An experimental investigation on hydrogen production using solar energy

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Submitted By : Dr. I.S.N.V.R. SNVR PRASANTH
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PROPOSAL DETAILS

(CRG/2023/000703)

Dr. I.S.N.V.R. SNVR PRASANTH

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Associate Professor (Mechanical Engineering)

Malla Reddy Engineering College

Maisammaguda, dhulapally (post via. kompally), secunderabad, rangareddy dt, Hyderabad, Telangana-500100

Technical Details :

Scheme :	Core Research Grant		
Research Area :	Mechanical & Manufacturing Engineering & Robotics (Engineering Sciences)		
Duration :	36 Months	**Contact No :**	+919963244299
Date of Birth :	10-Dec-1977		
Nationality :	INDIAN	**Total Cost (INR) :**	34,40,000

Is PI from National Laboratory/Research Institution ? No

Project Summary :

The goal of this research is to find concepts for solar-powered hydrogen synthesis from water that are both technically and financially practical. The final goal of the project was to choose one or more competing ideas for a pilot-scale solar energy demonstration. The success of the pilot-size plant would serve as the basis for securing public and private resources for the development and testing of the full-scale facility. If this business effort is financially successful, the general people will have access to a renewable and unbounded source of energy carrier for use in balancing electric power loads and as a carbon-free transportation fuel. Within the Office of Hydrogen Fuel Cells and Infrastructure Technologies, the Sun Hydrogen Generation Research (SHGR) initiative incorporates technologies pertinent to hydrogen research. The Office of Hydrogen Fuel Cells and Infrastructure Technology (HFCIT) and the Office of Solar Energy Technologies are both involved in the Solar Hydrogen Generation Research (SHGR) project, which encompasses technologies important to research on hydrogen (SET). Despite the fact that the photo electrochemical work is in line with HFCIT, some of the technologies in this effort are also consistent with the knowledge and methods found in concentrated solar power and photovoltaic technology under the Office of Solar Energy Technologies (SET). The purpose of producing hydrogen using only water and sustainable solar energy as feedstock is achieved by thermochemical water splitting. This chemical process splits water into hydrogen and oxygen using only heat or a combination of heat and electrolysis instead of pure electrolysis.

Objectives :

This article provides an overview of the technologies for producing hydrogen, particularly solar-powered alkaline water electrolysis. Alternatives to fossil fuels and their availability and pricing issues, which are destroying small, emerging, oil-importing economies, include solar energy and hydrogen (an energy carrier). Yet, a significant disadvantage to fully utilizing solar energy, in particular photovoltaic (PV), is the reduction in conversion efficiency of PV cells as a result of rising cell temperatures when in use. Also, hydrogen must be created in gaseous or liquid form before it can be used as fuel, but the main conversion process it currently goes through generates a lot of carbon dioxide, which is bad for the environment because it causes global warming. Researchers intend to conduct field testing of their prototype. Throughout the summer, hydrogen would be kept in a small, underground pressure vessel and pumped throughout the house in the winter. If everything goes as planned, Martens says the team may develop a larger neighborhood system or install 20 panels at the house to allow other families to use the "green" hydrogen.

Keywords :

Hydrogen production

Expected Output and Outcome of the proposal :

The creation of solar H2 is a potentially promising technique to use solar energy and combat climate change brought on by burning fossil fuels. The most thoroughly researched methods for producing solar H2 include photocatalytic, photoelectrochemical, photovoltaic-electrochemical, solar thermochemical, photothermal catalytic, and photobiological processes. We will give a detailed analysis of these technologies in this Focus Review. The most recent developments in solar H2 production are outlined after a brief introduction to the principles and workings of these technologies, with a particular emphasis on the high solar-to-H2 (STH) conversion efficiencies attained by each method.

Any other relevant information:

The technical examination of water electrolysis systems used to produce hydrogen using solar energy is the main goal of this research activity. Hybrid systems that use photovoltaic energy to generate electricity have certain drawbacks since, on the one hand, the weather can change and, on the other, there are issues with how to store extra electrical energy. In addition to storing extra electrical energy and reintroducing it into the system when needed, electrolytic hydrogen may be the answer to balancing out consumption spikes and erratic consumption.

Suitability of the proposed work in major national initiatives of the Government:

Not Applicable

Theme of Proposed Work:

Environment

Collaboration Details for last 5 Years :

Planned Collaboration for the proposed work with any foreign scientist/ institution ? **No**

SNo.	CO-PI Details
1	 **A Raveendra** akunururaveendra@mrec.ac.in Professor(Mechanical Engineering) **Malla Reddy Engineering College** Maisammaguda, Dhulapally (Post via. Kompally), Secunderabad, Rangareddy Dt, TELANGANA, HYDERABAD D.O.B : 17 Dec, 1970

1.Origin of the Proposal:

The goal of this research is to find concepts for solar-powered hydrogen synthesis from water that are both technically and financially practical. The final goal of the project was to choose one or more competing ideas for a pilot-scale solar energy demonstration.

The success of the pilot size plant would serve as the basis for securing public and private resources for the development and testing of the full-scale facility.

If this business effort is financially successful, the general people will have access to a renewable and unbounded source of energy carrier for use in balancing electric power loads and as a carbon-free transportation fuel.

Within the Office of Hydrogen Fuel Cells and Infrastructure Technologies, the Sun Hydrogen Generation Research (SHGR) initiative incorporates technologies pertinent to hydrogen research.

The Office of Hydrogen Fuel Cells and Infrastructure Technology (HFCIT) and the Office of Solar Energy Technologies are both involved in the Solar Hydrogen Generation Research (SHGR) project, which encompasses technologies important to research on hydrogen (SET). Despite the fact that the photo electrochemical work is in line with HFCIT, some of the technologies in this effort are also consistent with the knowledge and methods found in concentrated solar power and photovoltaic technology under the Office of Solar Energy Technologies (SET).

The purpose of producing hydrogen using only water and sustainable solar energy as feedstock is achieved by thermo chemical water is splitting, a chemical process that splits water into hydrogen and oxygen using only heat or a combination of heat and electrolysis instead of pure electrolysis.

These objectives are also achieved by photo electrochemical hydrogen production, which uses photo electrolysis at the surface of a semiconductor in contact with an electrolyte with bias supplied by a photovoltaic source. In this case, hydrogen is created by a photo-electrolytic process where water and sun photons are the only feedstock.

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

2.1 International Status:

Many renewable resources, including solar, wind, rain, tides, and geothermal, are available worldwide. Which are constantly supplied by nature. Solar power, wind power, hydroelectricity, biomass, and bio-fuels for transportation are the technologies connected to these renewable sources of energy. The global deficit of petroleum can be reduced with the use of natural energy. There have been some recent innovations, such the electric and solar-powered cars. One of the newest technologies being worked on at the moment is solar hydrogen fuel cell vehicles [1].

A sustainable energy source with no dangerous byproducts is hydrogen. Furthermore, hydrogen is a source of energy.

Regenerating fuel can be created from water, stored in the middle, and then burned back to water in fuel cells or internal combustion engines. It is claimed that if hydrogen solar cars are successfully produced and it will constitute a huge for renewable energies and will be secure from the ever global warming effect [2-3].

It will be energy-efficient and have the benefit of reversibly storing hydrogen in solid state materials, such as polymers, carbon nano tubes, metal hydrides, and chemical complexes [4].

Hydrogen can be created from water through photocatalysis, thermochemical processes, and water electrolysis, all powered by solar energy [5-6].

There are two distinct categories of carbon emissions associated with the existing methods of producing H_2. The first component is a result of reactions: when methane or coal mix with water or oxygen to form H_2, all the carbon eventually turns into CO2. The second portion primarily involves burning coal or methane to produce the high temperatures and energy required for the reactions. The combined carbon footprint of these two components should be taken into account to produce H2 at low carbon levels. One remedy is to switch out coal and methane for zero-carbon feed stocks like water to make H_2.

2.2National Status:

The creation of new energy resources has received a lot of attention recently due to the challenges posed by rising fossil fuel pollution and greenhouse gas emissions. Also, as a result of the industrial revolution's increased demand for energy, traditional energy sources have reached a point of insufficiency [7]. One of the most significant issues in the process of producing hydrogen using a water electrolyzer is the buildup of hydrogen bubbles on the surface of the electrodes. In a perfect scenario, the bubble develops, rises to the electrolyte surface, and then bursts. In reality, though, the bubbles build up on the electrodes and slowly rise to the surface. It has been shown that an increase in the volume fraction of hydrogen or oxygen bubbles between the electrodes would result in a rise in the electric resistance in aqueous solution and a decrease in the efficiency of water electrolysis [8-9].

References:

1. http://www.hydrogencarinfo.com/"Going green with hydrogen fuel cell powered cars".

2. http://www.epa.gov/climatechange/8. R. Shinnar, "The hydrogen economy,fuel cells and electric cars,"*Technology in Society*, 25 (2003):455-476.

3. California Fuel Cell Partnership, "Looking at Hydrogen to Replace Gasoline in Our Cars," *Scientific American*, Energy & Sustainability, EarthTalk, July 3, 2008.

4. G.W. Crabtree, M.S. Dresselhaus, "The Hydrogen Fuel Alternative," *MRS Bulletin*, 33, 04 (April 2008): 421-428.

5. Nie J, Chen Y, Boehm RF, Katukota S. A photoelectrochemicalmodel of proton exchange water electrolysis for hydrogenproduction. J Heat Transf 2008;130.

6. Conibeera GJ, Richardsb BS. A comparison of PV/electrolyserand photoelectrolytic technologies for use in solar tohydrogen energy storage systems. Int J Hydrogen Energy2007;32:2703e11.

7. Srinivasan S, Salzano FJ. Prospects for hydrogen productionby water electrolysis to be competitive with conventionalmethods. Int J Hydrogen Energy 1977;2:53e9

8. Nagai N, Takeuchi M, Furuta MT. Effects of bubbles betweenelectrodes in alkaline water electrolysis efficiency underforced convection of electrolyte, vol. 16. Lyon France: WHEC;June 2006. pp. 1e10

9. Nagai N, Takeuchi M, Kimura T, Oka T. Existence of optimum space between electrodes on hydrogen production by water electrolysis. Int. Jor.o f Hydrogen energy , 2003:28:35e41.

2.3 Importance of the proposed project in the context of current status

This article provides an overview of the technologies for producing hydrogen, particularly solar-powered alkaline water electrolysis. Alternatives to fossil fuels and their availability and pricing issues, which are destroying small, emerging, oil-importing economies, include solar energy and hydrogen (an energy carrier). Yet, a significant disadvantage to fully utilizing solar energy, in particular photovoltaic (PV), is the reduction in conversion efficiency of PV cells as a result of rising cell temperatures when in use. Also, hydrogen must be created in gaseous or liquid form before it can be used as fuel, but the main conversion process it currently goes through generates a lot of carbon dioxide, which is bad for the environment because it causes global warming.

Researchers intend to conduct field testing of their prototype. Throughout the summer, hydrogen would be kept in a small, underground pressure vessel and pumped throughout the house in the winter. If everything goes as planned, Martens says the team may develop a larger neighborhood system or install 20 panels at the house to allow other families to use the "green" hydrogen.

The direct oxidation of water into hydrogen using concentrated solar radiation is another option. Low cost, high efficiency hydrogen generation systems utilizing solar energy are the focus of significant research due to the enormous potential presented by solar energy technology.

The creation of solar H_2 is seen to be a potentially promising technique to use solar energy and combat climate change brought on by the burning of fossil fuels. The most thoroughly researched methods for producing solar H_2 include photo catalytic, photo electrochemical, photovoltaic-electrochemical, solar thermo chemical, photo thermal catalytic, and photo biological processes. We will give a detailed analysis of these technologies in this Focus Review. The most recent developments in solar H_2 production are outlined after a brief introduction to the principles and workings of these technologies, with a special emphasis on the high solar-to-H_2 (STH) conversion efficiencies attained by each method.

2.4 If the project is location specific, basis for selection of location be highlighted:

N.A

3.Work Plan:

3.1 Methodology:

The technical examination of water electrolysis systems used to produce hydrogen using solar energy is the main goal of this research activity. Hybrid systems that use photovoltaic energy to generate electricity have certain drawbacks since, on the one hand, the weather can change and, on the other, there are issues with how to store extra electrical energy. In addition to storing extra electrical energy and reintroducing it into the system when needed, electrolytic hydrogen may be the answer to balancing out consumption spikes and erratic consumption.

One of the pioneering research' main goal is to produce hydrogen through water electrolysis using solar energy while also utilizing electrical energy and thermal energy in the form of steam. Materials Hydrogen is produced by electrolysis using water as the raw material, and other energy sources such as wind, sun, water, nuclear, coal, and natural gas can also be utilized to generate electricity. In this assignment, we must examine the process of producing hydrogen utilizing water electrolysis and solar energy as the source of energy.

3.2 Time Schedule of activities giving milestones through BAR diagram.

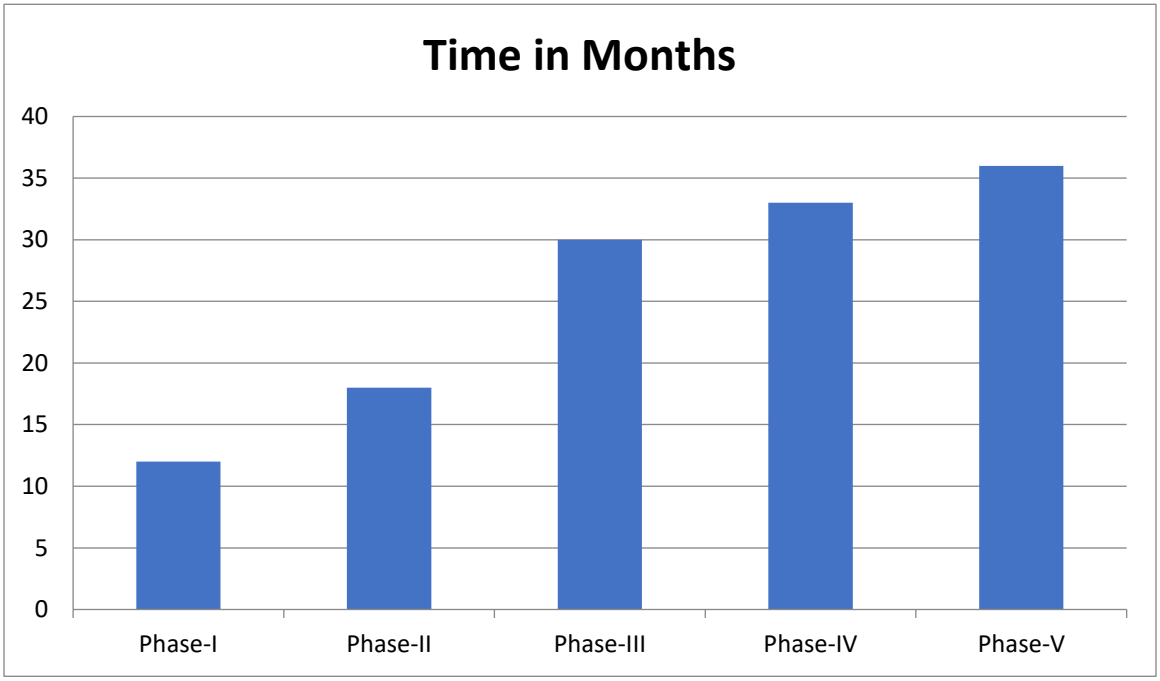
Phase 1: Purchase of equipments, Raw material powders

Phase II: Installation of hydrogen production and storage plant

Phase III: Performing initial experimentation.

Phase IV: Optimization maximum solar radiation analyzed

Phase V: Stored and determining the maximum solar radiation conversion into chemical energy in the form of hydrogen.



3.3Suggested Plan of action for utilization of research outcome expected from the project.

• Research outcome from the project will be published in international journals which will be accessed by industrialist as well as academicians.

• Patent may be filed on production of H_2 from solar PV cells.

• Research outcomes will be discussed in international conferences wherein there is interaction of academicians and industrialist. This may help the industrialist to apply the techniques in their concerned areas.

3.4 Environmental impact assessment and risk analysis.

Environmental impact will be analyzed in the present proposal by measuring energy consumed in H_2 production and storage. This will help to evaluate amount of carbon emitted to the environment. Parameters which decrease power consumption will be studied and suggestions will be provided on how to minimize energy consumption.

4 Expertise:

4.1 Expertise available with the investigators in executing the project:

Expertise available with the investigators in executing the project:

- Dr. I.S.N.V.R.Prasanth Associate Professor in Mechanical Engineering with a proven academic and administration track record with over 17 years of experience. He is very much enthusiastic towards research activities. He has published 3 SCI & 8 Scopus papers, 1 book chapter, 2 patents and around 25 other reputed publication papers. Under his able guidance 30 projects have been completed in UG level, and 8 projects in PG level.
- Dr. A.Raveendra Professor & HOD in Mechanical Engineering with a proven academic and administration track record with over 22 years of experience. • Worked as Principal over 2 Years • UGC Coordinator • Worked as HOD over 18 Years • Published 2 8 publications in peer reviewed journals • 02 patents received • Conducted Workshops, FDP, National and International Conferences. • Handling MOU's from Eminent Organizations for training students and improves skills. My Doctorate Degree, my qualifications, my experience and my attitude further bolster the Institute.

Preliminary results to implement the work:

The investigator has done some preliminary work on hydrogen production using solar energy components. So, the investigator has knowledge provision of competitively priced hydrogen is the biggest hurdle for hydrogen generation, particularly from renewable resources. But hydrogen must be cost-competitive with conventional fuels and technologies on a per-mile basis for transportation, a major factor in achieving energy independence.

4.2 Summary of roles/responsibilities for all Investigators:

S. No.	Name of the Investigators	Roles/Responsibilities
1.	Dr. I.S.N.V.R.Prasanth	PI
2.	Dr. A.Raveendra	Co-PI

4.3 Key publications published by the Investigators pertaining to the theme of the proposal during the last 5 years

- **I.S.N.V.R.Prasanth**, D.V.Ravishankar, M.Manzoor Hussain, Chandra Mouli Badiganti. ‘‘Influence of Milling Process Parameters and Significance of Tools to Improve the Surface Quality of GFRP Composites’’. Machining Science and Technology. Vol.26, No. 1, (2022) 120-136. **(Taylor & Francis Ltd- SCI).**
- **I.S.N.V.R.Prasanth**, D.V.Ravishankar, Manzoor Hussain, Vinod Sharma, Sunil Pathak Chandra and Mouli Badiganti. ‘‘Investigations on Performance characteristics of GFRP Composites in Milling’’. International Journal of Advanced Manufacturing Technology, 2018, 99(5-8), pp.1351–1360. Doi:10.1007/s00170-018-2544-2. **(Springer- SCI).**
- I**. S. N. V. R. Prasanth**, P.Jevanandam, Selavaraju P, Sateesh K, Sujatha P, M.Selvaraju, ‘‘Study of friction and wear behavior of Graphite reinforced AA7075 Nanocomposites by Machine learning’’. Journal of nano materials **(Hindawi-SCI)**.
- **I.S.N.V.R.Prasanth**, S.Nikitha, R.Pulsingh, M.Sampath, Shaik Bazee and Chandra Mouli Badiganti. ‘‘Influence of Milling Process Parameters on Machined Surface Quality of Carbon Fibre Reinforced Polymer (CFRP) Composites Using Taguchi Analysis and Grey Relational Analysis’’. International Journal of Integrated Engineering. VOL.13 NO. 6 (2021) 76-88.
- **I.S.N.V.R.Prasanth**, D.V.Ravishankar, M.Manzoor Hussain. ‘‘Comparative Evaluation on Surface Quality of GFRP Composites by Different End mill Tools’’. InternationalJournal of Machining and Machinability of Materials, 2017, 19(5), pp.483-504. DOI:10.1504/IJMMM.2017.087622 .

- **I.S.N.V.R.Prasanth**, D.V.Ravishankar, M.Manzoor Hussain. ‘‘Analysis of Milling Process Parameters and Their Influence on GFRP Composites’’. International Journal of Engineering TRANSACTIONS A: Basics, 2017, 30(7), pp.1074-1080. Doi: 10.5829/ije.2017.30.07a.17.
- **I.S.N.V.R.Prasanth**, D.V.Ravishankar, M.ManzoorHussain, D.Ramanareddy

‘‘Performances of different mill cutters in machining of GFRP Composite Laminates”. (ICMPC_2016) Materials Today: Proceedings, 2017, 4(2), pp. 2800-2805.

- **I.S.N.V.R.Prasanth**, D.V. Ravishankar, M.Manzoor Hussain, ‘‘Critical Analysis in Milling of GFRP Composites by Various End Mill Tools’’. (ICAFM_2017) Materials Today: Proceedings, 2018, 5(6), pp.14607–14617.
- Chandra Mouli Badiganti, K Kishor Kumar, Shiva Leelapali, **I.S.N.V.R.Prasanth**. ‘‘Effect of Temperature on Free Vibration of Functionally Graded Plate with Cut out’’. International Journal of Integrated Engineering. VOL.13 NO. 1 (2021) 28-38.

4.4 Bibliography

Dr I.S.N.V.R.Prasanth is working as Associate Professor in Department of Mechanical Engineering, Malla Reddy Engineering College, Secunderabad, India. He has done her Ph.D from JNTU University, Hyderabad. He has published 25 papers in International journals and presented in 10 international and national conferences. Under his able guidance 30 projects have been completed in UG level, and 8 projects in PG level.

Dr. A.Raveendra is working as Professor & HOD in department of Mechanical Engineering in Malla Reddy Engineering College, Secunderabad, India. He has done her Ph.D from JNTU University, Hyderabad. He has published 29 papers in International journals and presented in 18 international and national conferences. He has guided many B.Tech and M.Tech students in their projects.

5.List of Projects submitted/implemented by the Investigators

NA

6.List of facilities being extended by parent institution(s)for the project implementation.

6.1 Infrastructural Facilities

Sr. No.	**Infrastructural Facility**	**Yes/No/ Not requiredFull or sharing basis**
1.	Workshop Facility	YES
2.	Water & Electricity	YES
3.	Laboratory Space/ Furniture	YES
4.	Power Generator	YES
5.	AC Room or AC	YES
6.	Telecommunication including e-mail & fax	YES
7.	Transportation	YES
8.	Administrative/ Secretarial support	YES
9.	Information facilities like Internet/Library	YES
10.	Computational facilities	YES
11.	Animal/Glass House	Not Required
12.	Any other special facility being provided	-

6.2 Equipment available with the institution/ group/Department

Equipment available with	**Generic Name of Equipment**	**Model, Make & year of purchase**	**Remarks including accessories available and current usage of equipment**
PI & his group	-	-	-
PI's Department Department of Mechanical Engineering MallaReddy Engineering College (Autonomous)	Solar panel	SPVC-20,05/08/2020	Currently used in Laboratory for UG, PG and Research works
	Research laboratory	RAB-250,15/06/2015	Currently used in Laboratory for UG, PG and Research works

7 Name and address of experts/ institution interested in the subject /outcome of the project.

IIT Hyderabad (Mou).

Budget Details

Institution wise Budget Breakup :

Budget Head	Malla Reddy Engineering College	Total
Research Personnel	7,80,000	**7,80,000**
Consumables	3,00,000	**3,00,000**
Travel	90,000	**90,000**
Equipment	20,00,000	**20,00,000**
Contingencies	2,10,000	**2,10,000**
Other cost	15,000	**15,000**
Overhead	45,000	**45,000**
Total	**34,40,000**	**34,40,000**

Institute Name : ***Malla Reddy Engineering College***

Year Wise Budget Summary (Amount in INR) :

Budget Head	Year-1	Year-2	Year-3	Total
Research Personnel	3,96,000	1,92,000	1,92,000	**7,80,000**
Consumables	1,50,000	1,00,000	50,000	**3,00,000**
Travel	35,000	30,000	25,000	**90,000**
Equipments	20,00,000	0	0	**20,00,000**
Contingencies	60,000	70,000	80,000	**2,10,000**
Other cost	5,000	5,000	5,000	**15,000**
Overhead	15,000	15,000	15,000	**45,000**
Grand Total	**26,61,000**	**4,12,000**	**3,67,000**	**34,40,000**

Research Personnel Budget Detail (Amount in INR) :

Designation	Year-1	Year-2	Year-3	Total
Junior Research Fellow *For conducting experimental tests and analysis*	3,96,000	1,92,000	1,92,000	**7,80,000**

Consumable Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
Consumables raw materials water level covering the membrane electrode assemblies Nafion type membrane	1,50,000	1,00,000	50,000	**3,00,000**

Travel Budget Detail (Amount in INR) :

Justification (Inland Travel)	Year-1	Year-2	Year-3	Total
Travel expenses for conducting testing analysis attending conferences	35,000	30,000	25,000	**90,000**

Equipment Budget Detail (Amount in INR) :

Generic Name ,Model No. , (Make)/ Justification	Quantity	Spare time	Estimated Cost
Customized type H2, O2 Generator ALK2453 (PERIC Hydrogen technologies) *Model CV 20/33-20*	1	15 %	**15,00,000**
PV-proton exchange membrane H2FC 20/2021 (Hydmrne) *Hybrid1 kw* *Made in India* *Dimension: 345 mm x450 mm 500 mm*	1	10 %	**5,00,000**

Contingency Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
Printing testing and analysis	60,000	70,000	80,000	**2,10,000**

Overhead Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
DC-DC converter devices	15,000	15,000	15,000	**45,000**

Other Budget Detail (Amount in INR) :

Description/Justification	Year-1	Year-2	Year-3	Total
Paper and stationary costs Paper and stationary costs	5,000	5,000	5,000	**15,000**

PROFORMA FOR BIO-DATA (to be uploaded)

1. Name and full correspondence address:

Dr. I. S. N.V. R. PRASANTH, Associate Professor, Mechanical Department
Malla reddy Engineering College(Autonomous)
Maisamma guda (H), Medchal-Malkajgiri District, Secunderabad, Telangana State-500100

2. Email(s) and contact number(s):

Prasanth5109@gmail.com
9963244299

3. Institution: Malla reddy Engineering College (Autonomous)

Maisamma guda (H), Medchal-Malkajgiri District, Secunderabad, Telangana State-500100

4. Date of Birth : 10/12/1977

5. Gender (M/F/T): Male

6. Category Gen/SC/ST/OBC: OC

7. Whether differently abled (Yes/No): No

8. Academic Qualification (Undergraduate Onwards)

	Degree	Year	Subject	University/Institution	% of marks
1.	B. Tech	2005	Mechanical Engineering	JNTU College of Engineering Hyderabad	61.1
2.	M.Tech	2010	Mechanical Engineering (IE & M)	J.B.I.E.T, Hyderabad, JNTUH	71.2
3.	Ph.D	2020	Mechanical Engineering	JNTU, Hyderabad	
4.					

9. Ph.D thesis title, Guide's Name, Institute/Organization/University, Year of Award.2020

Ph.D thesis title: ''An Investigation on Machining of Reinforced Glass Composite Materials and Optimization of Cutting Parameters'' under the guidance of Dr.D.V.Ravishankar, Principal, TKRCET, Meerpet, Hyderabad and Dr.Manzoor Hussain, Professor & Registrar, JNTUH, Hyderabad.

10. Work experience (in chronological order).

S.No.	Positions held	Name of the Institute	From	To	Pay Scale
1	Associate Professor	Malla Reddy Engineering College (Autonomous)	December 2021	Till date	65,000/-
2	Associate Professor	Guru Nanak Institute of Technology, Hyderabad.	July 2018 to	November 2020	48,000/-
3	Associate Professor	St. Mary's Integrated campus (St.Mary's group of institutions), Hyderabad.	January 2016	May 2018	42,000/-
4	Assistant Professor	Bharat Institute of Engineering and Technology, Hyderabad	July 2013	December 2015	40,000/-
5	Associate Professor	Dhruva Institute of Engineering and Technology	October 2008	June2013	30,000/-
6	Assistant Professor	Hits College of Engineering & Technology, Hyderabad.	August 2005	September 2008	8,000/-

11. Professional Recognition/ Award/ Prize/ Certificate, Fellowship received by the applicant.

S.No	Name of Award	Awarding Agency	Year

12. Publications *(List of papers published in SCI Journals, in year wise descending order).*

S.No.	Author(s)	Title	Name of Journal	Volume	Page	Year
1	I. S. N. V. R. Prasanth, P.Jevanandam, Selavaraju P, Sateesh K, Sujatha P, M.Selvaraju	Study of friction and wear behavior of Graphite reinforced AA7075 Nanocom posites by Machine learning	Journal of nano materials (Hindawi). Volume 2023 | Art icle ID 5723730 | https ://doi.org/10.1155/ 2023/5723730	Vol.20 23,	1-15.	2023

2	I.S.N.V.R.Prasanth, D.V.Ravishankar, M.Manzoor Hussain, Chandra Mouli Badiganti	Influence of Milling Process Parameters and Significance of Tools to Improve the Surface Quality of GFRPco mposites	Machining Science and Technology(Taylor & Francis Ltd. DOI:https://doi.org/10.1080/10910344.2021.199880	Vol.26, No.1	120-136.	2022
3	I.S.N.V.R.Prasanth, D.V.Ravishankar, Manzoor Hussain, Vinod Sharma	Investigations on Performance characteristics of GFRP Composites in Milling	International Journal of Advanced Manufacturing Technology	99(5-8)	1351–1360	2018
4	I.S.N.V.R.Prasanth, S.Nikitha, R.Pulsingh, M.Sampath, Shaik Bazee and Chandra Mouli Badiganti	Influence of Milling Process Parameters on Machined Surface Quality of Carbon Fibre Reinforced Polymer (CFRP) Composites Using Taguchi Analysis and Grey Relational Analysis	International Journal of Integrated Engineering. ISSN: 2229-838X.	VOL.13 NO. 6	76-88	2021
5	Chandra Mouli Badiganti, K Kishor Kumar, Shiva Leelapali, I.S.N.V.R.Prasanth	Effect of Temperature on Free Vibration of Functionally Graded Plate with Cut out	International Journal of Integrated Engineering. ISSN: 2229-838X.	VOL.13 NO. 1	28-38	2021
6	I.S.N.V.R.Prasanth, D.V.Ravishankar, Manzoor Hussain	Critical Analysis in Milling of GFRP Composites by Various End Mill Tools	Materials Today: Proceedings	5(6)	14607–14617	2018
7	Manzoor Hussain	cutters in machining of GFRP Composite Laminates	Materials Today: Proceedings	4(2)	2800-2805	2017

13. Detail of patents.

S.No	Patent Title	Name of Applicant(s)	Patent No.	Award Date	Agency/Country	Status
1	Enhanced tool angles produced a better grade milled surface	I.S.N.V.R.Prasanth	202241072453			Published
2	SSD-PLANTER: SPRAYING SEEDS DISPENSED FROM A PLANTER	I.S.N.V.R.Prasanth	201941051600			Published
3	INTELLIGENT DEVICE FOR UNLOCKING CAR DOOR (KEY INSIDE THE CAR)	I.S.N.V.R.Prasanth	201941054101			Published

14. Books/Reports/Chapters/General articles etc.

S.No	Title	Author's Name	Publisher	Year of Publication
1 Book chapter	Influence of milling process parameters on the surface quality of GFRP composites in Glass Fibre – Reinforced Polymer Composites	Vinod Kumar Sharma, Sunil Pathak, I.S.N.V.R. Prasanth, D.V. Ravishankar, M. Manzoor Hussain	Walter DE GRUYTER	2020

15. Any other Information (maximum 500 words)

BIO-DATA

1. Name and full correspondence address : Dr. A.RAVEENDRA
   Professor,Dept of Mechanical Engg
   Mallareddy EngineeringCollege
   Maisammaguda,Secunderabad,Telangana
   500100.
2. Email(s) and contact number(s) : akunururaveendra@mrec.ac.in
   9502294258
3. Institution : MallaReddy Engineering College (**A**)
4. Date of Birth : 17-12-1970
5. Gender (M/F/T) : M
6. Category Gen/SC/ST/OBC : OBC
7. Whether differently abled (Yes/No) : No
8. Academic Qualification :

	Degree	Year	Subject	University/Institution	% of marks
1	B.Tech	1994	Mechanical Engg	REC-Warangal, AP.	58
2	M.Tech	2003	Production Engg	VTU-Belgaum	72
3	Ph.D	2017	Welding	JNTUH-Hyderabad	

9. Ph.D thesis title, Guide's Name, Institute/Organization/University, Year of Award.

   Title: Experimental Investigations on welding Characteristics of Aluminium alloy(5052) and Alloy steel(EN24) using gas tungsten arc welding(GTAW).

   Year of Award : 2017

   Guide : Dr.B.V.R Ravi kumar

   University : JNTUH-Hyderabad

10 .Work experience :

S. No.	Positions held	Name of the Organization/ Institute	From	To	Pay Scale
1.	Planning Engineer	H.H.V CO.Pvt Ltd, Bangalore	1995	2000	Rs 6000+ perks
2.	Assist.prof	Dr.SGIET- Markapur	2003	2005	Rs 8000-275-13500
3.	Assoc.prof	Malla Reddy Engg College	2005	Feb 13th 2020	37400-67000
4.	Principal	Malla Reddy Engg College	Feb14th 2020	Till date	

11.Publications (List of papers published in Journals.

S.No	Author(s)	Title	Name of Journal	Volume	Page	Year
1.	A.Raveendra, Dr.B.V.R.Ravi Kumar	Welding characteristics of Aluminium alloy (6082) and stainless steel(304) weldments, using pulsed and non-pulsed current GTAW	Technical journals(IJMEAR) ISSN:2249-6548	Vol 02, issue 03	50-59	Aug 2011
2.	B.Tularirama Rao K.Srinivas P.Rami Reddy A.Raveendra B.V.R.Ravi kumar	Effect of processing parameters on surface finish of the components processed by CNC turning machine	Technical journals(IJMEAR) ISSN:2249-6564	Vol 04,issue 01	224-228	Jan-Mar 2013
3.	A.Raveendra B.V.R.Ravi Kumar	Effect of pulsed current on welding characteristic of aluminium alloy(5052) using gas tungsten arc welding	IJSR, ISSN:2319-7064	VOL 2 Issue 5	82-86	May 2013
4.	A.Raveendra B.V.R.Ravi Kumar	Effect of pulsed current on welding characteristic of EN19alloy steel using gas tungsten arc welding	IJIRSET ISSN:2319-8753	Vol 2 Issue 5	1359-1367	May 2013
5.	A.Raveendra B.V.R.Ravi Kumar	Experimental study on pulsed and non-pulsed current TIG welding of stainless steel(SS304)	IJIRSET ISSN:2319-8753	Vol:2, Issue 6	2337-2344	June 2013
6.	A.Raveendra B.V.R.Ravi Kumar	Experimental study on pulsed and non-pulsed current tig welding of aluminium sheet(6082)	IJSER ISSN:2277-2685	Vol-3 Issue 6	4102-4108	June 2013
7.	B.Tularirama Rao Dr.K.Srinivas P.Rami Reddy A.Raveendra Dr.B.V.R.Ravi kumar	Experimental study on the effect of cutting parameters on surface finish obtained in CNC turning operation	IJIRSET ISSN:2319-8753	Vol 2 Issue 9	4547-4555	Sept 2013
8.	A.Raveendra B.V.R.Ravi Kumar	Effect of pulsed current on welding characteristic of EN24	IJAST ISSN:2229-5216	Vol 8 No 1	28-37	Jan 2014

		alloy steel using gas tungsten arc welding				
9.	A.Raveendra Dr.B.V.R.Ravi Kumar Dr.A.Siva Kumar V.Prudhvi Kumar Reddy	Influence of welding parameters on weld characteristics of 5052 aluminium alloy sheet using tig welding	IJAIEM ISSN:2319-4847	Vol 3 Issue 3	186-190	Mar 2014
10.	B.Tularirama Rao Dr.K.Srinivas P.Rami Reddy A.Raveendra Dr.B.V.R.Ravi kumar	Measuring cutting forces while cutting of different metals with different speeds	IJAIEM ISSN:2319-4847	Vol 3 Issue 9	163-169	September 2014
11.	B.Tularirama Rao Dr.K.Srinivas P.Rami Reddy A.Raveendra Dr.B.V.R.Ravi kumar	Finding cutting forces while turning operations on lathe machine at different depth of cut of different metals	IJIRSET ISSN:2319-8753	Vol 3 Issue 10	16866-16872	Oct 2014
12.	A.Raveendra B.V.R.Ravi Kumar	Micro-Hardness and mechanical properties of EN24 Alloy steel weldments using pulsed and non-pulsed current gas tungsten arc welding	IJIRSET ISSN:2319-8753	Vol 03 Issue 10	16588-16592	Oct 2014
13.	A.Raveendra .B.V.R.Ravi Kumar Dr.Siva Kumar Mr.N.Santhosh	Effect of welding parameters on 5052 aluminium alloy weldments using TIG welding	IJIRSET ISSN:2319-8753	Vol 3 Issue 3	10302-10308	Mar 2014
14.	A.Raveendra .B.V.R.Ravi Kumar Dr.Siva Kumar Mr.V.Pruthvi Kumar Reddy	Influence of welding parameters on weld characteristics of 5052 aluminium alloy sheet using TIG welding	IJAIEM ISSN:2319-4847	Vol 3 Issue 3	186-190	Mar 2014
15.	K.Vinay A.Raveendra	Effect of exhaust gas recirculation on the performance and emission characteristic of diesel engine using biodiesel	IJERT ISSN:2278-0181	Vol 4 Issue 5	1276-1281	May 2015
16.	A.Raveendra M.Satish Sagar Dr.B.V.R.Ravi Kumar	Effect of pulsed current on TIG weldments of aluminium alloy (5052) and alloy steel(EN24)	IJIRSET ISSN:2319-8753	Vol 4 Issue 5	3095-3101	May 2015
17.	J.Padmaja A.Ravindra	Design and Analysis of a Heat Sink for a High Power LED System	IJERT ISSN:2278-0181	Vol 4 Issue 7	975-982	July 2015
18.	Ch.Naveen Kumar M.V.Vara Lakshmi	Measurement of cutting forces while turning different	IJIRSET ISSN:2319-8753	Vol 4 Issue 7	6070-6076	July 2015

	A.Raveendra	materials by using lathe tool dynamometer with different cutting tool nomenclature				
19.	V.Sravanthi A.Raveendra	Experimental investigation on influence of welding parameters on welding characteristics of aluminium alloy using TIG welding	IJETTS ISSN:2348-0246	Vol 5 Issue 3	407-418	Sept 2015
20.	Korri Pradeep Kumar A.Raveendra	Thermal load effect on value by using conventional and blended fuels	IJOER ISSN:2321-7758	Vol 3 Issue 6	211-215	Nov-Dec 2015
21.	V.Lokesh Varma A.Raveendra	Structural design and FEM analysis of butterfly valve	AIJREAS ISSN:2455-6300	Vol 1 Issue 6	56-62	June 2016
22.	B.Akshay Kumar A.Raveendra	Effect of pulsed and non-pulsed current on welding characteristics of AA6061 Aluminium alloy welded joints using Tig welding	IJOER ISSN:2395-6992	Vol 2 Issue 7	93-102	July 2016
23.	K.Abhilash Korvi A.Raveendra	Improving productivity and quality by changing feeding system in an injection moulding process	GJAET ISSN:2277-6370	Vol 6 Issue 1	1-5	2017
24.	M. Ravi Teja A.Raveendra	Simulation in composition of cement manufacturing and comparison of mechanical properties	IJSETR ISSN:2319-8885	Vol 6 Issue 3	1-7	Feb 2017
25.	Ch.Prahallad A.Raveendra	Modeling and optimization of cushioning system in hydraulic cylinder to achieve performance characteristics	IJIR ISSN:2454-1362	Vol 3 Issue 1	2122-2128	2017
26.	B.Sampath A.Raveendra	CFD analysis of steam ejector with different nozzle diameter	IJR ISSEN:2348-6848	Vol 4 Issue 14	2448-2452	Nov 2017
27.	Bhiksha Gugulothu A.Raveendra M.Uma Mahesh	Effect of process parameters on Mrr and surface roughness in turning process of EN8	IFERP ISSN:2456-1290	Vol 2 Issue 9	28-34	Sep 2017
28.	A.Rohith,Dr.A.Raveendra,Dr.D.K.Nageswara rao,M.Ramesh Babu	Stress Distribution around Polygonal Holes in Graphite/Epoxy Laminates Under in Plane Loading	IJR ISSN:2348-6848	VOL 05 Issue 01	1488-1507	Jan 2018
29.	A.Raveendra, B.V.R.Ravi Kumar, S.Sudhakara Reddy	Micro-Hardness and Mechanical properties of 5052 aluminium alloy weldments using pulsed and non-pulsed current gas tungsten arc welding	International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) ISSN:2249-8001 (**scopus**) Indexed Journal	Vol.8,Issue 6,	691-698	Dec2018
30.	A.Raveendra,K.Sri Noothan Reddy	Infinitely Variable Valve Lifting	International Journal of Innovative Technology and Exploring	Vol.8 Issue-2S	280-285	Dec 2018

			Engineering(IJITEE) ISSN:2278-3075 (**Scopus**) Indexed			
31.	A.Raveendra,Mohammed Abdul Mubashir	Design and Analysis of Leaf Spring for Heavy Weight Vehicles using Composite Materials	International Journal of Innovative Technology and Exploring Engineering(IJITEE) ISSN:2278-3075 (**Scopus**) Indexed	Vol.8 Issue-2S	286-291	Dec 2018
32.	B.Tulsiramarao,P.Ramreddy,K.Srinivas,A.Raveendra	Effect of tool Overhang on turning operation using finite element model	International Journal of Innovative Technology and Exploring Engineering(IJITEE) ISSN:2278-3075 (**Scopus**) Indexed	Vol.8 Issue-4S2	486-488	Dec 2018
33.	B.Tulisiramarao,P.Ramreddy,K.Srinivas,A.Raveendra	A Multivariable model of orthogonal turning operation on cutting dynamics modeled by optimum cutting Parameters using genetic algorithm	International Journal of Recent Technology and Engineering(IJRTE) ISSN:2277-3878 (**Scopus**) Indexed	Vol-7,Issue-5S2	530-535	Jan 2019
34.	A.Raveendra	Experimental Research of wire cut EDM for SR&MRR using Taguchi Method	International Journal of Engineering and Advanced Technology(IJEAT) ISSN:2249-8958 (**Scopus**) Indexed	Vol-9,Issue-2	3096-3701	Dec 2019
35.	A.Raveendra	Characterization of Roselle &Kevlar hybrid Composites	International Journal of Engineering and Advanced Technology(IJEAT) ISSN:2249-8958 (**Scopus**) Indexed	Vol-9,Issue-2	3699-3701	Dec 2019
36.	Dr.A.Raveendra	Optimization of process parameters in Turning operation by using taguchi method Special issue-NCAETS 2019	Suraj punj Journal for Multidisciplinary Research(SPJMR) UGC,approved https://app.box.com/s/b6t4n95da16g0uve3bk5shap6397odpv	Vol 9,Issue 4 ISSN:2394-2886	473-479	Dec 2019

37.	Dr.A.Raveendra	A Study on the effect of process parameter variation in TIG welding	Suraj punj Journal for Multidisciplinary Research(SPJMR) UGC,approved https://app.box.com/s/077yde65q7vyia7wdgu1i8nd191nbb4m	Vol 9,Issue 4 ISSN:2394-2886	469-472	Dec 2019
38	K.Chaitanya, Dr.A.Raveendra	Design and analysis of composite drive shaft	International Journal of Research ISSN NO:2236-6124 (UGC)	Vol 8, Issue IV	4031-4041	Dec/2019
39	S.Praveen Kumar Dr.A.Raveendra	Practical Investigation of Tool Wear Mechanism of PCBN Material by using FSP	International Journal of Advanced Science and Technology(IJAST)	ISSN:2005-4238 Vol.28, No.18,	338-348	2019
40	Dr.A.Raveendra, D.Nithis kumar	Exploration of indispensible properties of textile-grade glass fibers/white caustic treated banana fiber hybrid composite	ELSEVIER Material Today :Proceedings (**SCOPUS**)	Article in press		2020
41	Mr.K.Tarun kumar Dr.A.Raveendra	Study and Effectiveness and Reconfiguration of a Jar Tilting Mechanism of an RFC Machine	Journal of Engineering, computing and Architecture(jeca) UGC,approved	Vol:10, Issue 4,ISSN:1934-7197	159-173	2020

12. Detail of patent:

S.No	Patent Title	Name of Applicant(s)	Patent No.	Award Date	Agency/Country	Status
1	Apparatus to automatically draw two –dimensional drawing	Malla Reddy Engineering College.Department of Mechanical Engineering	Application no. 201841017390A ApplicationDate: 25/05/2018		India	published
2	An Extendable and height adjustable ceiling fan with eject abla blades.	Malla Reddy Engineering College.Department of Mechanical Engineering	Application no.202041003637A Dated27/01/2020		India	published

13. Books/Reports/Chapters/General articles etc.

S.No	Title	Author's Name	Publisher	Year of Publication
1.	An Overview of Additive manufacturing Technology	Dr. A. Raveendra Dr. N. Rishi Kanth Dr. G. Suryaprakash Rao Dr. L. Rasidhar	AkiNik Publications New Delhi	In progress
2.				

14. Any other Information (*maximum 500 words*)

a. Conferences Attended

Sl No	**Name of the Conference**	**Title of the paper**	**Organized by**	**Period**
1.	National seminar on applications of optimization in mechanical engineering	Taguchi technique as a tool to optimize the operating parameters of CNC drilling to minimize burr size	Gudlavalleru Engineering college Andhra Pradesh.	18-20 Jan 2008
2.	International conference on renewable energy and Environment for sustainable development	Transesterification process of Bio-Diesel	IIT-Delhi	11^{th}-13^{th} Dec 2008 Pp623-631
3.	NEC128-PA05MM-66NAC09	Development of mathematical models in gas metal arc welding	Dayanand sagar college of Engineering Bangalore	2009
4.	International conference on computational methods in Engg & Science-2009	Experimental investigations of Jatropa oil(preheated and blends) in a direct injection C.I Engine.	CBIT-Hyderabad	8^{th}-10^{th} Jan 2009
5.	National conference on excellence in new technologies in new mechanical Engineering(ENTIME)	Comparison of welding characteristics between TIG& MIG weldments	Malla Reddy Engineering College Secunderabad	12^{th} &13^{th} Dec 2009
6.	National conference on Aerospace Engineering (NCAE-2009)	Mechanical properties of gas metal arc weldments	Malla Reddy college of Engineering and Technology	Dec 04-05 2009
7.	ICSE 2010	Optimizing pulsed current TIG welding parameters to refine the fusion zone	Dayanand sagar Engineering college Bangalore	April 21-23 2010

8	International conference in Material processing& Characterization(ICMPC-2012)	Experimental Investigation on welding characteristics of aluminium alloy(6082) weldments using pulsed and non-pulsed current GTAW	Gokaraju Rangaraju Institute of Engineering and Technology, Hyderabad	8^{th}-10^{th} Mar2012
9	RITS- ICAEM-2012	Experimental Investigations on welding characteristics of stainless steel (304) weldments using pulsed and non-pulsed current GTAW.	Royal institute of Technology and management	28^{th} and 29^{th} Feb 2012
10	RCMS-2K13	Supersonic flow through conical nozzle with various angles of divergence	Malla Reddy Engineering College	Sept 20^{th} &21^{st} 2013
11	RCMS-2K13	Experimental investigations on welding characteristics of similar metal weldments and dissimilar metal weldments using arc welding	MallaReddy Engineering College	Sept 20^{th} &21^{st} 2013
12	RITS- ICAEM-2013	Characteristics of force feed on stability in various turning process	Royal college of management and sciences Hyderabad	Feb 28 &29 2013
13	RITS- ICAEM-2013	Comparative study on welding characteristics of EN8 &EN31 alloy steel weldments using Gas Tungsten Arc Welding	Royal college of management and sciences Hyderabad	Feb 27&28 2013
14	Emerging Trends in Science, Technology& Management (NCETSTM 2K14)	Numerical analysis of free convection with effect of surface radiation between parallel vertical heated plates with experiment data	Malla Reddy Engineering college Secunderabad	08-09 Aug 2014
15	International conference on Advanced Materials and Manufacturing Technologies(AMMT)	Micro-Hardness and Mechanical properties of 5052 aluminium alloy weldments using pulsed and non-pulsed gas tungsten arc weldments	JNTUH-Hyderabad	Dec18-20 2014
16	Inter National conference on Emerging Technologies in Mechanical Sciences(ICEMS-2014)	Microscopic study of EN24 alloy steel weldments using pulsed and non-pulsed current gas tungsten arc welding	Malla Reddy college of Engineering and Technology Secunderabad	Dec-26-27 2014
17	ICICASEMC-2016	Structural Design and FEM Analysis of Butterfly valve	Anveshana Educational and Research Foundation	18^{th} June 2016

18	ICRCET 17	Effect of process Parameters on MRR and Surface Roughness in Turning process of EN8	Annamacharya Institute of Technology & Sciences,Ttrupathi.AP.	12^{th}-13^{th} Sept 2017

FDP/ Workshops Attended		
Sl.no	**Name of the work shop**	**Organization & Year**
1	**Refresher course** on Operational Research	Departments of Civil &Mechanical Engineering during 21^{st} -22^{nd} June 2007.
2	3 day **national seminar** on Applications of Optimization Techniques in Mechanical Engineering ,	Gudlavalleru Engineering college During 18-20 Jan 2008.
3	Two day **refresher course** in Internal Combustion Engines	Dept of Mechanical Engineering Malla Reddy Engineering on 18^{th} &19^{th} of June 2008.
4	**FDP** on Design Aspects of Mechanical &Aerospace Engineering	Departments of Mechanical &Aeronautical Engineering MRCET &CMEC from 2^{nd} to 10^{th} July 2009.
5	Two day **workshop** on Recent Developments in Mechanical Engineering	Dept of Mechanical Engineering. Malla Reddy Engineering college on12th &13^{th} of March 2011
6	A Two day **national level work shop** under TEQIP-II on Recent Advances in CFD for industrial Applications.	Dept of Mechanical Engineering. Malla Reddy Engineering college on24th &25^{th} of March 2012
7	One day **workshop** on Advanced trends in I.C engines and combustion	28^{th} Feb 2013 organized by Dept of Mechanical Engineering. JNTUH college of Engineering
8	One day **workshop** on advances in welding and Surface Engineering(AWSE)	Indian Institute of Welding ,Hyderabad branch on 17^{th} Oct17th October 2014.
9	5-day workshop(**FDP**) on principles of additive/ Generative Manufacturing	IIT-Hyderabad. Dec 1-4, 2014
10	Two-day **workshop** on Engineering Drawing	During 12^{th} &13^{th} Sept 2014, MallaReddy Engineering College
11	Two-day **FDP**on Finite Element Analysis	Mallareddy Engineering College during 20^{th} and21st Feb 2015 by dept of Mechanical Enineering.
12	A **two day workshop** on Innovations in Waste Water and Energy Technologies	BITS Pilani, Hyderabad Campus during 13^{th} &14^{th} July 2015.
13	**One day workshop** on Outcome Based Education and Accreditation	JNT University,Hyderabad,Kukatpally on Sept 2015
14	One week **FDP** on Applications of CFD in Thermal-fluids Engineering	CMR Engineering College Kandlakola.Medchal,Hyderabad. During 29 Feb-06 Mar 2016
15	Six day **FDP** on Hyper-Works &Computational Fluid Dynamics	St.Martin's Engineering college,Dulapally,Secunderabad. 5^{th} -10^{th} Dec 2016

16	**FDP** on Engineering Mechanics made easy	Narasimha Reddy Engineering College during 28th June to 2nd July 2017.
17	**AICTE** sponcered two weeks **FDP** on Design for Manufacturing,Assembly,Environment for Product Innovation &Optimization	Dr.MAHALIMGAM college of Engineering and Technology-Pollachi.25th Nov 2019 to 7th Dec 2019.
18	**AICTE** sponcered one week Short Term Training Programme(STTP) on Innovations and Research Challenges in LoT Applications for Smart Manufacturing and Smart Design	Sri Ramakrishna Engineering – Vattamalaipalayam,N.G.G.O.Colony post.Coimbatore,Tamalnadu. From 09.12.2019 to 14.12.2019.
19	Five day **FDP(**online**)** on Emerging Technologies in Robotics	MallReddy Engineering College(Autonomous),Maisammaguda,Secunderabad.
20	Six day **FDP** (online) on Emerging areas in Manufacturing	Vimal jyothi Engineering College,Trivandrum,Kerala..
21	One week **FDP(**online**)** on Advanced NDT Techniques &Applications in Industry	Indian society for Non-Destructive Testing,Hyderabad Chapter in association with department of Mechanical Engineering,QISCET.Ongole from 25th to 29th May,2020.
22	One week **FDP** (online) on contemporary developments in manufacturing and industrial technologies	Dept of mechanical Engineering, Pragati Engineering College ,during 9th to 13th June, 2020
23	One week **FDP**(online) on multi objective optimization for mechanical applications	Dept of Mechanical Engineering QIS College of Engineering and Technology, Ongole,AP.During 8th to 12th June 2020.
24	One week **FDP**(online) on Disruptive Technologies in Mechanical Engineering	Dept of Mechanical Engineering Sreenidhi Institute of Science and Technology-Hyderabad during 8th to 13th June 2020.
25	Three day **FDP**(online) on "The Role of Artificial Intelligence and Machine Learning in Robotics and Automation"	During 1st-3rd June 2020 organized by Science and Technology Innovation Center, Anurag University, Hyderabad.
26	One Week **FDP** (Online) on **"**Advanced NDT Techniques & Applications in Industry	From 25th to 29th May,2020 organized **by** Indian Society for Non Destructive Testing, Hyderabad Chapter in association with Department of Mechanical Engineering, QISCET, Ongole.
27	8 weeks FDP(online) on Advanced Manufacturing Processes by IIT-Madras	From Sep-Nov 2020. Organized by IIT-M
28	AICTE approved Two weeks FDP (online) programme on Renewable Energy Intervention in industry, commercial and domestic application	From 14th Dec to26th Dec 2020 organized by Rajeev Gandhi memorial college of Engineering and Technology-Nndyal AP.

Certificate from the Investigator

TITLE: An experimental investigation on hydrogen production using solar energy

It is certified that

1. The same project proposal has not been submitted elsewhere for financial support.
2. We/I undertake that spare time on equipment procured in the project will be made available to other users.
3. We/I agree to submit a certificate from Institutional Bio safety Committee, if the project involves the utilization of genetically engineered organisms. We/I also declare that while conducting experiments, the Bio safety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in to.
4. We/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. The research work proposed in the scheme/project does not in any way duplicate the work already done or being carried out elsewhere on the subject.
6. We/I agree to abide by the terms and conditions of SERB grant.

Signature of the Principal Investigator
Name of the Principal Investigator:

Dr.I.S.N.V.R.Prasanth
Date: **02/03/2023**
Place: **Hyderabad, TS, India**

Signature of the Co-Principal Investigator
Name of the Co-Principal Investigator:

Dr. A.Raveendra
Date: **02/03/2023**
Place: **Hyderabad, TS, India**

Undertaking by the Principal Investigator

To

The Secretary
SERB, New Delhi

Sir

I **Dr. I.S.N.V.R.Prasanth** here by certify that the research proposal titled **An experimental investigation on hydrogen production using solar energy** submitted for possible funding by SERB, New Delhi is my original idea and has not been copied/taken verbatim from anyone or from any other sources. I further certify that this proposal has been checked for plagiarism through a plagiarism detection tool i.e. **TURNITIN SOFTWARE** approved by the Institute and the contents are original and not copied/taken from any one or many other sources. I am aware of the UGCs Regulations on prevention of Plagiarism i.e. University Grant Commission (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulation, 2018. I also declare that there is no plagiarism charges established or pending against me in the last five years. If the funding agency notices any plagiarism or any other discrepancies in the above proposal of mine, I would abide by whatsoever action taken against me by SERB, as deemed necessary.

Signature of the PI with date

10/3/23

Name: **Dr. I.S.N.V.R.Prasanth**
Designation: **Associate Professor**

Endorsement from the Head of the Institution of PI

This is to certify that:

1. Institute welcomes participation of Name: **Dr. I.S.N.V.R.Prasanth** Designation: **Associate Professor**...as the Principal Investigator and **Dr. A.Raveendra** as the Co- Investigator/s for the project titled: **An experimental investigation on hydrogen production using solar energy** and that in the unforeseen event of discontinuance by the Principal Investigator, the Co-Investigator will assume the responsibility of the fruitful completion of the project with the approval of SERB.

2. The PI ...**Dr. I.S.N.V.R.Prasanth** is a permanent or regular employee of this Institute/University/Organization and has **12 years 9 months** of regular service left before superannuation.

3. The project starts from the date on which the University/Institute/ Organization/College receives the grant from SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.

4. The investigator will be governed by the rules and regulations of University/ Institute/Organization/College and will be under administrative control of the University/ Institute/Organization/College for the duration of the project.

5. The grant-in-aid by the SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi will be used to meet the expenditure on the project and for the period for which the project has been sanctioned as mentioned in the sanction order.

6. No administrative or other liability will be attached to SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi at the end of the project.

7. The University/Institute/Organization/College will provide basic infrastructure and other required facilities to the investigator for undertaking the research project.

8. The University/ Institute/Organization/College will take into its books all assets created in the above project and its disposal would be at the discretion of SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.

9. The University/ Institute/Organization/College assumes to undertake the financial and other management responsibilities of the project.

Seal of

University/ Institute/Organization/College

Date: 10-7-23

Malla Reddy Engg. College (A) 500 100 Hyderabad

Signature

Registrar of University/Head of the Institute/
Head of organization /Principal of College

Principal
Malla Reddy Engineering College
Maisammaguda, Dhulapally,
(Post Via Kompally), Sec'bad-500100.

Endorsement from the Head of the Institution of Co-PI

This is to certify that:

1. Institute welcomes participation of Name: **Dr. I.S.N.V.R.Prasanth** Designation: **Associate Professor**...as the Principal Investigator and **Dr. A.Raveendra** as the Co- Investigator/s for the project titled: **An experimental investigation on hydrogen production using solar energy** and that in the unforeseen event of discontinuance by the Principal Investigator, the Co-Investigator will assume the responsibility of the fruitful completion of the project with the approval of SERB.

2. The Co-PI **Dr. A.Raveendra**is a permanent or regular employee of this Institute/University/Organization and has **9 years, 5 months** years of regular service left before superannuation

3. The Co-PI will be governed by the rules and regulations of University/ Institute/Organization/College and will be under administrative control of the University/ Institute/Organization/College for the duration of the project.

4. The grant-in-aid by the SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi will be used to meet the expenditure on the project and for the period for which the project has been sanctioned as mentioned in the sanction order.

5. No administrative or other liability will be attached to SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi at the end of the project.

6. The University/Institute/Organization/College will provide basic infrastructure and other required facilities to the investigator for undertaking the research project.

7. The University/ Institute/Organization/College will take into its books all assets created in the above project and its disposal would be at the discretion of SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.

8. The University/ Institute/Organization/College assumes to undertake the financial and other management responsibilities of the project.

Seal of

University/ Institute/Organization/College

Date: 10 - 3 - 23

Malla Reddy Engg. College (A) 500 100 Hyderabad

Signature

Registrar of University/Head of the Institute/
Head of organization / Principal of College

Principal
Malla Reddy Engineering College
Maisammaguda, Dhulapally
(Post Via Kompally), Sec'bad-500 100.