PV cells,
- assembly of PV modules,
- installation of a photovoltaic system,

IEC 60904-5, Photovoltaic devices - Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method.

IEC 60904-7, Photovoltaic devices - Part 7: Computation of spectral mismatch error introduced in the testing of a photovoltaic device.

IEC 60904-8, Photovoltaic devices - Part 8: Measurement of spectral response of a photovoltaic (PV) device.
IEC 60904-10, Photovoltaic devices - Part 10: Methods of linearity measurement.

Innovative Elements/Components of the Project

- Low cost approach for recycling
- Simple methods of recycling
- Environmental friendly methods
- Quality material to be obtained by the end of recycling processes

readily be reused, while the remainder is further refined. Silicon particles called wafers are etched away using acid. Broken wafers are melted to be used again for manufacturing new silicon modules, resulting in 85% recycling rate of the silicon material.

Thin-Film Based Solar Panel Recycling

In comparison, thin-film based panels are processed more drastically. The first step is to put them in a shredder. Afterwards, a hammer mill ensures that all particles are no larger than 4-5mm, which is the size where the lamination keeping the inside materials together breaks, and hence can be removed. Contrary to silicon-based PV panels, the remaining substance consists of both solid and liquid material. To separate these, a rotating screw is utilised, which basically keeps the solid parts rotating inside a tube, while the liquid drips into a container.

Liquids go through a precipitation and dewatering process to ensure purity. The resulting substance goes through metal processing to completely separate the different semiconductor materials. The latter step depends on the actual technology used when producing the panels; however, on average 95% of the semiconductor material is reused.

Solid matters are contaminated with so-called interlayer materials, which are lighter in mass and can be removed through a vibrating surface. Finally, the material goes through rinsing. What is left behind is pure glass, saving 90% of the glass elements for easy re-manufacturing.

Proposed target specifications & performance standards

The technology of recycling solar PV panels is planned to focus on meeting the following standards for preparation of new solar PV panels.

Standards for Solar cells and Modules

Standards from this category regulate solar cells (modules) characteristic measurement, solar cells (modules) tests and other standards referring to solar cells (modules) production and testing production procedure, mechanic or electric photovoltaic module testing, I-U module characteristics measurement etc.

Solar Cells - General Standards

EN 50513, Solar Wafers - Data sheet and product information for crystalline silicon wafers for solar cell manufacturing.

EN 50461, Solar cells - Datasheet information and product data for crystalline silicon solar cells .

IEC 60891, Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices.

IEC 60904-1, Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics.

IEC 60904-2, Photovoltaic devices - Part 2: Requirements for reference solar cells.

IEC 60904-3, Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data.

IEC 60904-4, Photovoltaic devices - Part 4: Reference solar devices - Procedures for establishing calibration traceability.

Work package-2 (WP-2)

Goals in WP-2

Title of WP-2	Lab setup
Objective	Setup of infrastructure and lab for the equipment
Deliverable	Creating environment for the research work
Duration	12 months

Major Tasks in WP-2

1	From the shortlisted vendors ordering the equipment
2	Transport the equipment to the lab
3	Erecting of the equipment
4	Testing the functionality of equipment

Agencies & their roles in WP-2

ID	Agency	Role
A	VJIT	Based on the technology and cost effectiveness purchase order need to place for the purchase of equipments
B	VJIT	Arrange the transport facilities for equipment
C	VJIT	With the help of expert team from the vendor the equipments are need to setup or erect in the lab
D	VJIT	Test the erected equipment with the standards

Section-5. Detailed Work Plan

List of Work-Packages

No	Title of Work-Package	Lead Investigating Agency
1	Literature Survey, Identification of vendor	VJIT,
2	Lab setup	VJIT,
3	Collection of used PV panels	VJIT and Profuse Energy & Infrastructure Pvt Ltd
4	Recycling and disposal of PV panels	VJIT,

Work package-1 (WP-1)

Goals in WP-1

Title of WP-1	Literature Survey, Identification of vendor
Objective	Recent technology and modern tools availability and vendor are need to identify
Deliverable	Cost effective, modern technology devices are shortlisted to purchase
Duration	6 month

Major Tasks in WP-1

1	Detailed literature survey in India and International to be done
2	Identification of modern tools
3	Identification of vendor for the required technology
4	Shortlist the vendors and equipment

Agencies & their roles in WP-1

ID	Agency	Role
A	VJIT	Using the resources of the institute for the collection of literature in international and national level
B	VJIT	Based on the literature survey and the interaction with the experts Identification of modern tools
C	VJIT	Identification of vendor for the required technology by the interaction with the experts in the field
D	VJIT	Shortlist the vendors and equipment based on the technology, government guidelines and cost effective

Work package-4 (WP-4)

Goals in WP-4

Title of WP-4	Recycling and disposal of PV panels
Objective	Recycle the Solar cell and dispose other materials
Deliverable	Solar cell and harmless minimized waste materials
Duration	9 months

Major Tasks in WP-4

1	Collecting solar cell as the end of the process
2	Collecting aluminum in the process of separation
3	Separate different types of waste materials at the end of the process
4	Disposal of the waste materials

Agencies & their roles in WP-4

ID	Agency	Role
A	VJIT	In the process of solar panel disposal, the solar cells are collected at the end
B	VJIT	Aluminum is separated at the end of the process
C	VJIT	Different types of waste material are extracted in the process
D	VJIT	Find and use the best ways for the disposal waste materials

Work package-3 (WP-3)

Goals in WP-3

Title of WP-3	Collection of used PV panels
Objective	Evaluate the process of recycle and disposal of PV panel
Deliverable	Justify the betterment of the process developed for the recycle and disposal of PV panel
Duration	9 months

Major Tasks in WP-3

1	Collecting the used PV panels from the individuals / Institute / Industry
2	Physical separation
3	Thermal and chemical treatment
4	Solar cell recovery

Agencies & their roles in WP-3

ID	Agency	Role
A	VJIT	Collecting the used PV panels from the individuals / Institute / Industry
B	VJIT , Profuse Energy & Infrastructure Pvt Ltd	labor workers are used for Physical separation of solar PV panel
C	VJIT	Purchased equipments are used for the Thermal and chemical treatment
D	VJIT, Profuse Energy & Infrastructure Pvt Ltd	Solar cell recovered at the end of the process

NCIEEE'17 on April 17th and 18th, 2017, Sathyabama University, Chennai – 600 119, pp. 127-132.

4. Ganesan P, K. Vasanth, C.N. Ravi, (2017), "Soft Computing based Investigation of Satellite Image Segmentation in RGB and HSI Color Space", National Conference on NCIEEE'17 on April 17th and 18th, 2017, Sathyabama University, Chennai – 600 119, pp. 148-155.

Patents:

patent filed, Patent no:202041045339

Research Thesis Guided:

PG: 10 Thesis

Section-6. Budget Summary (in lakhs)

	Item	1st Year	2nd Year	3rd Year	Total
1.	Manpower	6,37,767	6,37,767	6,37,767	19,13,301
2.	Consumables	50,000	1,00,000	2,00,000	3,50,000
3.	Contingency	50,000	75,000	1,00,000	2,25,000
4.	Other Costs*	-	1,00,000	3,00,000	4,00,000
5.	Travel	1,00,000	1,00,000	1,00,000	3,00,000
6	Permanent Equipment	15,00,000	3,00,000	-	18,00,000
7	Overhead Charges	2,33,777	131277	133776	4,98,830
	Total	25,71,544	14,44,044	14,71,543	54,87,131

Total Project Budget = Rs. 54.87131 lakhs,

Request for TPEM Grant= Rs.54.87131 lakhs,

Partners Contributions= --

Research Manpower to be engaged in the project:

JRF (Rs. 25,000 +HRA)	SRF (Rs. 28,000+HRA)
27,500	30,800

Norms for Manpower & Overheads, from TPEM Grants

Manpower @ Research Institutes

Nomenclature & Emoluments	**Qualification**
Junior Research Fellow (₹25,000/- + HRA)	Post Graduate Degree in Basic Science with NET qualification or Graduate Degree in Professional course with NET qualification or Post Graduate Degree in Professional Course
Senior Research Fellow (₹28,000/- + HRA)	Qualification prescribed for JRF with two years of research experience
Research Associate-I (₹36,000/- + HRA)	Ph.D/ MD/ MS/ MDS or equivalent degree or having 3 years of research, teaching and design and development experience after MVSc/ M.Pharm/ ME/ M.Tech with at least one research paper in Science Citation Indexed (SCI) journal. The Research Associate Scale may be decided by the institute/ organization based on the experience of the candidate.
Research Associate-II (₹38,000/- + HRA)	
Research Associate-III (₹40,000/- + HRA)	

Section-7. Itemised Budget

Manpower

Budget for Salaries

Designation	Qualification	Salary per month	Number of Persons	Amount (in lakhs)	Role Description
JRF	M.Tech / M.E	27,500	1	9,90,000	Executing the process and support the SRF
SRF	M.Tech / M.E with two years of research experience	30,800	1	11,08,800	Conducting the experiment as per the directions of PI and CI
				?19.13301 lakhs	

Budget for Salaries - Partner Contribution - NA

Equipment proposed to be procured

Please provide justification in Annexure on the use of equipment in project. Provide supporting Quotation

Budget for Permanent Equipment

Description of Equipment	Foreign/ Indigenous	Unit Landed Cost (CIF, Custom Duty of Items etc.)	Number of Items	Total(in ? lakhs)
PV panel disassembly equipment	Indigenous	3,83,000	1	3.83
Furnace	Indigenous	5,00,000	1	5.00
Shredder	Indigenous	2,90,000	1	2.90
Hammer mill	Indigenous	82,000	1	0.82
Glass crusher	Indigenous	1,45,000	1	1.45
Crushed / milled scrap holding bin	Indigenous	1,00,000	1	1.00
			Total	**15.00**

List of equipment available with participating agencies, relevant to the project

Description of Equipment	Foreign/ Indigenous	Agency where it is located
Digital Library	Foreign and Indian	Central Library
Computers and printing facilities	Indian	Department of Electrical and Electronics

Section-8. Biodata of Investigators

Principal Investigator (1):

Dr. A. Srujana
Professor and Head
Department of Electrical and Electronics Engineering,
Vidya Jyothi Institute of Technology, Hyderabad

Gender & Date of Birth: Female, 23-07-1977

Qualifications: M.Tech., Ph.D

Employment Experience (Last 10 years):

October 2019 to till date: Professor and Head, Vidya Jyothi Institute of Technology, Hyderabad

November 2013 to October 2019: Principal and Professor, Sri Venkateswara Engineering College, Suryapet

March 2012 – November 2013: Professor and Vice Principal, Sri Venkateswara Engineering College, Suryapet

August 2010 to March 2012: Professor and Head, Sri Venkateswara Engineering College, Suryapet

Publications (Last 5 years):

1. Dr A.Srujana "Performance Evaluyation of Bi Directional DC/DC Converters with Buck, Boost Operations" International Journal of Computer Science Information and Engineering Technologies .Vol 2,Issue 4. 2015
2. E.Ravi Naik and Dr A.Srujana "Power Generation Method from Adaptive Control Power Point Tracking System" International Journal and Magazine of Engineering ,Technology,Management and Research . Vol 2,Issue 6 Dec-2015
3. Narender Reddy Narra O.Chandrashekar and Dr A.Srujana "Power Quality Enhancement in Micro Grids by Employing MPC-EKF" International Journal of Engineering and Technology ,7(3)(2018) 996-999.
4. Narender Reddy Narra O.Chandrashekar and Dr A.Srujana "Power Quality Enhancement by MPC based Multi level Control Employed with Improved Particle Swarm Optimized Selective Harmonic Elimination" ENERGY SOURCES PART A RECOVERY,UTILIZATION AND ENVIRONMENTAL EFFECTS, Taylor & Francis
5. Venugopal Reddy Bodha ,Dr A.Srujana and O.Chandrashekar "A Modified H Bridge Voltage Source Converter with Fault Ride Capability" ELSEVIER Journal for ENERGY 165 (2018) 1380-1391

6. Dr.A.Srujana, Venugopal Reddy Bodha. (2020). Combination of ANFIS and PI Based Add-on Controller for Secondary waves and in Least Voltage Micro Grid. *International Journal of Advanced Science and Technology*, *29*(7), 811 - 822.
7. Kore. Manohar, Dr. A. Srujana (2020), "HARMONICS SUPPRESSION IN INDUCTION MOTOR WITH SVPWM IN PV SYSTEM", JCR.Volume: 7, Issue: 16: 2693-2703.
8. K. Rakesh Kumar, Dr. A. Srujana (2020), "PLUG-AND-PLAY COMPLIANT CONTROL HYBRID SYSTEM FOR MICRO-GRID", JCR. Year: 2020, Volume: 7, Issue: 4: 3944-3959.

Patents:

Patent filed, Patent no: **202041044434**
Title of the Patent: **Design Implementation and simulation of pre paid, post paid digital electric meter, theft monitoring system with SMS, voice alert**

Research Thesis Guided:

PG: 15 Thesis
Ph. D: 4 Thesis

Temporary Registration No. : TPN / 57871

(2)

सत्यमेव जयते
Ministry of Science & Technology
Government of India

Project Proposal On

"Ujwala Samriddh Grameena Mahila Prerak Abhivrudh Prasthaan."

Submitted to

Division :SEED

Programme or Scheme : WOMEN TECHNOLOGY PARK

Submitted by

Project Investigator:

Dr. D Aruna Kumari

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY-Hyderabad

Dept. Electrical & Electronics E...
Vidya Jyothi Institute of Technolog...
Hyderabad-500 075

Part 1 : General Information

General Information:

1.Name of the Institute/University/Organisation submitting the Project Proposal :

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

2. State	Telangana
3. Principal Investigrator Name:	Dr. Aruna Kumari
4. Category:	SC
5. Type of the Institue :	Academic Institutions (Private)
6. Project Title :	Ujwala Samriddh Grameena Mahila Prerak Abhivrudh Prasthaan.
Division :	SEED
8. Programme Or Scheme :	WOMEN TECHNOLOGY PARK
9. Academic Area :	Food and Nutrition, Electronics,Computers and Communication Engineering,
10. Application Area :	Digital technologies, Food and agriculture, Health, Security,
11. Goverment National Initiative :	Swachh Bharat, Startup India, Digital India,
12. Type of Proposal :	Proposal Against Call
13. Project Duration :	3 Years and 0 Months
14. Proposal Submit Date :	31/10/2020
15. Project Keywords :	Coconut water Extraction , solar food maker, storage of food grains and Health Hygiene safety

16. Project Summary :

Temporary Registration No. : TPN / 59786

(3)

सत्यमेव जयते
Ministry of Science & Technology
Government of India

Project Proposal On

"AI Technique for optimization of waste disposal in electric power generation company"

Submitted to

Division : Technology Development Transfer

Programme or Scheme : Waste Management Technologies

Submitted by

Project Investigator:

Dr. C N Ravi

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY-Hyderabad

PROFESSOR
Dept. Electrical & Electronics Engg
Vidya Jyothi Institute of Technology
Hyderabad-500 075

Part 1 : General Information

General Information:

1.Name of the Institute/University/Organisation submitting the Project Proposal :

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

2. State	Telangana
3. Principal Investigrator Name:	Dr. C N Ravi
4. Category:	General
5. Type of the Institue :	Academic Institutions (Private)
6. Project Title :	AI Technique for optimization of waste disposal in electric power generation company
7. Division :	Technology Development Transfer
8. Programme Or Scheme :	Waste Management Technologies
9. Academic Area :	Electrical Engineering,
10. Application Area :	Energy,
11. Goverment National Initiative :	Swachh Bharat, Innovate India,
12. Type of Proposal :	Proposal Against Call
13. Project Duration :	2 Years and 0 Months
14. Proposal Submit Date :	30/11/2020
15. Project Keywords :	optimization, Genetic Algorithm, Intelligent algorithm, minimization

16. Project Summary :

Carbon foot print is latest hot discussion and all the countries are started the initiation to minimize it. One of the main carbon emission industries is thermal electrical power generating company. For the social welfare the emission has to minimize to maximum extend. The electrical power generation company as well needs to minimize the generation cost for the better operation. Minimizing carbon foot print and minimal power generation cost are opposite to each other. When the optimization focused to minimize the generation cost it lead to increase the carbon foot print and vice versa. This paper addresses the constraint the optimization problem which needs the objective of reducing both emission and generation cost. Electrical power generating cost of thermal power plant is nonlinear and non-convex in nature. Likewise the emission produced by the thermal power plant is complex mathematical problem. Intelligent algorithms are best suitable to solve these types of practical problems. Present status is Genetic Algorithm GA is adopted to find the constrained emission minimization. GA uses the Darwin theory for the optimization of emission in the plant. It uses the selection, cross over, mutation and stopping criterion to get better result.

Part 2: Particulars of Investigators

Temporary Registration No. : TPN / 58762

(4)

सत्यमेव जयते
Ministry of Science & Technology
Government of India

Project Proposal On

"Smart system for waste management of electric power generation plant"

Submitted to

Division : Technology Development Transfer

Programme or Scheme : Waste Management Technologies

Submitted by

Project Investigator:

Dr. D Bala Gangi Reddy

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY-Hyderabad

PROFESSOR
Dept. Electrical & Electronics Engg
Vidya Jyothi Institute of Technology
Hyderabad-500 075

Part 1 : General Information

General Information:

1.Name of the Institute/University/Organisation submitting the Project Proposal :

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

2. State	Telangana
3. Principal Investigrator Name:	Dr. D Bala Gangi Reddy
4. Category:	General
5. Type of the Institue :	Academic Institutions (Private)
6. Project Title :	Smart system for waste management of electric power generation plant
7. Division :	Technology Development Transfer
8. Programme Or Scheme :	Waste Management Technologies
9. Academic Area :	Electrical Engineering,
10. Application Area :	Waste Processing,
11. Goverment National Initiative :	Swasth Bharat,
12. Type of Proposal :	Proposal Against Call
13. Project Duration :	2 Years and 0 Months
14. Proposal Submit Date :	30/11/2020
15. Project Keywords :	Waste Management, coal, ash, genetic algorithm, Intelligent smart system

16. Project Summary :

Waste management in the electric power generation plant is big task and need an efficient and smart technique. This proposal uses the intelligent technique, genetic algorithm for the waste disposal management system. During the last few years, environment has become an issue of paramount importance. Almost all world powers, including India, have realised that to sustain this planet we need to focus on the environmental wellbeing. Keeping this urgency in mind there have been several national and international seminars and conferences. Several treaties and agreements as well as regulations have been signed and formulated. Among various threats to the ecological balance the humongous amount of waste generated by human civilisation is of a tremendous concern. And a significant contributor to the accumulating waste is the power sector. Every day the power sector generates an alarming amount of waste but it also consumes a significant volume of the waste products for the waste-to-energy process.

At the beginning of 2020, the Government of India made an important series of changes to the nation's coal sector through an ordinance and then amendments to the Coal Mines Special Provisions Act, 2015. Through these, the government has expanded opportunities for privatised, commercial mining. Coal blocks can now be owned by private entities without any prior coal mining experience and any "specified end-use."

These big shifts have raised many questions about what the government intends to achieve by commercialising coal in this era of intense competition from renewables in the electricity sector, the rising NPAs of thermal power plants TPPs and a massive global withdrawal from fossil fuel for climate and environmental reasons.

(5)

Show pictures

Department of Science & Technology

Subject: Acknowledgement of Project Under Consideration & Reference File No.

Dear Dr. vasanth kishorebabu

System Project Management

www.onlinedst.gov.in | Email:

This refers to the project proposal entitled **Farmer friendly Automatic equipment for the extraction of coconut products** testing the proposal submission submitted by you for financial support to this Department.

Please note the File Number: **SP/YO//2019/960** for future reference

This project will be considered under SEED Division and **Scheme for Young Scientists and Technologists** Scheme which is being handled by the following officer:

Programme Officer : Dr. Rashmi Sharma , Scientist - 'E', Email Id: r.sharma72@nic.in

Please mention the above FILE NUMBER and TITLE OF THE PROJECT in all future correspondences with DST. You can access this project account at www.onlinedst.gov.in using the Principal Investigator (PI) username and password

(6)

Department of Science & Technology

Subject: Acknowledgement of Online Project Submission & Temporary Registration No.

Dear Dr. vasanth kishorebabu

System Project Management

onlinedst.gov.in | Email:

This is to acknowledge the online submission of your project proposal entitled **Low Cost Strip based Wearable Hearing aid for Children with Mild Hearing Impairment** testing the proposal submission.
You can track the status of your proposal quoting the reference as given below:

Temporary Registration Number : **TPN / 42131**

You will be receiving a File Number shortly.

Please mention TEMPORARY REGISTRATION NUMBER and TITLE OF THE PROJECT in all future correspondence with DST, till you receive the File Number. You can access this project account at http://onlinedst.gov.in/ using the Principal Investigator (PI) username and password.

Regards
Administrator
e-PMS

(7) (7)

National Grand Challenge Award for Designing User Friendly Smart Solar Cooking Solutions

DEPARTMENT OF SCIENCE AND TECHNOLOGY
GOVERNMENT OF INDIA

COVER SHEET

Title of the proposed design:

"Zobhana Surya Paka Nirmimite" – Smart Solar Cooking setup for Small Community Cooking

Design Category :
(Tick the appropriate)

- [X] Small Community Cooking
- [ ] Large Community Cooking
- [ ] Household Cooking

Submitted by:

Name of the Proposer: Dr.K.Vasanth, Professor

Name of the Co-Proposer: Dr.C.N.Ravi, Dr.P.Ganesan, Dr.V.G.Sivakumar, Dr.M.Vadivel

Official Postal Address: Department of E.C.E/E.E.E, Vidya Jyothi Institute of Technology, Aziz Nagar, Chilukur Road, Hyderabad- 500075, Telangana.

Phone:91-8413-235300/399 Mobile:9573561857 **Email:vkbece@vjit.ac.in**

Send to : (Organizer's Address)

National Innovation Foundation - India, Grambharti, Amrapur, Gandhinagar - Mahudi Road, Gandhinagar, Gujarat Pin: 382650

Dr. A. Srujana <eeehod@vjit.ac.in>

Fwd: Acknowledgement for proposal no.DST/TDT/148-AMT/2017 submitted under AMT Program

1 message

RAVI CN <ravicn@vjit.ac.in> Tue, Nov 3, 2020 at 11:01 AM
To: "Dr. A. Srujana" <eeehod@vjit.ac.in>

---------- Forwarded message ---------
From: **S. Mubashir** <sajid@nic.in>
Date: Tue, Feb 14, 2017 at 10:15 PM
Subject: Acknowledgement for proposal no.DST/TDT/148-AMT/2017 submitted under AMT Program
To: <ravicn@vjit.ac.in>
Cc: Indu Lakhina <indulakhina1@gmail.com>, Madhusudhanan Pillai <mrcm1962@gmail.com>

Dear Dr. Ravi,

This is to confirm that we have received your project proposal titled Development of IIOT based solar powered air conditioner in educational institute, submitted under the *Advanced Manufacturing Technologies (AMT) Program, against the 2nd Call for Proposals (Dec.1, 2016 - Jan 31, 2017).*

This proposal is being considered under Level-1: Proof of Concept Level-1 Prototyping Projects (TRL 4-5), Category 5: Smart Manufacturing - Automation and Information C5 Communication Technologies (ICT); Advanced Robotics (AR) C5 Industrial Internet of Things (IIOT).

You may kindly quote the proposal reference number DST/TDT/148-AMT/2017, for corresponding with us on this project proposal.

Since we have got about 285 project proposals, the evaluation process will take some time and we will be able to communicate the initial decisions only in early April 2017. In the meantime, we may contact you for any clarification or additional information; and you may also send us any supplementary information related to this project.

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Best regards,
S. Mubashir
Scientist "G", Department of S&T-G.o.I.,D-4, Technology Bhawan, New Delhi 110016
Land-Phone:011.26512463, Email:sajid@nic.in, Skype:sajid.mubashir@live.in

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Dr.C.N.Ravi,
Professor/EEE,
Vidya Jyothi Institute of Technology,
Hyderabad - 500075,
Ph:9444425853

(8)

सत्यमेव जयते

Department of Science & Technology (DST)
Technology Development & Transfer (TDT) Division

Project Proposal under
Advanced Manufacturing Technology (AMT) Program

Project Title	Development of IIOT based solar powered air conditioner in educational institute
Category	Level-1: Proof of Concept & Prototyping Projects (TRL 4-5)
Research Area	Industrial Internet of Things (IIOT)
Principal Investigator	Dr. C.N. Ravi and Dr. D. Bala Gangi Reddy
Lead Institution	Vidya Jyothi Institute of Technology (Autonomous), Aziz Nagar, C.B.Post, Hydrabad, T.S
Date of Submission	30-01-2017

I. Proposal Summary

1.	Project Title	Development of IIOT based Solar powered Air conditioner in educational institute
2.	Project cost *(Amount in lakhs)*	DST: 46 Lakhs
3.	Duration *(in months)*	*24 months*
4.	PI Name Date of Birth	Dr. C.N. Ravi, Dr. D. Bala Gangi Reddy, 30/05/1978 01/05/1975
5.	Lead Organisation	*Vidya Jyothi Institute of Technology, Aziz Nagar, C.B.Post, Hydrabad, T.S*
6.	Lead Organisation Status	*Private Enineering College (Autonomous)*
7.	Objectives ➢ To use IIOT for the control of solar powered AC in an efficient way ➢ To Develop a maximum power point tracking for Photovoltaic Panel using intelligent algorithm – Particle Swarm Optimization (PSO) ➢ Design of efficient power controller for solar powered AC	
8.	Methodology ➢ Develop IIOT based solar powered Air Conditioner (AC) model simulation with sensors ➢ Develop a centralized controller which uses Particle Swarm Optimization (PSO) for Maximum Power Point Tracking Technique ➢ Fabricate the simulated IIOT based solar powered Air Conditioner (AC) model ➢ Experimental verification of the simulation results ➢ Analysis and testing the implementation for the portability of common usage	
9.	Deliverables	From the proposed system the following deliverables can be achieved. 1) IIOT based controller for solar powered AC with PV panel 2) PV system with maximum power point tracking system used to power AC which is connected to internet. 3) Controller to solar powered AC based on PSO intelligent algorithm

10. Budget details:

A.	Project Manpower (Post & Nos)	JRF-1
B.	List of Equipments required	Internet, PV solar panel system of 25 KW, Air Conditioner, Sensors, Smart Energy Meters, Computer, etc.,
C.	Details of Fabricated Plant /prototype ,if any	IIOT enabled AC with sensors, Battery system, Sensing and Measuring Instruments, etc.,

University/College : College
Name of the College : Vidya Jyothi Institute of Technology
Name of the University : Jawaharlal Nehru Technological University
Whether the college is located in rural/backward area : Yes
Whether the University/College/Institution is approved under section 2 (f) and 12 (B) of the UGC Act ? : Yes, View 2(f)& 12 B recognition letter issued by UGC

Proposed Research work

Project Title : FREQUENCY RESPONSE OF TRANSFORMER

Introduction : (Including Origin of the research problem..) :

Thework relates to determining the various resonant frequencies of transformer toassess the movement of the winding. A transformer contains core to providemagnetic path of the flux. Different windings containing copper conductor withappropriate insulation and oil as cooling and insulation medium. Thetransformer is tested at manufacturers' works with routine and mandatory tests.

Thetransformer is transported to site and commissioned. Transformers being ofheavy weight any transportation may cause internal movement of the component. eg.Core or winding. Since the relative distance between the core to winding aswell as winding to winding are likely to be disturbed, it can affect high voltage withstand characteristic. Itis therefore imperative that the integrity of the transformer is checked beforeit is put into operation. Although there are a few tests prescribed to becarried out at site like continuity test for winding, moisture content in oil,no major tests with regard to insulation is specified. It is after severalreported failures of transformers at site, either during commissioning or aftera few years of operation that a concern has emerged regarding diagnosticmeasurement. Several measurements have been recommended to be carried out atsite to assess the degradation of winding insulation for life assessment. The SweepFrequency Response Analysis (SFRA) is one of the major diagnostic techniquesaccepted world over to be carried out for transformers periodically by electricityboards and all other utilities.

It has also emerged as a majordiagnostic test for transformers. In Addition to the tests recommended to becarried out as above, it is important to compare the FRA before and after theshort circuit test of the transformer. The method has been also recommended by CIGRE workingcommittee.

A samplemeasurement using FRA on transformer gives abrief highlight of the concept of frequency resonance analysis. The origin ofFRA, usefulness in carrying out FRA for diagnostic of transformer., The advantage in terms of saving the transformeragainst a fault is clearly indicated. A detailed write up on specification and capability is enclosedas M5400 sweep frequency analyzer.

Objectives :

Theproject envisages establishing a research centre in diagnostics of powertransformer with a view to enhance the residual life of transformer with theaid of Frequency Response Analysis (FRA). The economic Consideration drives thediagnostic of various **types** on transformer such that useful life can beenhanced. The objective is to establish the FRA facility to generate data,train research students and utilize in the laboratory or at site to determinethe movement of winding inside transformer. Such **measurements** can be used to predictthe type of refurbishment and renovation work which requires

ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANTS COMMISSION

Minor Research Project (MRP) 2015-16

APPLICATION FORM

Subject Applied

MRP ID : **ROMRP-SERO-ELEC-2015-16-88208**
Regioal Office : Southern Eastern Regional Office (SERO)
Research Project : Minor
Broad Subject : Electrical Engineering
Areas of Specialization : POWER SYSTEMS
Duration : 2 Year, View Declaration Certificate

Principal Investigator

Name : Dr. D. BALA GANGI REDDY, Male
Date of Birth : 01/05/1975
Category : GENERAL
Educational Qualification : PhD
Designation : Professor
Correspondence Address : PROF. IN EEE DEPT, VJIT, AZIZ NAGAR, GANDIPET POST, HYDERABAD -500075
Email : dbgr.vjit@gmail.com
Contact No. : 9440347421
Whether Principal Investigator is appointed on regular basis? : Yes
Is Principal Investigator superannuated? : No

Experience Detail

Teaching Experience : UG Level :15 PG Level :10
Research Experience : 5
Ph.D. Status : Awarded
Year of Award of Doctoral degree : 2014
Title of Thesis of Doctoral degree : Available Transfer Capability enhancement using FACTS controllers

Publication Details with impact Factor(only for Science Subjects):

Papers Published : Accepted :20 Communicated :0
Books Published : Accepted :4 Communicated :0
View List of Paper[s]

Project Applied

Name of the Institute : Vidya Jyothi Institute of Technology
Institute Address : Vidya Jyothi Institute of Technology, Aziz Nagar Gate,C.B. Post, Hyderabad, Telangana 500075
Department : EEE

Amount of Equipment : 1400000

Total : 1500000

Whether the teacher has received support for the research project from the UGC from any other agency? : No

Details of the Project/scheme completed or ongoing with the P.I :

NO

Institutional and Departmental facilities available for the proposed work :

NO

Other Infrastructural facilities :

NO

Any other information which the investigator may like to give in support of this proposal which may be helpful in evaluating :

NO

Recommendation/ Forwarding letter from the Principal: View Principal Letter

DECLARATION

I hereby declare that I have read the guidelines of Major Research Project Scheme of the University Grants Commission. In the event of a project being awarded, I undertake to engage myself for research work on the subject. I further declare that to the best of my knowledge and belief, the particulars given in the form are correct.

Date :24/08/2015 13:43:52

Print Exit

to be taken up forimproving the active life of old transformers. igh voltage withstand characteristic. Itis therefore imperative that the integrity of the transformer is checked beforeit is put into operation. Although there are a few tests prescribed to becarried out at site like continuity test for winding, moisture content in oil,no major tests with regard to insulation is specified. It is after severalreported failures of transformers at site, either during commissioning or aftera few years of operation that a concern has emerged regarding diagnosticmeasurement. Several measurements have been recommended to be carried out atsite to assess the degradation of winding insulation for life assessment. The SweepFrequency Response Analysis (SFRA) is one of the major diagnostic techniquesaccepted world over to be carried out for transformers periodically by electricityboards and all other utilities.

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Methodology :

A sample measurement using FRA on transformer gives a brief highlight of the concept of frequency resonance analysis. The origin of FRA, usefulness in carrying out FRA for diagnostic of transformer., The advantage in terms of saving the transformer against a fault is clearly indicated.

View Year wise plan of work

Details of Collaboration, if needed :

Assesment Certificate: View Assesment Certificate

Financial Assistance

Hiring Services : 20000
Field Work and Travel : 20000
Chemicals and Glassware : 20000
Contigency (including special needs) : 20000
Books and Journals : 20000
Equipment if needed : Yes

Please specify name and approx. cost along with the quotation :

S. No.	Item	Rs.in Lakhs
1.	FRA	8
2.	Digital Oscilloscope& Accessories	1.5
3.	Transformer Models	2.5
4.	Computers & Peripherals	2.0
	Total (A)	14