DVR & Dr. HS
MIC College of Technology
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E mail: office@mictech.ac.in, Website: www.mictech.edu.in

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mr. N V Subba Rao

Designation: Associate Professor

Department: Civil Engineering

Title of the Project: Stabilization of soil by using shredded rubber tyres

1. Background

1.1 Description of the problem

Soil is the basic foundation for any civil engineering structures. It is required to bear the loads without failures. In some places Soil may be weak which cannot resist the oncoming loads in such cases soil stabilization is needed, the clay often is weak has no enough stability in heavy loading.

1.2 Rational for taking up the project:

In this project I will use shredded rubber tyres to improve properties of soil. With ongoing rise in use of motor vehicles hundreds of millions of tyres discarded each year throughout the world. Use of tyres in geotechnical engineering for improvement of bearing capacity of clayey soil has received great attention in recent times.

1.3 Description of Proposal

1.3.1 Objectives of the Project

Present an attempt has been made through laboratory study to understand the potential of tyres in soil stabilization, which helps not only in soil stabilization but also in utilization of waste

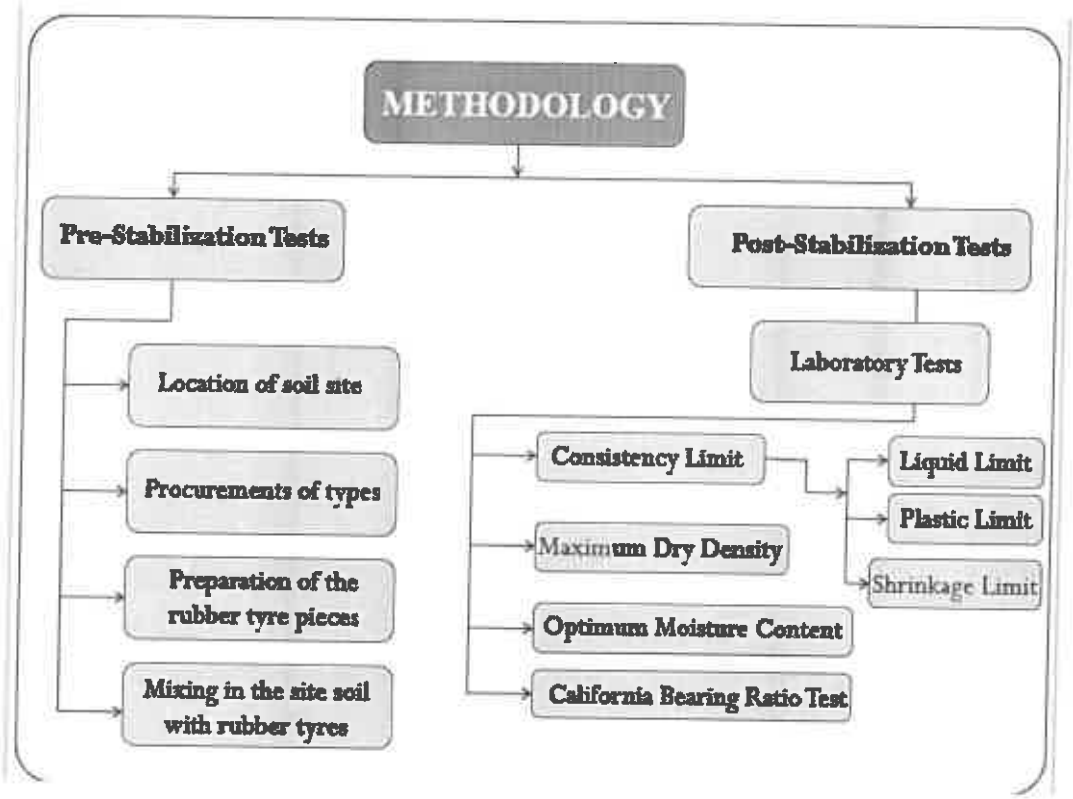
The soil in this study will be collected from Keesara village with an area 300x300mm and excavate 200mm deep from ground level . Classification of soil as per BIS is CL which is clay with low compressibility.

1.4 Innovative component of the project

Shredded rubber tyres with different percentages will be used (4%,8%,12%,16%) of tyres by weight of soil sample for the experimental work.

The main objective is to increase the strength or stability of soil and to reduce the construction cost by using local available materials.

1.5 Methodology detailing stepwise activities and sub-activities



2. Work Plan

Phase-wise plan of action upto post-project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project reports& Paper Communication

3. Expected Outcome and Deliverables of the Project

It will show that MDD of soil tyre mixtures reduces significantly with an increase in the percentage of shredded rubber tyre. This is due to the light weight nature of shredded rubber tyre. On the other hand, the value of OMC also will decrease with an enhancement of percentage of shredded rubber tyre. This is due to the fact that the shredded rubber tyre has more water absorption capacity.

Likely Impact(Please attempt to quantify) : Yes

4. Suggested Post-Project Activities:

The outcome of the project is to increase the strength or stability of soil and to reduce the construction cost by using local available materials.

5. Budget estimate

A. Recurring (in Rs):45000
1. Shredded Rubber Tyre 2. Soil
Non-Recurring (Equipment/Instrument)**(in Rs): Nil**

C. Total (in Rs):45,000

Date: 22.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. N.V. Subba Rao,
Associate Professor,
Department of Civil Engineering
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **N.V. Subba Rao,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Stabilization of soil by using shredded rubber tyres"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 45,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of Civil Engineering, MIC
- Account Section, MIC

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DVR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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Accredited by NAAC A With Grade

PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

Title of the project: "Stabilization of soil by using shredded rubber tyres"

1) Name of the Principal Investigator(s) and Co-Investigator(s): **Mr. N V Subba Rao**
2) Date of commencement: 15-07-2022
3) Proposed date of completion: 30.06.2023
4) Actual date of completion: 20.8.2023
5) Objectives as stated in the project proposal:

   In this work, Present an attempt has been made through laboratory study to understand the potential of tyres in soil stabilization, which helps not only in soil stabilization but also in utilization of waste.

   The soil in this study will be collected from Keesara village with an area 300x300mm and excavate 200mm deep from ground level. Classification of soil as per BIS is CL which is clay with low compressibility.

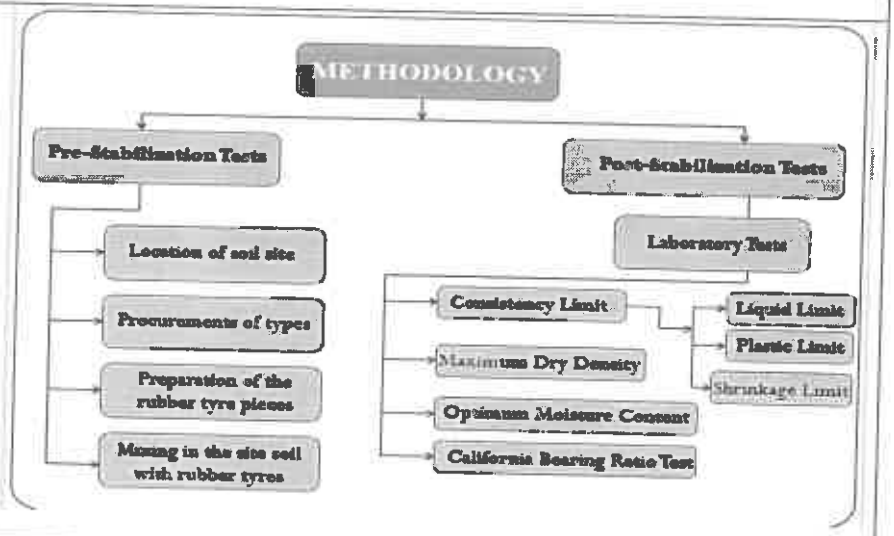
Experimental set up	Compressive Strength Test
Methodology	
Results	

Table-1: OMC and MDD Nominal Values

Trail No	1	2	3	4
Weight of Mould	2940	2940	2940	2940
Weight of wet soil + mould	4880	4920	4810	4730
Weight of wet soil	1940	1980	1870	1790
Weight density of soil	2.05	2.10	1.98	1.89
Container No	P-2	J-1	P-6	P-2
Weight of container	45	40	55	45
Weight of wet soil+ container	105	115	120	135
Weight of dry soil + container	95	100	110	115
Weight of water	10	15	10	20
Weight of dry soil	50	60	55	70
Water Content	20	25	18.18	28.57
Density	1.70	1.68	1.67	1.47

It can be seen from the above tables that the MDD of soil tyre mixtures reduces significantly with an increase in the percentage of shredded rubber tyre. This is due to the light weight nature of shredded rubber tyre. On the other hand, the value of OMC also decreasing with an enhancement of percentage of shredded rubber tyre. This is due to the fact that the shredded rubber tyre has more water absorption capacity.

6) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure(In Rs.)	% of Total cost
1.	Recurring (in Rs) :	30,000	Labour Cost – 13000/- Cost of 1. Shredded Rubber Tyre 2. Soil ---10000/- Food & Refreshments – 4000/- Travel Expenditure – 3000/-	66.67
2.	Non-Recurring (Equipment/Instrument) (in Rs)	15,000	Testing Equipment--15000/-	33.33
3.	Others, if any	Nil	Nil	Nil

7) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator

Date: 20.8.2023

Place: Kanchikacherla

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UTILIZATION CERTIFICATE

Certified that out of **Rs 45,000** of institute funded seed grant for the **"Stabilization of soil by using shredded rubber tyres"** sanctioned during the Academic Year **2022-23** in favour of **Mr.N.V. Subba Rao** from **Department of Civil Engineering** dated **15.07.2022** and a sum of **Rs. 45,000 (Rupees Fourty Five Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
DVR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mr. K Prasad

Designation: Assistant Professor

Department: Civil Engineering

Title of the Project: Influence of Steel Fiber as an Admix in Normal Concrete with Partial Replacement of Cement by Fly Ash

1. Background

1.1 Description of the problem

- Concrete is the commonly use construction material which has numerous desirable properties like, stiffness high compressive strength and durability under normal usual environmental factors
- Concrete is a breakable and mixed material that is strong in compression and weak in tension. We know that concrete mixed with other material was applied for resistance purpose.
- Without any fiber in the concrete there was development of the cracks due to plastic shrinkage, drying shrinkage and changes in volume of concrete.
- The structural properties of fiber reinforced concrete are well known. Plain concrete, being brittle in nature, has lower tensile strength and lower resistance to crack propagation.

1.2 Rational for taking up the project:

- Steel fiber is a metal reinforcement. Steel fiber for reinforcing concrete is defined as short, discrete lengths of steel fibers with an aspect ratio (ratio of length to diameter) from about 20 to 100.
- Steel Fiber in plain c. ·crete would act as crack arrester and would si·' ·tantially improve its compressive strength properties.
- Increase the Tensile strength and Toughness
- Improves Abrasion and Impact load resistance

1.3 Description of Proposal

1.3.1 Objectives of the Project

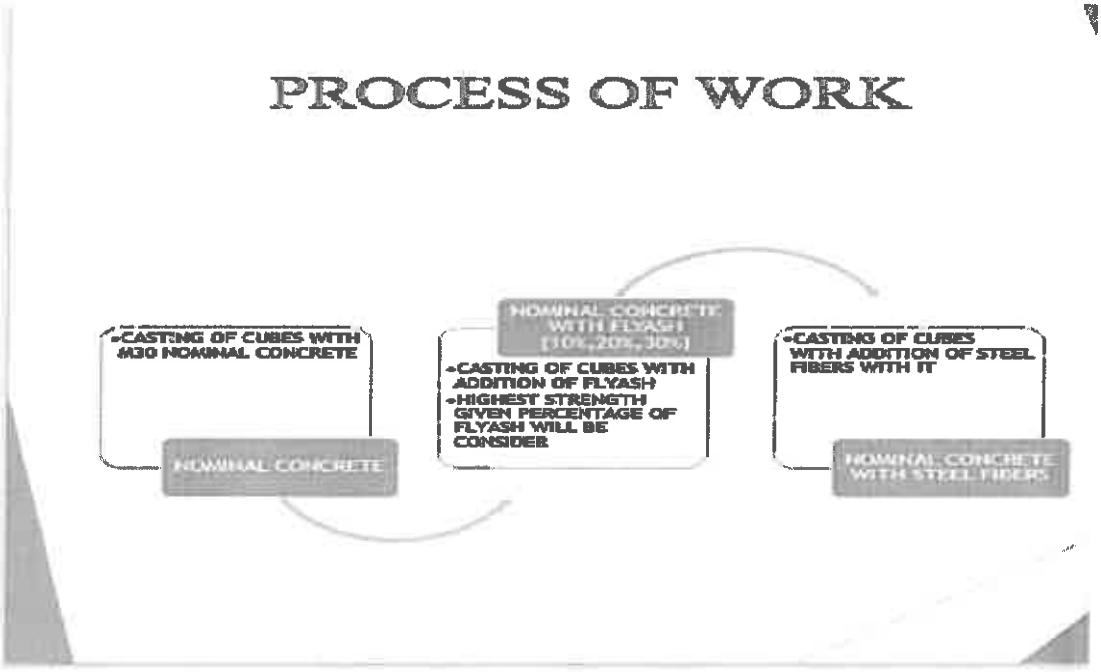
- By using fly ash as partial replacement with cement in concrete it give more sustainability in environmental
- Using steel fibre it gives addition strength to concrete .

- By addition reinforcement with steel fiber it will able gain more tensile strength

1.4 Innovative component of the project

This project is focused at the effects on the addition of fly ash as a partial replacement of cement in concrete and steel fibers acts as a fiber in the concrete. this experiment will be carried by finding the compressive strength. the fly ash will be added in the proportion of 10%, 20% and 30% by weight in the cement respectively to the presents good pozzolanic properties and steel fibers provide good strength to the concrete as the results are compared with the control mix of design mix M30. The specimens will be tested after nominal,7,28,56 days of curing. it is observed that while keeping fly ash at 5% and 7.5% and 10% and 12.5% with steel fibers can be carried out in concrete without decreasing the strength.

1.5 Methodology detailing stepwise activities and sub-activities



2. Work Plan

Phase-wise plan of action up to post-project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project reports& Paper Communication

3. Expected Outcome and Deliverables of the Project

The specimens will be tested after nominal,7,28,56 days of curing. it is observed that while keeping fly ash at 5% and 7.5% and 10% and 12.5% with steel fibers can be carried out in concrete to increase the strength of concrete.

Likely Impact(Please attempt to quantify) : Yes

4. Suggested Post-Project Activities:

This project is focused at the effects on the addition of fly ash as a partial replacement of cement in concrete and steel fibers acts as a fiber in the concrete. this experiment will be carried for finding the compressive strength.

5. Budget estimate

A. Recurring (in Rs):40000

1.Cement. 2. Fly ash. 3. Steal Fiber. 4. Sand 5. Coarse Aggregate 6. Water

B. Non-Recurring (Equipment/Instrument)**(in Rs): Nil**

C. Total (in Rs):40,000

Date: 22.06.2022
Place: Kanchikacherla

K. P Rao
Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. K Prasad,
Assistant Professor,
Department of Civil Engineering
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **K Prasad,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Influence of Steel Fiber as an Admix in Normal Concrete with Partial Replacement of Cement by Fly Ash"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of Civil Engineering, MIC
- Account Section, MIC

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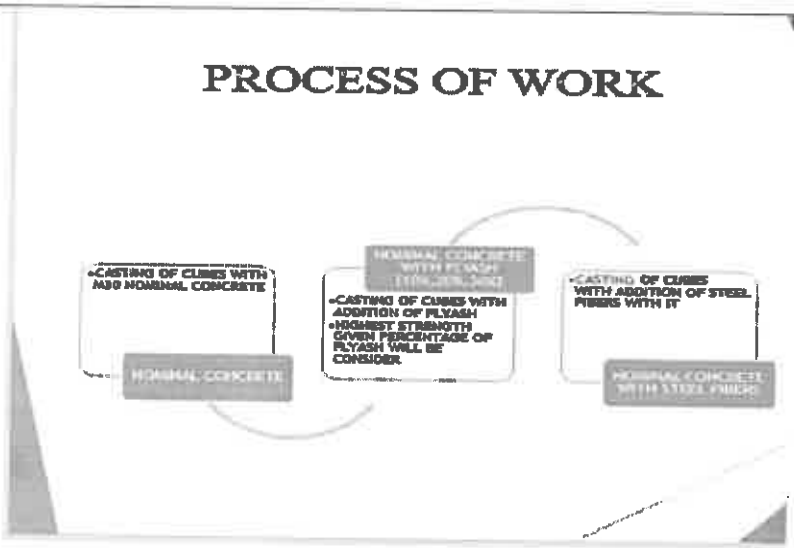
PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

Title of the project: "Influence of Steel Fiber as an Admix in Normal Concrete with Partial Replacement of Cement by Fly Ash"

1) Name of the Principal Investigator(s) and Co-Investigator(s): **Mr. K Prasad**
2) Date of commencement: 15-07-2022
3) Proposed date of completion: 30.06.2023
4) Actual date of completion: 20.8.2023
5) Objectives as stated in the project proposal:

This project is focused at the effects on the addition of fly ash as a partial replacement of cement in concrete and steel fibers acts as a fiber in the concrete. this experiment will be carried by finding the compressive strength. the fly ash will be added in the proportion of 10%, 20% and 30% by weight in the cement respectively to the presents good pozzolanic properties and steel fibers provide good strength to the concrete as the results are compared with the control mix of design mix M30. The specimens will be tested after nominal,7,28,56 days of curing. it is observed that while keeping fly ash at 5% and 7.5% and 10% and 12.5% with steel fibers can be carried out in concrete without decreasing the strength.

Experimental set up	Compressive Strength Test
Methodology	
Results	Nominal Concrete with Flyash 10%,20%,30% --- 28 Days

S.NO	% OF FLYASH	WEIGHT [KG]	PEAK LOAD [KN]	PEAK STRESS [MPA]
1	10%	8.54	1002	44.56
		8.38	969.4	43.08
		8.57	1002	44.57
		AVG	=991.1	44.07
2	20%	8.490	847.8	37.68
		8.455	816.3	36.28
		8.525	871.7	38.74
		AVG	=845.2	37.56
3	30%	8.4	826.3	36.72
		8.505	902.3	40.10
		8.460	914.2	40.63
		AVG	=880.9	39.15

- Testing of Cubes is carried out after curing ends
- Test is done using compression test machine

The specimens is tested after nominal,7,28,56 days of curing. it is observed that while

keeping fly ash at 10, 20% and 30% with steel fibers is carried out in concrete to increase the strength of concrete.

6) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure(In Rs.)	% of Total cost
1.	Recurring (in Rs) :	25,000	Labour Cost – 10000/- Cost of 1.Cement. 2. Fly ash. 3. Steal Fiber. 4. Sand 5. Coarse Aggregate ---10000/- Food & Refreshments – 2000/- Travel Expenditure – 3000/-	62.5
2.	Non-Recurring (Equipment/ Instrument) (in Rs)	15,000	Testing Equipment--15000/-	37.5
3.	Others, if any	Nil	Nil	Nil

7) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

K. Prasad
Signature of the Principal Investigator

Date: 20.8.2023

Place: Kanchikacherla

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Kanchikacherla - 521180. NTR Dist. A.P, India.

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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute funded seed grant for the titled **"Influence of Steel Fiber as an Admix in Normal Concrete with Partial Replacement of Cement by Fly Ash"** sanctioned during the Academic Year **2022-23** in favour of **Mr. K. Prasad** from **Department of Civil Engineering** dated **15.7.2022** and a sum of **Rs. 40,000(Rupees Fourty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE-FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Dr. D. Venkata Siva Reddy

Designation: Associate Professor

Department: Mechanical Engineering

Title of the Project: Investigation of different cellular scanning strategies on selective laser melting Process

1. Background

1.1 Description of problem (Brief)

Additive manufacturing techniques, such as selective laser melting (SLM), are used to create complex components that may be customised in a variety of ways, such as topological optimization, lightweight construction, lattice architectures, and so on. The mechanical characteristics of SLM components are almost identical or even better than those of bulk material provided the components are near full density. It is possible to construct functional metal goods using selective laser melting (SLM) in which a computer model serves as a guide for melting metal particles layer by layer. SLM has a broad variety of applications in aerospace, automotive, tool, medical, and power generation sectors because of its promise of quick production. Unfortunately, the enhanced thermal cycle of quick melting, cooling, and melt-back during SLM leads to higher residual stress gradients, which contribute to microcracks, delamination, and component deformation, all of which are major challenges in the . .etal additive manufacturing (AM) comm. ity. It is recalled that residual stress (RS) originates from differential expansion and contraction of the material.

Residual Stress then causes deformation, delamination, and fissures in the component. Additional faults might emerge throughout the SLM process. Apart from RS, the most prevalent faults are balling, warping, and dross development. However, RS may have similar effects to stress concentration that are vital to the component life cycle. The

presence of RS, along with additional loading stress, may dramatically weaken fatigue resistance and induce deformation, as well as delamination, fissures, and other structural problems. Residual stresses are self-balancing stresses that remain in a component after manufacture, even in the absence of a temperature gradient or external forces. These stresses are created by geometric mismatches between components covering many locations and phases inside a part, or even by local variances in elastic constants, thermal and mechanical properties.

Chemical resistance, magnetization, deformation resistance, and static and dynamic strength are just a few of the properties that are affected. Sintering/melting and subsequent solidification of metal may be induced by laser, electron, or plasma heating. There is a change in how each component functions locally as a result. It is possible that rapid cooling and heating may cause distortions and cracks in AM materials. RS is also responsible for additively manufactured components anisotropic behavior. The Temperature Gradient Mechanism (TGM) may be observed as a predecessor to RS in AM. This means that during localized heating the power source increases stress in the region around it, as well as a sequence of local deformations (expressed by its deformation values). During subsequent cooling of the molten top layer, thermal contraction induces tensile RS on the solidified zone and compressive RS at its boundary due to the self-balancing character of RS filed. Because of the intricacy of the AM process, the TGM model can only provide a simplified representation of where and how RS are generated.

1.2 Rational for taking up the project:

Additive manufacturing is one of the fastest-growing fields in materials engineering. This is because there is a new trend for custom, high-precision, and on-demand manufacturing. The undesired residual stress induced in the components during the layer-by-layer melting and solidification of the metal powder is an important issue related to selective laser melting (SLM) process that needs to be studied deeply. These stresses may impair mechanical performance and potentially result in premature failure. As a result, a thorough knowledge of residual stress is crucial for improved component dependability. By keeping constant

process parameters, samples were produced with a difference in the scanning method. Results indicate that the defect-free parts are manufactured in all the four patterns used, and the self-balanced residual stresses are within the safe limits of yield strength.

1.3 Description of Proposal

1.3.1Objectives of the project (Brief and to the point)

The influence of print scan method on Residual Stresses is studied utilizing a SLM procedure. The bridge-shaped samples made of AISI316L stainless steel were created and then tested. The current work is focused on analyzing as-printed SLM specimens in order to get sufficient primary knowledge regarding the surface and interior quality of the samples. XRD is used to quantify residual stresses. These findings would contribute to a better understanding of the evolution of residual stress during SLM using four different pattern techniques.

1.4 Innovative component of the project (Brief)

A TruPrint 1000 SLM equipment was utilised to create the stainless steel 316L samples used in this investigation. The laser has a concentrated beam diameter of 20 μm. Both samples were created in a 99.999 % pure argon atmosphere to prevent oxidation during the SLM process. The basic material powders had a spherical form and varied in size from 20 to 40 μm. Table 1 collects the values of process parameters employed in this study such as laser power (W), scan speed (mm/s) and layer thickness (μm). Different scanning strategies were tested.

1.5 Methodology detailing stepwise activities and sub-activities

In this study, RS is measured on the lateral surface at different positions using the Pulsed μ-X360n Portable X-ray Residual Stress analyzer. The sample surface was cleaned using emery sheets before measurement. cos(α) measuring method with a spot size of 2 mm was adopted.

2 Work Plan

Phase-wise plan of action up to post-project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification and framing research design	Project Implementation & Finding	Preparing project reports & Paper Communication

3. Expected Outcome and Deliverables of the Project

In this project, residual stresses are measured and analyse the behavior of SLM parts. Any unwanted geometrical change or departure from specifications in a fabricated structure or component, as a consequence of parts. The layered-by-layer parts area experiences heating and cooling cycles so that differential thermal expansion and contraction of the weld metal and parent material cause welding residual stresses (RS).

4. Likely Impact (Please attempt to quantify): Yes

5. Suggested Post Project Activities:

6. Budget estimate

A. Recurring (in Rs): Nil

B. Non-Recurring (Equipment/Instrument) **(in Rs): 50,000.00**

C. Total (in Rs): 50,000.00

Date: 16.06.2022

Signature of the Principal Investigator

Place: Kanchikacherla

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Research and Development Cell

15.07.2022

To

Dr. D. Venkata Siva Reddy,
Associate Professor,
Department of Mechanical Engineering
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **D.V. Siva Reddy,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Investigation of Different Cellular Scanning Strategies on Selective Laser Melting Process"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 50,000/-** to work for a period of one Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

PRINCIPAL
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Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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- HOD, Department of Mechanical Engineering, MIC
- Account Section, MIC

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E mail: office@mictech.ac.in, Website: www.mictech.edu.in

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PROJECT COMPLETION REPORT FOR INSTITUTE-FUNDED SEED GRANT

1) Title of the project: **Investigation of different Cellular scanning strategies on selective laser melting Process**
2) Name of the Principal Investigator: **Dr. D. Venkata Siva Reddy**
3) Date of commencement: **15.07.2022**
4) Proposed date of completion: **12.06.2023**
5) Actual date of completion: **31.07.2023**
6) Objectives as stated in the project proposal:

Additive manufacturing is one of the fastest-growing fields in materials engineering. This is because there is a new trend for custom, high-precision, and on-demand manufacturing. The undesired residual stress induced in the components during the layer-by-layer melting and solidification of the metal powder is an important issue related to selective laser melting (SLM) process that needs to be studied deeply. These stresses may impair mechanical performance and potentially result in premature failure. As a result, a thorough knowledge of residual stress is crucial for improved component dependability. By keeping constant process parameters, samples were produced with a difference in the scanning method. Results indicate that the defect-free parts are manufactured in all the four patterns used, and the self-balanced residual stresses are within the safe limits of yield strength.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No

8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	Micro Hardness

Methodology	The influence of print scan method on Residual Stresses is studied utilizing a SLM procedure. The bridge-shaped samples made of AISI316L stainless steel were created and then tested. The current work is focused on analyzing as-printed SLM specimens in order to get sufficient primary knowledge regarding the surface and interior quality of the samples. XRD is used to quantify residual stresses. These findings would contribute to a better understanding of the evolution of residual stress during SLM using four different pattern techniques.
Results	Vickers hardness measurements were performed on the top and transverse surfaces of as-fabricated samples shown in Figure 4. The hardness results depend on the four different scanning strategies used to print the parts. The chess field pattern gives the highest hardness average value of 303 HV, and the lowest for Anti-parallel horizontal is 227 HV the hardness values obtained. The increase in the hardness was attributed to the repeated thermal cycles experienced during the multi-layered procedure with melting and solidification. SLM samples had higher average hardness values than those of the cast samples (227, 303, 259, 271 HV) (192 HV). Different studies have confirmed that additively manufactured SS316L components have a greater hardness than that of SS316L components traditionally fabricated. Anti-parallel horizontal pattern induces compressive residual stresses at the middle and tensile in nature at other two ends, with a variation from -5MPa to !4MPa, as shown in Figure 1(a). In Chess field pattern the stresses are tensile in nature throughout the measured surface as given in Figure 1(b); they vary from a minimum of 20 MPa at the left side end to a maximum of 101 MPa

	at the middle of the fabricated part.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

The residual stress field of metal AM components is affected by scanning techniques, dwell duration, and a variety of other process factors that have a significant influence on thermal history. The residual stress in AISI316 stainless steel is produced by SLM by using an imaging method called digital image correlation (DIC) and XRD. There has been a great deal of research into the dependency of residual stress on aspects such as scanning method, laser power, scanning speed, and construction orientation. A smaller scan island and a higher energy density throughout the length of the scan island would result in a reduced residual stress field. Tensile residual stress in the build direction of a cut-off component in the as-built condition is found immediately under the top surface, followed by a compressive zone in the center, and a tensile zone at the bottom surface.

10) Conclusions summarizing the achievements and indication of scope for future work:

- Defect-free 3D metal printed parts were produced irrespective to the scanning strategy used.
- SLM parts show higher hardness values than those of the cast parts.
- Residual stresses in all the printed parts are found within the yield limits of the base materials with a good factor of safety.
- Metal AM residual stress may be reduced via preheating, process planning, feedback management, and laser peening. Residual stress relief is best achieved by machining and heat treatment.

The research on residual stress in AM is still in its early stages. In the future, researchers will look into how to measure macro and micro residual stresses, as well as the effects of crystal structure, simulation, post-process mitigation, fatigue, creep, and corrosion on the size and function of 3D printed parts.

11) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	Nil	Nil	Nil
2.	Non-Recurring (Equipment/Instrument) (in Rs)	50, 000.00	SLM process, and Residual stress measurement	100
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in future, if any – **Not applicable**

Signature of the Principal Investigator

Date: 31.07.2023

Place: Kanchikacherla

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UTILIZATION CERTIFICATE

Certified that out of **Rs 50,000** of institute-funded seed grant for the **"Investigation of Different Cellular Scanning Strategies on Selective Laser Melting Process"** sanctioned during the Academic Year **2022-23** in favor of **Dr. D. Venkata Siva Reddy** from the **Department of Mechanical Engineering** dated **15.07.2022** and a sum of **Rs. 50,000 (Rupees Fifty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District, A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE-FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mr. A. Naga Pavan Kumar

Designation: Assistant Professor

Department: Mechanical Engineering

Title of the Project: Microstructural Study of Inconel 600 through Gas Tungsten Arc Welding Process

1.Background

1.1 Description of problem (Brief)

Welding is a highly complex process of permanently joining metals that involves heat source movement, mass exchange, and phase and microstructure transformations that in turn affect the joint's mechanical properties. In response to the growing demand for high-performance materials by the chemical, nuclear, fuel, aerospace, marine, and petroleum-based industries that are extremely resistant to a corrosive atmosphere, high-strength nickel-based alloys are mainly used. They combine excellent corrosion resistance with high strength at high temperatures. Nickel-based materials are austenitic superalloys containing about 50% of Ni and different percentages of Fe, Cr, Mo, and Ti (present as trace elements). Nickel offers good thermal and corrosive resistance at elevated temperatures. The grain size at the fusion zone depends on the alloy's chemical composition, as well as welding parameters such as interaction time, welding speed, and current. The fusion welding process promotes a thermo-mechanical variation of the parent metal properties; the high heat input and uncontrolled cooling rates negatively affect the microstructure of the fusion zone (FZ) and heat-affected zone (HAZ), inducing precipitation of undesirable phases, grain coarsening (in HAZ) and tensile residual stresses, among others. Moreover, these mentioned changes in the welded joint also have a negative impact on components' performances when working at elevated temperatures.

The gas tungsten arc welding (GTAW) process is widely employed to join high-strength alloys with suitable filler materials with both constant and pulsed current processes. As per the earlier research, the microstructures were observed to have satisfactory solid solubility with parent and filler metals but a wide fusion zone. Hot cracking is one of the major problems observed during single-pass welding, resulting in unacceptable permanent damage to the structure. As an alternative, this was overcome by employing a multipass welding procedure with the foresight to maintain appropriate inter-pass temperature. However, the mechanical and metallurgical properties can be improved by employing advanced welding techniques such as electron beam welding (EBW) and laser beam welding (LBW). Their high-power density allows for reducing the heat input and therefore the FZ and HAZ dimensions together with a higher welding speed. This results in improved metallurgical and mechanical properties and productivity. Moreover, these processes can be easily automated compared to conventional welding techniques.

Inconel materials are used to resist high temperature and corrosion applications required, i.e., aerospace, nuclear, and powerplants, etc. The arc welding process is widely practiced in industries. The gas tungsten arc welding (GTAW) process is easy to establish and can be operated manually and automatically during the welding, and weld is protected by shielding gas and the defects are minimized. Welding made by depositing filler metal filler with two or more passes in succession is known as multipass welding. It is often employed with the submerged arc process. The gas metal arc welding (GMAW) process is the best choice for both manual and automatic root and first-pass procedures. Ravisankar et al. Studied the effect of heat input in the weld causes distortion and residual stresses in the finals butt weldments by experiments and validated using finite element analysis.

1.2 Rational for taking up the project:

The demand for high-temperature and corrosion resistance materials is increased over a decade which has wide applications in nuclear, thermal plants and marine application. In recent years, Ni-based alloys are growing in their strategical importance given their use in

manufacturing and machining industry applications where mechanical and corrosion resistance at high temperatures are needed. However, the effect of multipass welding process on the residual stresses in Inconel 600 and its structural properties are not yet completely well studied in the literature.

1.3 Description of Proposal

1.3.1 Objectives of the project (Brief and to the point)

The objective of the study is to evaluate the distribution of residual stresses in multipass weldment. The pulsed current gas tungsten arc welding process was used for welding of Inconel600. The residual stresses are measured on the surface of weldment in the transverse direction, i.e., perpendicular to weld direction.

1.4 Innovative component of the project (Brief)

Gas tungsten arc welding process can be adaptable for all metals and can be used for all welding positions. It can be operated in both continues and pulsed mode current. The present study has been carried out with pulsed current gas tungsten arc welding of Inconel600 with three passes, and the filler wire of ERNiCrMo-3 has been considered. The single V-groove is employed for joining the plates with three passes welding. The residual stresses and tensile strength in weldments are studied. X-ray diffraction (XRD) technique is used to measure residual stresses. The measurement is carried out on the surface across the welding direction. The tensile residual stresses are observed at the fusion zone. The tensile strength of the weldment is higher than that of the base metal.

1.5 Methodology detailing stepwise activities and sub-activities

The pulsed current mode is used for welding of samples in multipass welding. The two different current modes are used during the process. During the welding process, the material was filled with ERNiCrMo-3 filler rod of 2.4 mm diameter. The plate dimensions are of 120 mm * 50 mm * 5 mm before welding. Standard single V-groove employed with an included angle of 60° is used with land of 1.6 mm. The butt joint is prepared with root gap of 2 mm between the plates. The welding process is carried out with pulsed mode

current with gas tungsten arc welding process with base current as 130 Amps, background current as 60 Amps, and voltage of 20 V. The weldment is free surface (hot cracking) and internal defects which were verified through X-Ray radiography. Further, the sample goes through the electric discharge machine wire cut with standard gauge lengths for preparation of tensile strength specimen. The weldment is shear as per the standard gauge length of the weldment for tensile strength. The residual stresses are measured on the surface weldment across the welding. The measurement will cover all the zones of the weld surface. The residual stress is measured using the X-ray diffraction.

2. Work Plan

Phase-wise plan of action up to post-project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

3. Expected Outcome and Deliverables of the Project

Gas tungsten arc welding process can be adaptable for all metals and can be used for all welding positions. It can be operated in both continues and pulsed mode current. The present study has been carried out with pulsed current gas tungsten arc welding of Inconel600 with three passes, and the filler wire of ERNiCrMo-3 has been considered. The single V-groove is employed for joining the plates with three passes welding. The residual stresses and tensile strength in weldments are studied. X-ray diffraction (XRD) technique is used to measure residual stresses. The measurement is carried out on the surface across the welding direction. The tensile residual stresses are observed at the fusion zone. The tensile strength of the weldment is higher than that of the base metal.

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4. Likely Impact (Please attempt to quantify) : Yes

5. Suggested Post Project Activities:

6. Budget estimate

A. Recurring (in Rs): Nil

B. Non-Recurring (Equipment / Instrument) **(in Rs): 40,000.00**

C. Total (in Rs): 40,000.00

Date: 15.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. A. Naga Pavan Kumar,
Assistant Professor,
Department of Mechanical Engineering
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **A. Naga Pavan Kumar,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Microstructural Study of Inconel 600 through Gas Tungsten Arc Welding Process"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of Mechanical Engineering, MIC
- Account Section, MIC

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PROJECT COMPLETION REPORT FOR INSTITUTE-FUNDED SEED GRANT

1) Title of the project: **Microstructural study of Inconel 600 through Gas Tungsten Arc Welding Process**
2) Name of the Principal Investigator: **Mr. A. Naga Pavan Kumar**
3) Date of commencement: 15.07.2022
4) Proposed date of completion: 12.07.2023
5) Actual date of completion: 27.07.2023

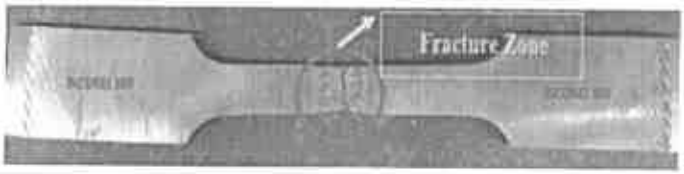
6) Objectives as stated in the project proposal:

The demand of using high temperature and corrosion resistance materials is increased from a decade which has wide applications in nuclear, thermal plants and marine application. This study aims to evaluate the distribution of residual stresses in multipass weldment. The pulsed current gas tungsten arc welding process was used for welding of Inconel600. The residual stresses are measured on the surface of weldment in the transverse direction, i.e., perpendicular to weld direction.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No

8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	X-ray Diffraction
Methodology	When using many passes of welding, samples are welded using pulsed current mode. During the procedure, the two distinct current modes are utilized. The material was filled with 2.4 mm diameter ERNiCrMo-3 filler rod during the welding operation. Before welding, the plate measures 120 mm x 50 mm x 5 mm. With 1.6 mm of land, a standard single V-groove is utilized with an incorporated angle of 60°. The plates are spaced 2 mm apart to prepare the butt joint. With a base current of 130 Amps, a background

	current of 60 Amps, and a voltage of 20 V, gas tungsten arc welding is performed using pulsed mode current. Through X-Ray radiography, it was confirmed that the weldment is free of internal and surface flaws (hot cracking). To prepare a specimen for tensile strength testing, the sample is further processed using an electric discharge machine using wire cut to specified gauge lengths. The weldment is sheared in accordance with the weldment's specified gauge length for tensile strength. On the surface weldment throughout the welding, residual stresses are detected. The measurement will encompass all weld surface zones. The X-Ray diffraction technique is used to calculate the residual stress.
Results	1. The tensile strength is carried out for weldment with a strain rate of 2 mm/min. The weldment undergoes plastic deformation up to fracture with a standard of ASTM A 370–2013. The load versus displacement and stress–strain in the tensile specimen. The fracture of the weldment is taken place at fusion zone as shown in Figure below, the ductility in the material of 33%, with ultimate tensile strength of 800.7 MPa. 

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

The tensile strength is carried out for weldment with a strain rate of 2 mm/min. The weldment undergoes plastic deformation up to fracture with a standard of ASTM A 370–2013. The fracture of the weldment is taken place at fusion, the ductility in the material of 30%, with ultimate tensile strength of 800.7 MPa. The stress distribution was calculated at various locations on the weldment. The residual stress distribution is measured in transverse direction. The residual shows max peak at the fusion zone and future, and in HAZ, the

lowest peak was observed because of the heat generated in the fusion zone; both sides of the plate experience compressive than fusion zone. This trend of stress distribution is due to influenced welding process parameters, thermal, cooling rate, and mechanical properties of the base materials.

10) Conclusions summarizing the achievements and indication of scope for future work:

i. Successful, defect-free multipass weldment of Inconel600 could be obtained using PCGTA welding process employing ERNiCrMo-3.

ii. Hot cracking in the welds can be avoided by using the interpass temperature between the passes.

iii. The tensile residual stress observed at the fusion zone in the weldment, which is within the yield limits, shows a factor of safety of 2.21.

12. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs):	Nil	Nil	Nil
2.	Non-Recurring (Equipment / Instrument) (in Rs)	40,000.00	Equipment	100
3.	Others, if any	Nil	Nil	Nil

13) Plan for utilizing the equipment facilities in future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 27.07.2023
Place: Vijayawada

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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute-funded seed grant for the **"Microstructural Study of Inconel 600 through Gas Tungsten Arc Welding Process"** sanctioned during the Academic Year **2022-23** in favour of **Mr.A Naga Pavan Kumar** from the **Department of Mechanical Engineering** dated **15.07.2022** and a sum of **Rs. 40,000 (Rupees Forty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
DVR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh. India – Pin: 521180

FORMAT FOR INSTIUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mrs.A.Anuradha

Designation: Assistant professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: AI

Title of the Project: Machine Learning and End-to-End Deep Learning for the Detection Of Chronic Heart Failure From Heart Sounds

1.Background

1.1 Description of Proposal: Chronic heart failure (CHF) affects over 26 million of people worldwide ,and it's incidence is increasing by 2% annually. Despite the significant burden that CHF poses and despite the ubiquity of sensors in our lives, methods for automatically detecting CHF are surprisingly scarce, even in the research community .We present a method for CHF detection based on heart sounds. The method combines classic Machine –Learning (ML) and end-to-end Deep Learning (DL). The classic ML learns from expert features and the DL learns from a spectro – temporal representation of the signal. The method was evaluated on recordings from 947 subjects from six publicly available datasets and one CHF dataset that was collected for this study. Using the same evaluation method as a recent physoNet challenge , the proposed method achieved a score of 89.3, which is 9.1 higher than the challenge's baseline method. The method's aggregated accuracy is 92.9% while the experimental results are not directly comparable, this error rate is relatively close to the percentage of recordings labeld as "unknown" by experts .Finally we identified 15 expert features that are useful for building ML models to differentiate between CHF phases with an accuracy of 93.2%. The proposed method shows promising results both for the distinction of recordings between healthy subjects and patterns and for the detection of different CHF phases. This may lead to the easier identifications of new CHF patients and the development of home based CHF monitors for avoiding hospitalizations.

1.2 Objectives of the project: The objectives of Machine Learning and End-to-End Deep Learning for the Detection Of Chronic Heart Failure From Heart Sounds is promising results

both for the distinction of recordings between healthy subjects and patients and for the detection of different CHF phases.

1.3 Methodology: It consist of the following two main components a classic ML component and an end-to-end DL component .The input to the classic ML pipeline is the same as the input to the end-to-end DL pipeline , but the classic ML pipeline contains a feature extraction process to extract features from the raw data and to format the data into a classic ML format. The end-to-end DL does not require feature etraction, and it works directly with the raw data. Additionally both pipelines work with signals from the time and frequency domains. The outputs of the two components are then merged by a recording-based ML model that outputs the final prediction , i.e, whether a recording comes from a healthy subject or from a patient. .

3. Total (in Rs): Rs40000/-

Date: 13.07.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Ms. A. Anuradha,
Associate Professor,
Department of Information Technology,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **A. Anuradha,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Machine Learning and End-to-End Deep Learning for the Detection of Chronic Heart Failure from Heart Sounds"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

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B.Tech (CSE | ECE | ME)
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With Grade

PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) Title of the project: Machine Learning and End-to-End Deep Learning for the Detection Of Chronic Heart Failure From Heart Sounds
2) Name of the Principal Investigator(s) and Co-Investigator(s): Ms.A.Anuradha
3) Date of commencement: 15.07.2022
4) Proposed date of completion: 19.06.2023
5) Actual date of completion: 17.07.2023
6) Objectives as stated in the project proposal:

The objectives of Machine Learning and End-to-End Deep Learning for the Detection Of Chronic Heart Failure From Heart Sounds is promising results both for the distinction of recordings between healthy subjects and patients and for the detection of different CHF phases.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. PhysioNet Experiments 2. UKC-JSI Experiments 3. End to END DL model 4. Personalization
Methodology	It consist of the following two main components a classic ML component and an end-to-end DL component .The input to the classic ML pipeline is the same as the input to the end-to-end DL pipeline , but the classic ML pipeline contains a feature extraction process to extract features from the raw data and to format the data into a classic ML format. The end-to-end DL does not require feature etraction, and it works directly with the raw data. Additionally both pipelines work with signals from the time and

	frequency domains. The outputs of the two components are then merged by a recording-based ML model that outputs the final prediction , i.e, whether a recording comes from a healthy subject or from a patient.
Results	We propose a novel approach to identifying CHF in PCG recordings . The technique integrates traditional ML with full-stack DL. The time-domain and spectral representations of the signal are used by DL for learning ,While the classical ML relies on a vast set of features defined by experts both our personal dataset for CHF detection and six public PhysioNet datasets used in the recent PhysioNet Cardiology Challenge were utilized to assess the methods efficacy. We were able to througly assess the methods efficacy on analogous domains thanks to the challenge datasets. All dataset evaluation findings demonstrated that our method outperforms the challenge baseline methods. Given that the PCG audio is recorded from a different body position in most of the datasets, and that the datasets are labeled for different types of heart-releated conditions, the proposed method is quite robust and useful for detecting different types of heart-sound classification problems and not just for CHF detection provided that domain specific labeled data is available finally,We went above and beyond the traditional healithy vs sick dichotomy and investigated individualized models for recognizing the two stages of CHF.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

Due to chronic heart failure many peoples are losing their lives worldwide and to reduce this lives lost we need to have expert physicians and sometime if such experts not available then it's difficult to save life Failure in the presentation of heart sound frequencies and the differention between them, the identification of the energy variations , the process of signal de-

noising, and the determination of the heart sound components are only few of the issues the researches often confront with when analyzing the PCG signals some of them we address in the research presented

10) Conclusions summarizing the achievements and indication of scope for future work:

We propose a novel approach to identifying CHF in PCG recordings . The technique integrates traditional ML with full-stack DL. The time-domain and spectral representations of the signal are used by DL for learning ,While the classical ML relies on a vast set of features defined by experts both our personal dataset for CHF detection and six public PhysioNet datasets used in the recent PhysioNet Cardiology Challenge were utilized to assess the methods efficacy. We were able to througly assess the methods efficacy on analogous domains thanks to the challenge datasets. All dataset evaluation findings demonstrated that our method outperforms the challenge baseline methods. Given that the PCG audio is recorded from a different body position in most of the datasets, and that the datasets are labeled for different types of heart-releated conditions, the proposed method is quite robust and useful for detecting different types of heart-sound classification problems and not just for CHF detection provided that domain specific labeled data is available finally,We went above and beyond the traditional healithy vs sick dichotomy and investigated individualized models for recognizing the two stages of CHF.

11. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	40,000	Chest x-ray.device – 5,000 cardiac radionuclide scan,MRI-5,000 BNP or N-terminal-pro-10,000 ECG device -20000	100
2.	Non-Recurring (Equipment / Instrument) (in Rs)	NIL	NIL	NIL
3.	Others, if any	Nil	Nil	Nil

noising, and the determination of the heart sound components are only few of the issues the researches often confront with when analyzing the PCG signals some of them we address in the research presented

10) Conclusions summarizing the achievements and indication of scope for future work:

We propose a novel approach to identifying CHF in PCG recordings . The technique integrates traditional ML with full-stack DL. The time-domain and spectral representations of the signal are used by DL for learning ,While the classical ML relies on a vast set of features defined by experts both our personal dataset for CHF detection and six public PhysioNet datasets used in the recent PhysioNet Cardiology Challenge were utilized to assess the methods efficacy. We were able to througly assess the methods efficacy on analogous domains thanks to the challenge datasets. All dataset evaluation findings demonstrated that our method outperforms the challenge baseline methods. Given that the PCG audio is recorded from a different body position in most of the datasets, and that the datasets are labeled for different types of heart-releated conditions, the proposed method is quite robust and useful for detecting different types of heart-sound classification problems and not just for CHF detection provided that domain specific labeled data is available finally,We went above and beyond the traditional healithy vs sick dichotomy and investigated individualized models for recognizing the two stages of CHF.

11. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	40,000	Chest x-ray.device – 5,000 cardiac radionuclide scan,MRI-5,000 BNP or N-terminal-pro-10,000 ECG device -20000	100
2.	Non-Recurring (Equipment / Instrument) (in Rs)	NIL	NIL	NIL
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 17.07.2023
Place: Kanchikacherla

DVR & Dr. HS
MIC College of Technology
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E mail: office@mictech.ac.in, Website: www.mictech.edu.in

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Accredited by NAAC With Grade A

UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute funded seed grant for the **"Machine Learning and End-To-End Deep Learning for the Detection Of Chronic Heart Failure From Heart Sounds"** sanctioned during the Academic Year **2022-23** in favour of **Mrs.A.Anuradha** from **Department of Artificial Intelligence** dated **15-07-2022** and a sum of **Rs. 40,000 (Rupees FourtyThousand Rupees only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
DVR & Dr. HS MIC College of Technol
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 5211

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AUTONOMOUS
NBA-Accredited
B.Tech (CSE/ECE/ME)
Accredited by
NAAC A
With Grade

FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mrs.R.Vijaya

Designation: Assoc professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: AI

Title of the Project: Detecting Impersonators in Examination Centers

1.Background

1.1 Description of Proposal: In order to establish a better system for conducting exams, which can aid in lowering malpractice occurring in testing facilities, it is critical to identify impersonators in examination halls. 56 JEE candidates who may be impersonators have reportedly been identified by a national testing organisation, according to the most recent news sources. This issue needs to be resolved effectively, yet with fewer resources. The development of machine learning and AI technology has made it simple to resolve this issue. In this project, we're creating an AI system that uses student photos, names, and hall ticket numbers to pre-train the KDTree algorithm, then saves the model. Every time a student enters the classroom, they should turn to face the camera. Once the class is full, the video file containing the students' names and hall ticket numbers is stored. Each face in the video will include the user's name and hall ticket number. Administrators can review and track impersonators if they discover any unusualuser tags on their faces.

1.2 Objectives of the project: The student verification process is fast and accurate with the least effort. Redu s impersonator's issue with live verificat n. The time taken for prediction and processing is less and prediction is done automatically using a trained model.

1.3 Methodology: Image Acquisition: Digital image Processing. In image processing, it is defined as the action of retrieving an image from some source, usually a hardware-based source for processing. It is the first step in the workflow sequence because, without an image, no processing is possible.

Pre-processing: Pre-processing is a common name for operations with images at the lowest level of abstraction — both input and output are intensity images. These iconic images are of the same kind as the original data captured by the sensor, with an intensity image usually

represented by a matrix of image function values (brightnesses). The aim of pre-processing is an improvement of the image data that suppresses unwilling distortions or enhances some image features important for further processing, although geometric transformations of images (e.g. rotation, scaling, translation) are classified among pre-processing methods here since similar techniques are used.

Face Detection: The face is one of the easiest ways to distinguish the individual identity of each other. Face recognition is a personal identification system that uses personal characteristics of a person to identify the person's identity. Human face recognition procedure basically consists of two phases, namely face detection, where this process takes place very rapidly in humans, except under conditions where the object is located at a short distance away, the next is the introduction, which recognize a face as individuals.FACE RECOGNITION: There are two predominant approaches to the face recognition problem: Geometric (feature based) and photometric (view based). As researcher interest in face recognition continued, many different algorithms were developed, three of which have been well studied in face recognition literature. Recognition algorithms can be divided into two main approaches: 1. Geometric: Is based on geometrical relationship between facial landmarks, or in other words the spatial configuration of facial features. That means that the main geometrical features of the face such as the eyes, nose and mouth are first located and then faces are classified on the basis of various geometrical distances and angles between features. (Figure 3) 2. Photometric stereo: Used to recover the shape of an object from a number of images taken under different lighting conditions. The shape of the recovered object is defined by a gradient map, which is made up of an array of surface normals (Zhao and Chellappa, 2006) (Figure 2) Popular recognition algorithms include: 1. Principal Component Analysis using Eigenfaces, (PCA) 2. Linear Discriminare Analysis, 3. Elastic Bunch Graph Matching using the Fisherface algorithm

3. Total (in Rs): Rs30000/-

Date: 13.07.2022
Place:Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. R. Vijaya,
Associate Professor,
Department of Information Technology,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **R. Vijaya,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Detecting Impersonators in Examination Centers"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 30,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

PRINCIPAL
VR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh. India – Pin: 521180

Copy to:

- HOD,.Department of IT, MIC
- Account Section, MIC

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B.Tech (CSE|ECE|ME)
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NAAC A
With Grade

PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) Title of the project: Detecting Impresonators in Examination Centers
2) Name of the Principal Investigator(s) and Co-Investigator(s): Mrs.R.Vijaya
3) Date of commencement: 13.07.2022
4) Proposed date of completion: 05.06.2023
5) Actual date of completion: 10.07.2023
6) Objectives as stated in the project proposal:

To reduce the malpractices occurring in the examination centers and to improve the examination handling system, detecting impersonators is one of the ways. Impersonators take the major part in malpractice.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1 Image Acquisition 2. Pre-processing 3. Face Detection 4. Face Recognition
Methodology	Digital image Processing. In image processing, it is defined as the action of retrieving an image from some source, usually a hardware-based source for processing. It is the first step in the workflow sequence because, without an image, no processing is possible. **Pre-processing:** Pre-processing is a common name for operations with images at the lowest level of abstraction — both input and output areintensity images. These iconic images are of the same kind as the original data captured by the sensor, with an intensity image usually represented by a matrix of image function values (brightnesses). The aim of pre-processing is an

improvement of the image data that suppresses unwilling distortions or enhances some image features important for further processing, although geometrictransformations of images (e.g. rotation, scaling, translation) are classified among pre-processing methods here since similar techniques are used.

Face Detection: The face is one of the easiest ways to distinguish the individual identity of each other. Face recognition is a personal identification system that uses personal characteristics of a person to identify the person's identity. Human face recognition procedure basically consists of two phases, namely face detection, where this process takes place very rapidly in humans, except under conditions where the object is located at a short distance away, the next is the introduction, which recognize a face as individuals.FACE RECOGNITION: There are two predominant approaches to the face recognition problem: Geometric (feature based) and photometric (view based). As researcher interest in face recognition continued, many different algorithms were developed, three of which have been well studied in face recognition literature. Recognition algorithms can be divided into two main approaches: 1. Geometric: Is based on geometrical relationship between facial landmarks, or in other words the spatial configuration of facial features. That means that the main geometrical features of the face such as the eyes, nose andmouth are first located and then faces are classified on the basis of variousgeometrical distances and angles between features. (Figure 3) 2. Photometric stereo: Used to recover the shape of an object from a number of images taken under different lighting conditions. The shape of the recovered object is defined by a gradient map, which is made up

	of an array of surface normals (Zhao and Chellappa, 2006) (Figure 2) Popular recognition algorithms include: 1. Principal Component Analysis using Eigenfaces, (PCA) 2. Linear Discriminate Analysis, 3. Elastic Bunch Graph Matching using the Fisherface algorithm
Results	An automated method of detecting impersonation in online examinations has been developed, which requires minimal human intervention and does not depend on the trustworthiness of the invigilators present in the examination hall. After the fingerprint verification is done, the student is allowed to take his/her seat, where ascreen asking for the username and password is displayed. After logging in, at regular intervals, the face detection is done, and if any extra face or any mismatch in the face is found multiple times, then the examination is paused and an alert SMS is sent to the examination authority in-charge of that particular center. Due to the rapid developments in the field of biometric recognition, especially that of face recognition, wherein, three dimensional identification is being evolved, this method of identification would help eliminate impersonation. In the case of unavailability of proper fingerprint (like accident victims, or certain skin disorders), iris recognition can be done. Aadhar Card has information about the iris and the fingerprint, hence the details can be verified using the same. In the near future, the online examination would replace the pen-andpaper methods, and hence many robust methods to eliminate impersonation could further be developed using biometric and physiological behavior patterns of the individuals..

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

system initially images of each student are collected and each dataset consists of 50 images of each student. These images are trained using kdtree algorithm using image processing technique and model is saved in system this model can be used for automatic prediction of student in exam halls from live video or images. The present system of online examinations includes a registration phase where the details of the candidate are entered. A passport size photograph, as well as a thumbprint is taken as proofs of identity. In some cases, a signature, either a scanned copy or a digital signature is collected as well. The next phase is that of examination. Only those candidates with a valid admit card are allowed into the examination hall. The fingerprint verification of the candidate is done and a system is allotted to the candidate if the document verification yields a positive result. Now, the candidate can enter his/her registration number and a password on a screen which is later redirected to the page of examination. In some cases, the login page also shows the image of the student to whom the specific system is allotted.

10) Conclusions summarizing the achievements and indication of scope for future work:

The computational models, which were implemented in this project, were chosen after extensive research, and the successful testing results confirm that the choices made by the researcher were reliable. The only reason for this was the face recognition subsystem did not display even a slight degree of invariance to scale, rotation or shift errors of the segmented face image. Implementing an eye detection technique would be a minor extension to the implemented system and would not require a great deal of additional research. They would probably be more compliant when a 6'5" policeman is taking their mugshot! In mugshot matching applications, perfect recognition accuracy or an exact match is not a requirement. If a face recognition system can reduce the number of images that a human operator has to search through for a match from 10000 to even a 100, it would be of incredible practical use in law enforcement. The automated vision systems implemented in this thesis did not even approach the performance, nor were they as robust as a human's innate face recognition system. However, they give an insight into what the future may hold in computer vision.

11. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	30,000	Face Detection camera-15,000 Database System-15,000	100
2.	Non-Recurring (Equipment / Instrument) (in Rs)	NIL	NIL	NIL
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 10.07.2023
Place: Kanchikacherla

UTILIZATION CERTIFICATE

Certified that out of **Rs 30,000** of institute funded seed grant for the **"Detecting Impersonators in Examination Centers"** sanctioned during the Academic Year **2022-23** in favour of **Mrs.R.Vijaya** from **Department of Artificial Intelligence** dated **15-07-2022** and a sum of **Rs. 30,000 (Rupees Thirty Thousand Rupees only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
DVR & Dr. HS MIC College of Technolc
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

DVR & Dr. HS
MIC College of Technology
ISO 9001:2015 Certified Institute
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E mail: office@mictech.ac.in, Website: www.mictech.edu.in

AUTONOMOUS
Accredited by NAAC A With Grade

FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Dr.P Pradeep

Designation: Associate professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: EEE

Title of the Project: Electrical battery thermal management system based on calculating state of charge and state of health.

1.Background

1.1 Description of Proposal: Electric vehicles become future of the transportation industry since it is eco-friendly and zero emission. There are certain limitations when developing an electric vehicle such as lifetime, safety, cost and the performance. The storing of electricity is crucial, in order to store electricity battery is essential. Batteries when kept in isolation or a closed compact space, as in electrical vehicles tend to heat up drastically resulting in depreciation of efficiency as well as lifetime of the battery. The temperature of the battery mainly depends on two factors. The factor that responsible for the heat generation in the battery during charging and discharging of the battery. This heat dissipated by the battery during charging and the discharging condition is controlled by water pump liquid cooling system and forced air cooling system.

1.2 Objectives of the project: To ensure the efficient operation of the battery, thereby enhancing its performance and extending its life-span.

1.3 Methodology: Battery is used to work at a normal temperature zone. When there is a sudden increase in the temperature the indication alert will be displayed. The temperature is monitored by using DHT11 temperature sensor. This DHT11 sensor and battery is readily paired with the Arduino microcontroller.

3. Total (in Rs): Rs50000/-

Date:21.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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With Grade

Research and Development Cell

15.07.2022

To

Dr. P. Pradeep,
Associate Professor,
Department of Electrical and Electronics Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **P. Pradeep,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Electrical battery thermal management system based on calculating state of charge and state of health"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of Rs 50,000/- to work for a period of one Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of EEE, MIC
- Account Section, MIC

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Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Electrical battery thermal management system based on calculating state of charge and state of health
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** Dr.P Pradeep
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 30.06.2023
5) **Actual date of completion:** 30.06.2023
6) **Objectives as stated in the project proposal:**

The objective of the project is to ensure the efficient operation of the battery, thereby enhancing its performance and extending its life-span.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. Lithium-ion Battery 2. Arduino 3. NANO ACS712 Current Sensor 4. DHT11 Temperature Sensor 5. 7805 Voltage regulated IC.2- Channel Optical Isolated Relay Module 6. R365 Diaphragm Mini Water Pump12VDC 7. 2V DC Fan 8. 16x2 LCD Display with I2Cmodule 9. 1N4007 Diode 10. Capacitor 11. Resistors
Methodology	Battery is used to work at a normal temperature zone. When there is a sudden increase in the temperature the indication alert will be displayed. The temperature is monitored by using DHT11 temperature sensor. This DHT11 sensor and battery is readily paired with the Arduino microcontroller. if temperature is greater than 35°C then fan is turned on at full speed and if temperature further increases and reaches 40°C then DC motor pump turns on and cools the battery.

Results	Improved battery's lifetime due to reduction in temperature of battery.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

The battery thermal management system uses air cooling and liquid-cooled tubes to maintain the battery's temperature within a normal range during regular operation. If there is an increase in temperature, the DHT11 temperature sensor, paired with the Arduino microcontroller, monitors and alerts the system. During overheating, the cooling system comes into operation, initially using air to dissipate the heat and then a pump that transfers the cooling liquid around the battery system. This system has proved effective in reducing the temperature of the battery by up to 4°C and increasing its health by 20 to 25 percent compared to a usual battery maintained at varying room temperatures.

10. Conclusions summarizing the achievements and indication of scope for future work:

In this work, a electric vehicle Lithium ion battery temperature is monitored during charging and discharging using DT11 temperature sensor. Voltage and current are measured using relay module and current sensor there by SOC and SOH are calculated. All the sensors Battery and other components are paired to the Arduino. If the temperature increases beyond 35°C fan gets turned on to control the temperature of battery if the temperature further increases and reaches beyond 40°C the DC motor pump turns on and cooling liquid flows through tube connected around the battery and cools the battery as SOC and SOH are also computed. It is observed that the system effectively reduced the battery temperature and improved the battery's charge retaining capacity and lifetime without compromising battery current. So by using this thermal management we can effectively improve the life of battery.

11) Budget utilization:

S.NO	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1	Recurring (in Rs) :	13000	Stationaries – 6500 Food & Refreshments – 2000 Connectivity - 2000 Travel Expenditure – 2500	26
2.	Non-Recurring (Equipment / Instrument) (in Rs)	37000	1. Lithium-ion Battery 2. Arduino 3. NANO ACS712 Current Sensor 4. DHT11 Temperature Sensor 5. 7805 Voltage regulated IC.2-Channel Optical Isolated Relay Module	74

			6. R365 Diaphragm Mini Water Pump12VDC 7. 2V DC Fan 8. 16x2 LCD Display with I2Cmodule 9. 1N4007 Diode 10. Capacitor 11. Resistors	
3	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 30.06.2023
Place: Kanchikacherla

DVR & Dr. HS
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UTILIZATION CERTIFICATE

Certified that out of **Rs 50,000** of institute funded seed grant for the **"Electrical battery thermal management system based on calculating state of charge and state of health "** sanctioned during the Academic Year **2022-23** in favour of **Dr.P Pradeep** from **Department of Electrical and Electronics Engineering** dated **15.7.2022** and a sum of **Rs. 50,000 (Rupees Fifty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mr.A.V.Ravi Kumar

Designation: Assistant Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: EEE

Title of the Project: Modelling of Fault Detection in Underground and Overhead Transmission System Using Arduino.

1. Background

1.1 Description of Proposal: Electric power transmission lines are the veins which pump life into the modern-day world, delivering electricity to consumers at their homes, offices and industries. It is important to ensure a smooth operation of transmission lines to deliver a minimally interrupted power supply making necessary for reliable operation of electrical power lines. This need has given rise to fault location detection techniques so that the economic impact of the fault situations can be mitigated and their correction can be rendered simpler and precise. Underground and overhead cables have been widely implemented due to their reliability and limited environmental concerns. To improve the reliability of a distribution system, accurate identification of a faulted segment is required in order to reduce the interruption time during fault. Therefore, a rapid and accurate fault detection method is required to accelerate system restoration, reduce outage time, minimize financial losses and significantly improve the system reliability. When fault occurs on transmission lines, detecting fault is necessary for power system in order to clear fault before it increases the damage to the power system. When any fault occurs in cable, then it is difficult to locate fault. Computing the distance of the underground and overhead transmission c: e fault location from the base station using Ar: .no is proposed.

1.2 Objectives of the project: To detect the location of fault in overhead and underground transmission lines thereby reducing the response time needed to rectify and save expensive transformers from damage or theft which usually occurs during longer power outages.

1.3 Methodology: UC has different resistance that depends upon the length of the cable. The low DC voltage is applied at the feeder end through series resistor (cable lines), the current would be vary depending

upon the location of fault in the cable. When, there is short circuit (Line to ground), the voltage across series resistor change accordingly, which is the fed to the inbuilt ADC of Arduino to develop precise digital data for display in meters. The fault is displayed on Liquid Crystal Display (LCD) interfaced to Arduino. For overhead cables (OC) fault detection, when the open circuit and short circuit fault occur, our sensing device i.e., relay sense the fault and send information to the microcontroller. The microcontroller senses that command and display on Liquid Crystal Display (LCD) Arduino system detects the faults, analyses and classifies these faults and then, determines the fault distance. Then, the fault information is transmitted to the control room.

3. Total (in Rs): Rs50000/-

Date:17.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. A.V. Ravi Kumar,
Assistant Professor,
Department of Electrical and Electronics Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **A.V. Ravikumar,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Modelling of Fault Detection in Underground and Overhead Transmission System Using Arduino"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 50,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of EEE, MIC
- Account Section, MIC

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DVR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Modelling of Fault Detection in Underground and Overhead Transmission System Using Arduino
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** Mr. A.V. Ravi Kumar
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 30.06.2023
5) **Actual date of completion:** 25.06.2023
6) **Objectives as stated in the project proposal:**

The objective of the project is to detect the location of fault in overhead and underground transmission lines thereby reducing the response time needed to rectify and save expensive transformers from damage or theft which usually occurs during longer power outages.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. Overhead line 2. Underground cable 3. Resistors 4. Relay 5. Rectifier 6. LCD display 7. Arduino Board
Methodology	UC has different resistance that depends upon the length of the cable. The low DC voltage is applied at the feeder end through series resistor (cable lines), the current would be vary depending upon the location of fault in the cable. When, there is short circuit (Line to ground), the voltage across series resistor change accordingly, which is the fed to the inbuilt ADC of Arduino to develop precise digital data for display in meters. The fault is displayed on Liquid Crystal Display (LCD) interfaced to Arduino. For overhead cables (OC) fault detection, when the open circuit and short circuit fault occur, our sensing device i.e., relay sense the fault and send information to the microcontroller. The microcontroller senses that command and display on Liquid Crystal Display (LCD) Arduino system detects the faults,

	analyses and classifies these faults and then, determines the fault distance. Then, the fault information is transmitted to the control room.
Results	The distance of fault and the phase in which fault occurred is identified accurately.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

This project represents that the fault location scheme for transmission systems consisting of an overhead line and underground cable. The Arduino system has the ability to locate the fault whether it is in the overhead line or in the underground power cable. In addition to, the proposed scheme gives an accurate estimation of the fault resistance at fault location.

10. Conclusions summarizing the achievements and indication of scope for future work:

This paper proposed a fault location scheme for transmission systems consisting of an overhead line in combination with an underground power cable. In this method, the short circuit fault at a particular distance in the underground cable can be located using simple concepts of OHM's law enables to rectify fault efficiently feeder end in meters by using Arduino. For this we use simple concept of OHM's law so fault can be easily detected and repaired. By using Arduino controller, we can find out exact fault location. Once faults occur in the cable, the display unit displays the exact fault location that displays which phase is affected in the cable and how long it's affected.

11.Budget utilization:

S.NO	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1	Recurring (in Rs) :	14000	Stationaries – 6500 Food & Refreshments – 2500 Connectivity - 2000 Travel Expenditure – 3000	28
2.	Non-Recurring (Equipment / Instrument) (in Rs)	34000	1. Overhead line 2. Underground cable 3. Resistors 4. Relay 5. Rectifier 6. LCD display 7. Arduino Board	68
3	Others, if any	2000	Miscalenous	4

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12. Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 25.06.2023
Place: Kanchikacherla

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MIC College of Technology
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UTILIZATION CERTIFICATE

Certified that out of **Rs 50,000** of institute funded seed grant for the **"Modelling of Fault Detection in Underground and Overhead Transmission System Using Arduino"** sanctioned during the Academic Year **2022-23** in favour of **Mr.A V RAVI KUMAR** from **Department of Electrical and Electronics Engineering** dated **15.7.2022** and a sum of **Rs. 50,000 (Rupees Fifty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
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Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Mr. M. Sunil Kumar

Designation: Assistant Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: EEE

Title of the Project: Adaptive PID Controller with P&O MPPT Algorithm for Photovoltaic System

1. Background

1.1 Description of Proposal: In order to extract maximum power from a Photovoltaic (PV) panel different Maximum Power Point Tracking (MPPT) algorithms have been developed, among which Perturb and Observe (P&O) MPPT algorithm is widely used. The P&O algorithm can be executed either by direct duty ratio or by voltage reference control. Both have drawbacks in tracking time and oscillation around MPP. In the latter case, the reference voltage generated by the algorithm is fed to a controller (PI/PID) to generate the corresponding duty ratio. The gains of PID controller are calculated under the standard test conditions (STC) (1000W/m2, 25°C) of PV panel and the same values are used for other operating conditions too, which does not provide satisfactory performance under varying operating conditions. An adaptive method is proposed to calculate the controller gains for different operating conditions without using any additional sensors. The proposed method establishes a linear relation between the PID gains calculated for the STC and those for other operating conditions, and this relation adaptively changes the PID gains for different operating conditions.

1.2 **Objectives of the project:** To extract maximum available power from the PV panel using an adaptive PID Controller with P&O MPPT Algorithm for Photovoltaic System.

1.3 **Methodology:** By observing the controller gains for different operating conditions, a linear relation is developed between the gains calculated for STC and other operating conditions. This linear equation uses the power change of the panel to calculate the controller gains for different operating conditions. Because of the adaptive nature, steady state oscillations, overshoot and settling time at every perturbation are

reduced, and the tracking time of the algorithm is improved. A DC-DC boost converter has been used for experimental purpose.

2. Total (in Rs): 40000/-

Date: 17.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. M. Sunil Kumar,
Associate Professor,
Department of Electrical and Electronics Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **M. Sunil Kumar,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Adaptive PID Controller with P&O MPPT Algorithm for Photovoltaic System"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of EEE, MIC
- Account Section, MIC

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Adaptive PID Controller with P&O MPPT Algorithm for Photovoltaic System
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** Mr. M. Sunil Kumar
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 30.06.2023
5) **Actual date of completion:** 24.06.2023
6) **Objectives as stated in the project proposal:**

The objective of the project is to extract maximum available power from the PV panel using an adaptive PID Controller with P&O MPPT Algorithm for Photovoltaic System.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. PV panel 2. Current sensor LEM LA 55P 3. Boost converter 4. Arduino microcontroller 5. Resistive load 6. Halogen lamps 7. Incandescent lamps
Methodology	By observing the controller gains for different operating conditions, a linear relation is developed between the gains calculated for Standard Test Condition (STC) and other operating conditions. This linear equation uses the power change of the panel to calculate the controller gains for different operating conditions. Because of the adaptive nature, steady state oscillations, overshoot and settling time at every perturbation are reduced, and the tracking time of the algorithm is improved. A DC-DC boost converter has been used for experimental purpose.
Results	The proposed adaptive method precisely tracks the maximum power and optimizes the perturbation characteristics.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

It is observed that the tracking time is minimal for both increase and decrease in irradiation. Therefore, the proposed adaptive PID controller improves the tracking time of P&O algorithm for all the different operating conditions, and does away with the need to adjust the PID gain for each change in operating conditions. It is also observed that the dip in voltage takes place when the irradiance value decreased. The value of dip voltage has been minimized by using adaptive PID method. The value of % ripple has found around 10% for all the conditions as the effect of adaptive PID control is only to improve the transient condition.

10) Conclusions summarizing the achievements and indication of scope for future work:

The PID controller gains change adaptively when there is a change in the operating conditions. As the MPP of the PV panel changes with different operating conditions accordingly the transfer function between PV panel voltage and duty ratio of the DC–DC converter changes due to the change in the linear model of the PV panel. So obviously, PID controller with fixed gains does not perform satisfactorily at different operating conditions. After calculating the PID controller gains for different operating conditions, a linear relation is developed between the gains calculated for STC and other operating conditions. This linear equation uses an adaptive value (κ) which is calculated by dividing the MPP power at STC with the available PV power at every perturbation. Therefore, PID controller gains change in a truly adaptive fashion in the proposed algorithm. A DC–DC Boost converter has been used for simulation and experimental purposes. In order to verify the proposed method with different operating conditions EN50530 testing standard were conducted. The simulation and experimental results prove that the proposed adaptive PID controller is able to generate a required PID gains for different operating conditions and is accurately tracking the MPP for the PV panel with improved perturbation characteristics. The experimental observations have been performed with a slight change in perturbation time to validate the effectiveness of the proposed controller. In future the proposed method can be applied for different DC–DC converters for high power applications

11) Budget utilization:

S.NO	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1	Recurring (in Rs) :	13000	Stationaries – 6500 Food & Refreshments – 2000 Connectivity - 2000 Travel Expenditure – 2500	32.5
			1. PV panel 2. Current sensor LEM LA 55P 3. Boost converter 4. Arduino microcontroller	

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2.	Non-Recurring (Equipment / Instrument) (in Rs)	27000	5. Resistive load 6. Halogen lamps 7. Incandescent lamps	67.5
3	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 24.06.2023
Place: Kanchikacherla

DVR & Dr. HS
MIC College of Technology
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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute funded seed grant for the **"Adaptive PID Controller with P&O MPPT Algorithm for Photovoltaic System"** sanctioned during the Academic Year **2022-23** in favour of **Mr. M SUNIL KUMAR** from **Department of Electrical and Electronics Engineering** dated **15.7.2022** and a sum of **Rs. 40,000 (Rupees Forty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Dr.CH. Pulla Rao

Designation: Associate Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Electronics and Communication Engineering

Title of the Project: IMPLEMENTATION OF ARM PROCESSOR USING FPGA

1. Background

1.1 Description of problem

The Arm processor has expansive uniform enlist record, stack/store design, where information preparing operations as it were work on enroll substance, not straightforwardly on memory substance. Straightforward tending to modes, with all heap/store addresses being resolved from enlist substance and guideline fields just Uniform and settled length direction fields to rearrange guideline interpret. The ARM processor has been particularly intended to be little to decrease control utilization and augment battery operation. The ARM design gives Control over both Arithmetic Logic Unit (ALU) and shifter in each information preparing guideline to amplify the utilization of an ALU and a shifter Load and Store numerous to boost information throughput. These upgrades to fundamental RISC engineering permit ARM processors to accomplish a decent adjust of superior, little code size and low power utilization. The FPGA based plan lessens time to advertise and includes plan adaptability and versatility with ideal gadget usage and saving both less board space and framework control, which is regularly not the conceivable for each situation of ASIC chips. I· .aking after this line of thought, this pape ɔondenses our current advance in creating VHDL delicate centre of ARM processor on Xilinx's Spartan III based FPGA. Favourable position of actualizing a full-highlighted ARM processor delicate centre on FPGA is finish equipment ·ustomization while actualizing different apr·lications..

1.2 Rational for taking up the project:

The equipment troubleshooting innovation is coordinated in ARM processor with the goal that developers can see what is going on amid execution of code by processor. With this software

engineers can resolve issues 1686 | P a g e rapidly and decrease time to market and general advancement cost. The ARM is not unadulterated RISC design in light of different constraints of applications in installed framework. These days Speed is not real requirement but rather control utilization and financially savvy arrangements are likewise assuming crucial part. In ARM delicate processor centre were executed with regards to FPGA based multiprocessor based SOC applications. All the 32-bit guidelines were actualized with single cycle information way and irregular rationale based direction decoder. The guidelines of Data preparing, Arithmetic, Branch directions, Logical and think about were executed. The proposed Virtual ARM Simulation Platform and examined how it can be utilized to decrease plan time and cost.

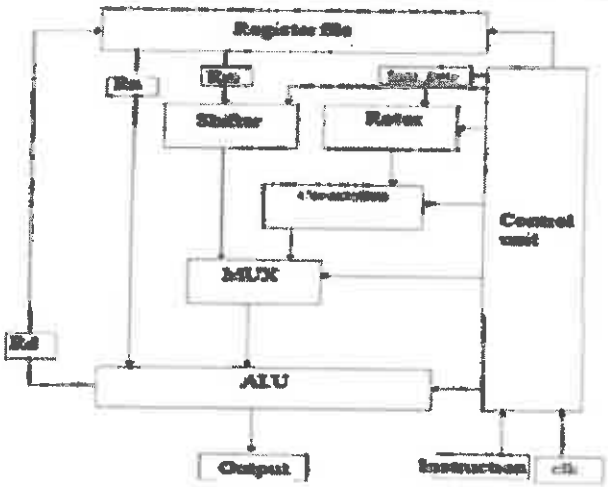
1.3 Description of Proposal

1.3.1 Objectives of the project

Nowadays application specific fragile processor focuses are grabbing importance for FPGA based introduced application in which customer can plan the processor as indicated by need. The auxiliary straightforwardness of ARM processors makes them sensible for low power applications. Gear delineation lingos (HDLs) are for the most part used to create hardware structure. FPGA gives reconfigurable stage, so reuse of the layout is a regular practice to upgrade the productivity nowadays. In this paper the data taking care of rules of ARM processor are actualized using Very fast planned circuit Hardware Description Language (VHDL) vernacular and affirmed by applying test situate on Xilinx's Spartan III based FPGA.

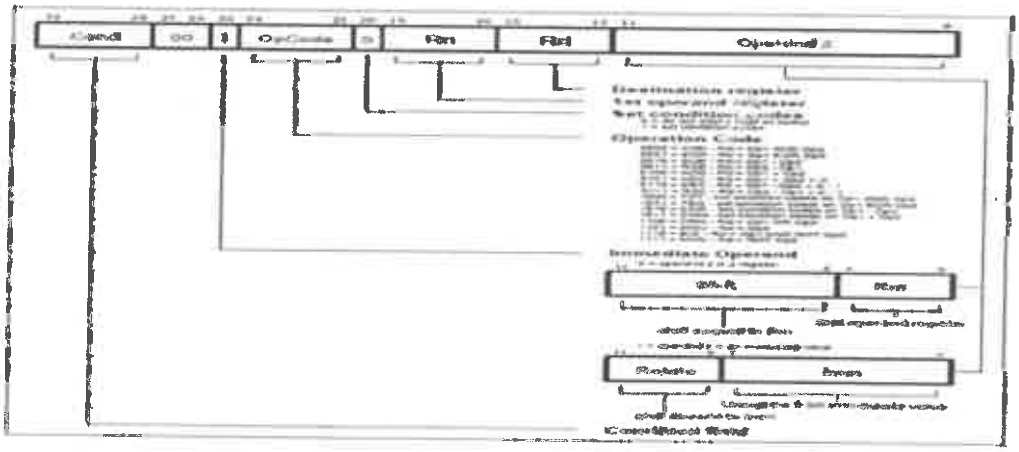
1.4 Innovative component of the project

The ARM building has been expected to allow pretty much nothing and world class execution. The building ease of ARM processors prompts little executions, and little use allow devices with greatly low power use. The ARM is a decreased rule Set Computer (RISC), as it wires regular RISC building features. The proposed plan of the processor is showed up in Fig.1 The essential portions of the proposed configuration are 1. Enroll record which contains 16 enroll of 32 bits. 2. Barrel shifter of capacity to move 32 bit right/left, math/lucid. 3. Rotor having capacity to turn 8 bit data right/left. 4. Concentration which change more than 8 bit yield of rotor into 32 bit. 5. Multiplexer which select one of two 32 bit inputs. 6. Calculating Logic Unit (ALU) to execute data getting ready rules 7. Control Unit which control all pieces as demonstrated by course.



1.5 Methodology detailing stepwise activities and sub-activities

The proposed work implements data processing instructions of the ARM processor. The data processing instruction is only executed if the condition is true. The instruction format for data processing instruction is given below in fig.2. The instruction produces a result by performing a specified arithmetic or logical operation on one or two operands. The first operand is always a register (Rn). The second operand may be a shifted register (Rm) or a rotated 8 bit immediate value (Imm) according to the value of the I bit in the instruction. The condition codes in the CPSR may be preserved or updated as a result of this instruction, according to the value of the instructions. Certain operations (TST, TEQ, CMP, CMN) do not write the result to Rd. They are used only to perform tests and to set the condition codes on the result and always have the S bit set in the instruction.



02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

3. Expected Outcome and Deliverables of the Project

1. Register file It contains 16 enroll of 32 bits since we are using customer mode, all select are interested in customer. The component of enroll record and its entertainment result are showed up in fig.1. 2. Barrel shifter the barrel shifter has a 32-bit commitment to be moved. This information is starting from the select archive. The shifter has other control inputs starting from control unit. Move field toward the path controls the operation of the barrel shifter. The figure shows the substance depiction of barrel shifter. The propagation eventual outcome of barrel shifter for number juggling left move operation is showed up in above fig.1 3. Control Unit The control unit brings 32 bit heading and gives control signs to the distinctive the modules in the building. The controller give yields multiplexer controls, ALU limits, enroll scrutinizes/forms, pennants, move field, turn regard and other control signs to the gear depending upon the present rule. The substance and amusement result is showed up in figure.

4. **Likely Impact**(Please attempt to quantify) : Yes

5. Suggested Post Project Activities:

- In future works, we can try adding extra bits and showing over 16 bit ALU.
- We can try to minimize the propagation delay.
- In future we can also increase the number of operations as per need.

6. Budget estimate

A. Recurring (in Rs) :25000

B. Non-Recurring (Equipment/Instrument)**(in Rs) :25,000**

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S. No	Sensor Type	Parameter Measured	Quantity
1	FPGA Spartan Board	High Speed Programmable device	2
2	USB Connectors	Connection between board and PC	2
3	Computer	Central Processing system	2
4	Power supply Adapter	Power supply to the circuit	2

C. Total (in Rs):50,000

Date: 25-06-2022

Place: Kanchikacherla

Signature of the Principal Investigator

DVR & Dr. HS
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Research and Development Cell

15.07.2022

To

Dr. Ch. Pulla Rao,
Associate Professor,
Department of Electronics and Communication Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **Ch. Pulla Rao,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Implementation of Arm Processor Using FPGA"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 50,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of ECE, MIC
- Account Section, MIC

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Andhra Pradesh, India – Pin: 521180

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) Title of the project: **IMPLEMENTATION OF ARM PROCESSOR USING FPGA**
2) Name of the Principal Investigator(s) and Co-Investigator(s): Dr. CH. Pulla Rao
3) Date of commencement: 15-07-2022
4) Proposed date of completion: 27.06.2023
5) Actual date of completion: 15.07.2023
6) Objectives as stated in the project proposal:
7) Nowadays application specific fragile processor focuses are grabbing importance for FPGA based introduced application in which customer can plan the processor as indicated by need. The auxiliary straightforwardness of ARM processors makes them sensible for low power applications. Gear delineation lingos (HDLs) are for the most part used to create hardware structure. FPGA gives reconfigurable stage, so reuse of the layout is a regular practice to upgrade the productivity nowadays. In this paper the data taking care of rules of ARM processor are actualized using Very fast planned circuit Hardware Description Language (VHDL) vernacular and affirmed by applying test situate on Xilinx's Spartan III based FPGA.
8) Deviation made from original objectives if any, while implementing the project and reasons there of: No
9) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	Power supply Adapter USB Connectors Computer FPGA Spartan Board
Methodology	The proposed work implements data processing instructions of the ARM processor. The data processing instruction is only executed if

	the condition is true. The instruction format for data processing instruction is given below in fig.2. The instruction produces a result by performing a specified arithmetic or logical operation on one or two operands. The first operand is always a register (Rn). The second operand may be a shifted register (Rm) or a rotated 8 bit immediate value (Imm) according to the value of the I bit in the instruction. The condition codes in the CPSR may be preserved or updated as a result of this instruction, according to the value of the instructions. Certain operations (TST, TEQ, CMP, CMN) do not write the result to Rd. They are used only to perform tests and to set the condition codes on the result and always have the S bit set in the instruction.
Results	1. Register file It contains 16 enroll of 32 bits since we are using customer mode, all select are interested in customer. The component of enroll record and its entertainment result are showed. 2. Barrel shifter the barrel shifter has a 32-bit commitment to be moved. This information is starting from the select archive. The shifter has other control inputs starting from control unit. Move field toward the path controls the operation of the barrel shifter. The figure shows the substance depiction of barrel shifter. The propagation eventual outcome of barrel shifter for number juggling left move operation. 3. Control Unit The control unit brings 32 bit heading and gives control signs to the distinctive the modules in the building. The controller give yields multiplexer controls, ALU limits, enroll scrutinizes/forms, pennants, move field, turn regard and other control signs to the gear depending upon the present rule.

10) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

In this 8 bit ALU we have taken two 8 bit operand A (7:0) and B (7:0) and result is stored in ALU_Out (7:0). All operations are performed between these two operands. Result obtained is also 8 bit long. Since we are implementing ALU on FPGA opcodes are used. The opcode determines what operations are to be performed by ALU. We have taken 4 bit opcode, so total 16 instructions should be created. Here we have used all 16 instructions.

11) Conclusions summarizing the achievements and indication of scope for future work:

This project helps us to know how to implement ALU on the build microcontroller on FPGA using Eda playground. After programming ALU we have to check and match the result with correct one. If the results are correct and the ALU performs the needed operations then this indicates that ALU is successfully built.

12. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	25000	Stationeries – 8000 Food & Refreshments – 5000 Connectivity - 5000 Travel Expenditure – 7000	50
2.	Non-Recurring (Equipment/Instrument) (in Rs)	25000	USB Connectors FPGA Spartan Board Power supply Adapter Computer	50
3.	Others, if any	Nil	Nil	Nil

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13) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator

Date: 15.07.2023

Place: Kanchikacherla

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UTILIZATION CERTIFICATE

Certified that out of **Rs 50,000** of institute-funded seed grant for the **"Implementation of Arm Processor Using FPGA"** sanctioned during the Academic Year **2022-23** in favour of **Dr. CH.Pulla Rao** from the **Department of Electronics and Communication Engineering** dated **15.07.2022** and a sum of **Rs. 50,000 (Rupees Fifty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Dr.B.PRAGATHI

Designation: Associate Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Electronics and Communication Engineering

Title of the Project: SMART TRAFFIC CONTROL USING ARDUINO UNO AND RF MODULE

1. Background

1.1 Description of problem

One of the biggest issues in major cities around the world is urban traffic congestion. Along with the amount of time spent in traffic, there is also the issue of carbon dioxide emissions. The longer vehicles are stuck in traffic, the longer their engines are left running at idle. Due to traffic jams in large cities, emergency vehicles like ambulances and fire trucks are also affected. As a result, many people could lose their life as a result of an ambulance delay. By resolving this problem, we not only improve the quality of life for city people but also have a positive impact on the environment. When there are more vehicles in a lane at a junction than rest of the other lanes, then the green traffic light time is increased for that lane compared to others and red for the other side's until the other lanes are clear. This would improve traveller comfort and driving safety while also facilitating efficient traffic flow. The traffic light system has also been given an emergency mode, which gives ambulances priority to pass through traffic lights so they can get to patients and hospitals without incident.

1.2 Rational for taking up the project:

In this modern era, usage of vehicle is more which leads the society to face traffic congestion and more road accidents. I ny emergency occurs at any time, the em gency vehicles should reach their respective places without any delay. If any emergency vehicles approaching traffic signal, if it is red signal, then time delay may occur. This may cause a loss of human life. So, to give the priority to emergency vehicles over traffic, this intelligent traffic light signal has been designed. In addition to this fe ure the operating time of traffic signal w controlled according to the number of vehicles standing before the signal. This will help us to reduce our traffic congestion and reduce our time consumption on standing before the signal. This system uses the ATMEGA 328 Arduino micro controller, IR sensors, Radio frequency receiver and transmitter is used.

1.3 Description of Proposal

1.3.1 Objectives of the project

The main objective of this project is to design an adaptive traffic light signals using IR sensors and to design an effective method to overcome the ambulance delay problem by using the RF modules. Traffic light controlling becomes major issue with increase in automobiles which causes congestion and it also became a major reason for the ambulance delay. This requires a smart system to handle traffic signals and to reduce ambulance delay. Using this system development at traffic junction we need not to worry about handing the traffic manually and also consumes less time as compared to the conventional traffic system. It also reduces the ambulance delay time.

1.4 Innovative component of the project

The Arduino comes in many variant flavours categorized in either 8bit or 32bit processing power. It is a very popular platform with a very active support community, a large Library repository, and lots of easy add-ons called shields to provide extra capabilities. Microcontroller based designs are easily implemented on the Arduino platform as the programs are written in C and a host of very good library functions are available reducing project development time. We refer to [20] to check the pin out diagram of the Arduino Uno Prototyping Board. The pin labelling is as follows starting from left to right in an anti-clockwise direction.

- Power Jack Input (5V to 13V input)
- Power and Ground Pins (Vin, 5V, 3.3V, GND - red, red, red, black)
- Analog Input Pins (A0 – A5: pink)
- Arduino Microcontroller direct programming input (ICSP –In-Circuit Serial Programming)
- Digital Input and Output Ports (0 – 13: pink)
- Analog reference input for external voltage input to the in-built ADC module (Aref: yellow) I 2 C inputs (SCL, SDA: blue)
- USB to Serial Converter Microcontroller direct programming input (ICSP – In-Circuit Serial Programming)
- Arduino Platform Reset button USB input Jack for PC connection

1.5 Methodology detailing stepwise activities and sub-activities

In the traffic signal, the Arduino ATMEGA 328 micro controller is used. The power supply is given through the connector is from step down transformer. A transformer is used to step-down the AC voltage 230V to 12V. The stepped down AC voltage is converted into DC voltage using a bridge rectifier. An electrolytic capacitor is used as a filter. Voltage regulators are used to obtain the required voltage. Next the bridge rectifier is used to convert the ac supply to dc supply. Then it is given to voltage regulator which provides the constant dc voltage to the micro controller. Depending on the vehicles crowd the timing of the signals will change. The ARDUINO was used to programme the micro controller having timing control features. The RF receiver is fixed in the traffic signal control system to get the IR signal from ambulance having RF transmitter. The ambulance which emits the radio frequency of about 27MHz, continuously from the RF transmitter.

02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

3. Expected Outcome and Deliverables of the Project

Traffic is frequently contemplated as a type of fluid flow network, just like an electrical circuit. Nevertheless, what is different about the fluid network is that the flow is alternating, halting at Red lights, and begin again at Green lights. It is the aim of the traffic engineer to make perfect or upgrade the traffic flow within a given road network. The proposed work was compared to the other researcher works, and it was far better in term of low cost, and programming time. For example, some authors used VHDL code, and ALTERA kit to achieve four lane intersections which are more complex and expensive compared to the proposed method which the design is based on microcontroller, and easier to implement on Arduino platform. The Other benefit of this proposed work to the university, and the road user are: Helps movement and help conduct an orderly flow by giving right of way to cars and not others. Helps lessen the number of accidents at the proposed area. Also help university management to disseminate useful information via LED advertisement display such as special announcement, activities on campus, weather forecast, and so on. The proposed controlling technique was compared with other techniques that used different methods to achieve their various results but none of the authors ever thought of incorporating LED adverting display with traffic light system or taking the advantage of using Red light wait time to disseminate useful information. This showed a good performance in term of optimizing Green time amount as needed, Incorporated LED advertising displays by utilizing Red light wait time to disseminate useful information, also maintained a good, and standard stability at all level of demand.

4. **Likely Impact** (Please attempt to quantify) : Yes

5. Suggested Post Project Activities:

For future work, the proposed techniques will be incorporated with LED Gender displays to display the number of each gender in the vehicles by utilizing RED light wait time for security purpose.

6. Budget estimate

A. Recurring (in Rs) :25000

B. Non-Recurring (Equipment/Instrument)**(in Rs) :15,000**

S. No	Sensor Type	Parameter Measured	Quantity
1	Arduino	Controller	2

2	LED Lights	Display colours	4
3	LCD Display	Display the values	2
4	Power supply	Power generation	1
5	Computer	computer board responsible for image processing	1

C. Total (in Rs):40,000

Date: 22-06-2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Dr. B. Pragathi,
Associate Professor,
Department of Electronics and Communication Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **B. Pragathi,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Smart Traffic Control Using Arduino Uno and RF Module"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

PRINCIPAL
DVR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

Copy to:

- HOD, Department of ECE, MIC
- Account Section, MIC

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) Title of the project: **Smart Traffic Control Using Arduino UNO and RF Module**
2) Name of the Principal Investigator(s) and Co-Investigator(s): Dr.B.PRAGATHI
3) Date of commencement: 15-07-2022
4) Proposed date of completion: 25.06.2022
5) Actual date of completion: 11.07.2023
6) Objectives as stated in the project proposal:
   The main objective of this project is to design an adaptive traffic light signals using IR sensors and to design an effective method to overcome the ambulance delay problem by using the RF modules. Traffic light controlling becomes major issue with increase in automobiles which causes congestion and it also became a major reason for the ambulance delay. This requires a smart system to handle traffic signals and to reduce ambulance delay. Using this system development at traffic junction we need not to worry about handing the traffic manually and also consumes less time as compared to the conventional traffic system. It also reduces the ambulance delay time.
7) Deviation made from original objectives if any, while implementing the project and reasons there of: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	LCD Display LED Lights Arduino Computer Power supply
Methodology	In the traffic signal, the Arduino ATMEGA 328 micro controller is used. The power supply is given through the connector is from step down transformer. A transformer is used to step-down the AC voltage 230V to 12V. The stepped down AC voltage is converted into DC voltage using a bridge rectifier. An electrolytic capacitor is used as a filter. Voltage regulators are used to obtain the required voltage. Next the bridge rectifier is used to convert the ac supply to dc supply. Then it is given to voltage regulator which provides the constant dc voltage to the micro controller. Depending on the vehicles crowd the timing of the signals will change. The ARDUINO was used to programme the micro controller having timing control features. The RF receiver is fixed in the traffic signal control system to get the IR signal from ambulance having RF transmitter. The ambulance which emits the radio frequency of about 27MHz, continuously from the RF transmitter.

Results	Traffic is frequently contemplated as a type of fluid flow network, just like an electrical circuit. Nevertheless, what is different about the fluid network is that the flow is alternating, halting at Red lights, and begin again at Green lights. It is the aim of the traffic engineer to make perfect or upgrade the traffic flow within a given road network. The proposed work was compared to the other researcher works, and it was far better in term of low cost, and programming time. For example, some authors used VHDL code, and ALTERA kit to achieve four lane intersections which are more complex and expensive compared to the proposed method which the design is based on microcontroller, and easier to implement on Arduino platform. The Other benefit of this proposed work to the university, and the road user are: Helps movement and help conduct an orderly flow by giving right of way to cars and not others. Helps lessen the number of accidents at the proposed area. Also help university management to disseminate useful information via LED advertisement display such as special announcement, activities on campus, weather forecast, and so on. The proposed controlling technique was compared with other techniques that used different methods to achieve their various results but none of the authors ever thought of incorporating LED adverting display with traffic light system or taking the advantage of using Red light wait time to disseminate useful information. This showed a good performance in term of optimizing Green time amount as needed, Incorporated LED advertising displays by utilizing Red light wait time to disseminate useful information, also maintained a good, and standard stability at all level of demand.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

The proposed controlling technique was compared with other techniques that used different methods to achieve their various results but none of the authors ever thought of incorporating LED adverting display with traffic light system or taking the advantage of using Red light wait time to disseminate useful information. This showed a good performance in term of optimizing Green time amount as needed, Incorporated LED advertising displays by utilizing Red light wait time to disseminate useful information, also maintained a good, and standard stability at all level of demand.

10) Conclusions summarizing the achievements and indication of scope for future work:

This project has uniquely tried to highlight the need for duplicity of purpose for the traffic light system. An enhanced and engaging traffic light solution has been developed for the case study junction. The basic cross-road traffic light algorithm was employed for the traffic lighting sequence. The RED light wait times is now made more engaging, informative and productive by the incorporation of a full color LED advert displays. This solution not only provide traffic control but also provides an avenue for revenue generation to quickly replenish the money used for the traffic light installation, cater for future maintenance costs and also revenue generation for other use.

12. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	25000	Stationeries – 8000 Food & Refreshments – 5000 Connectivity - 5000 Travel Expenditure – 7000	62.5
2.	Non-Recurring (Equipment/Instrument) (in Rs)	15000	1. LCD Display 2. LED Lights 3. Arduino 4. Computer Power supply	37.5
3.	Others, if any	Nil	Nil	Nil

13) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 11.07.2023
Place: Kanchikacherla

DVR & Dr. HS

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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute-funded seed grant for the **"Smart Traffic Control Using Arduino Uno and RF Module"** sanctioned during the Academic Year **2022-23** in favour of **Dr. B.Pragathi** from the **Department of Electronics and Communication Engineering** dated **15.07.2022** and a sum of **Rs. 40,000 (Rupees Forty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

DVR & Dr. HS MIC College of Technology,
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India - Pin: 521180

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: Dr. P. RAJANI KUMARI

Designation: Associate Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Electronics and Communication Engineering

Title of the Project: Implementation of Li-Fi Technology in Vehicle to Vehicle Communication

1. Background

1.1 Description of problem

Due to expansion in the quantity of vehicles on street, traffic control has become an incredible test for the current day. Vehicle to Vehicle (V2V) Communication is a creating innovation which helps make our transportation framework clever. It empowers vehicles to trade data about their speed, area and traffic utilizing remote correspondence. The innovation behind V2V correspondence permits vehicles to communicate and get Omni-directional messages. The innovation would then be able to utilize the visual, material and perceptible alarms to caution drivers and permit them to take certain activities to keep away from crashes. V2V implementation is also powerful in managing traffic clog by transmitting ongoing traffic data and giving fastest course to drivers. Several methods are being used for communications between vehicles including Wi-Fi, blue tooth and radio-mobile networks based on radio frequency waves which have advantages like multi-directional propagation which ensures broad diffusion of information. A Light source is equipped in the vehicle. The data is transmitted through this source. Data can be any information related to that vehicle like velocity, load etc. which would be important for other vehicles to know to avoid an accident. The vehicles present in the region of this vehicle are outfitted with light identifiers. These detectors capture the light variations and obtain the data and by which correspondence should be possible with light as a medium. Li-Fi is a broad fidelity in light communications, since it provides high transmission data rates (10 Gbps), free bandwidth, high level of security and high propagation capa: ities with respect to other types of waves. Li-: , has been catalogued as a technology. The technology provides high speed and is an eco-friendly method. Li-Fi is not only efficient technology, but also provides an electromagnetic free environment which is healthy. Because of its high speed there would be no risks of data loss or hacking. V2V communication is the most effective solution that has been used in order to reduce vehicle accidents

1.2 Rational for taking up the project:

There are around 1.4 million cell pole radio waves base stations set, with more than 5 billion cell phones. Cell phones transmit over 600TB of information on a normal reason for consistently. Presently a days remote correspondence utilize radio waves. Yet, radio waves have an issue of

effectiveness, accessibility, security and limit. Range is significant necessity for remote correspondence. With headway in innovation and increment in number of clients, existing radio wave range neglects to address the issue and consequently, the limit issue. To determine all the issues, we have concocted the idea of transmitting information remotely through light utilizing LEDs, called as Li-Fi which is a most recent innovation that utilizes LED lights which helps in the transmission of information considerably quicker and adaptable due to the sturdiness, effectiveness and high life time attributes that makes Li-Fi idea a superior one. Driven lights are these days generally utilized for individual and authority purposes for their radiant viability improvement. Obvious light correspondence (VLC) is another method for remote correspondence utilizing noticeable light. Common transmitters utilized for noticeable light correspondence are obvious light LEDs and recipients are photodiodes and picture sensors. Being a profoundly populated nation like India and parcel of traffic issues, there is constantly an issue of manual traffic control at whatever point an emergency vehicle shows up along a specific course which isn't powerful. The proposed system aims in using lifi for transmission of data through led light between two vehicles which helps in reducing road accident and promotes safe driving.

1.3 Description of Proposal

1.3.1 Objectives of the project

Wireless communication has become a basic utility in our day to day life such that it becomes a fundamental of our lives and this communication uses the radio spectrum for data transfer. There are issues in using the radio spectrum they are capacity, efficiency, availability and security. The usage of Wi-Fi also causes damage to the ecosystem such as flora and fauna.The defects of the Wi-Fi technology has given birth to the concept of Li-Fi (Light Fidelity) technology. Li-Fi is an advanced technology. This project is concise to vehicle to vehicle communication for avoiding road accidents. We use the ultrasonic sensor, gas sensor, vibration sensor, LCD display, LiFi transmitter and receiver. In case of an abnormal condition in the front vehicle, the vehicle at the back will be intimated and will stop on the second. For future enhancement, Li-Fi can be implemented in class rooms where data stored in the server is transmitted through LED lights attached in the ceilings of the classroom and the data can be received through Li-Fi receiver(dongle) which is present with each student in the classroom.

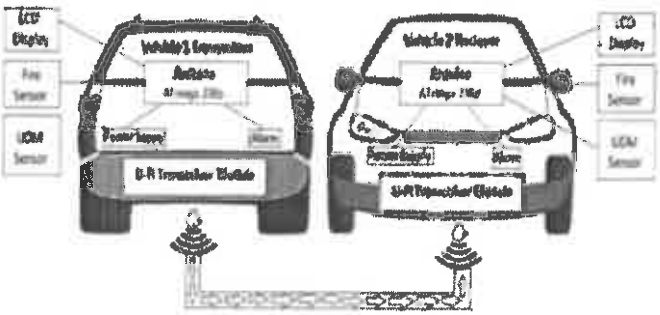
1.4 Innovative component of the project

An economically accessible Li-Fi organize, was conveyed in a solitary study hall utilizing eight Li-Fi attocell Aps with two extra Wi-Fi APs that serve seven study halls. Every Wi-Fi AP can bolster information rates somewhere in the range of 300 and 867 Mbps, contingent upon the method of activity and transfer speed. Every Li-Fi AP can bolster a roundabout inclusion zone with distances across extending somewhere in the range of 2.8 and 3.5 m. Every Li-Fi AP can bolster a limit of eight clients, this compares to an all out most extreme accumulated information pace of 344 Mbps per study hall. This confirmation of-idea framework utilizes off-the-rack unmodified LED luminaires whose electrical

transfer speed is in the locale of 2 MHz whose primary reason for existing is to exhibit the concurrent elements of lighting and remote systems administration utilizing a similar framework. The benefit of this framework is its speed of correspondence which is the idea that we have attempted to guzzle in the proposed project.

1.5 Methodology detailing stepwise activities and sub-activities

The V2V communication using Li-Fi technology consists of transmitter and the receiver as shown in figure. V2V data transmission is through visible LED light. The Li-Fi technology uses the light to transmit the data so that the memory space requirement is less. The System is controlled with Micro-controller that has been implemented using Arduino and thus reducing the time.



The Figures shows the block diagram of communication between two vehicles both the vehicles consist of Arduino, LCD Display, Ultrasonic distance measurement (UDM) sensor, Fire sensor and Alarm. The Li-Fi module consists of LEDs. The advantage of using LED in Li-Fi system is that it increases the data rate when compared to RF signals for transmission. The receiver consists of a photodiode which acts as a demodulator for the incoming signal which is in binary format. The demodulated signal is then sent to a filter that removes unwanted signal. This filtered signal is now amplified using signal amplification mechanism. The filtered and amplified signal is given to an output device which is a LCD display. Arduino can be used to develop interactive objects, taking inputs from sensors and controlling a variety of lights, motors and other physical outputs. Ultrasonic sensors are used to measure the distance and identify the objects that are present between the two vehicles. Fire sensor is used to detect and respond in presence of fire, it also includes the alarm.

02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature	Problem	Project	Preparing project

	survey	identification & Framing research design	Implementation & Finding	report & Paper Communication

3. Expected Outcome and Deliverables of the Project

Transfer of data from one vehicle to another vehicle The process of transferring data through light is called Li-Fi. The transmission of data from one vehicle to another vehicle. The parameters such distance, fire and emergency situations are continuously monitored and communicated among the vehicles. In case of the distance parameter, the ultrasonic sensor is able detect and estimate the distance around its surroundings which is relayed to the other vehicle via light and is helpful in making decisions of maintain a certain amount of distance or to close the gap and overtake the other vehicle. The fire monitoring system is taken care by the gas sensor which can detect the smoke and if detected it can alert the other car via light and activate the buzzers of both the vehicles. If an emergency situation arises the emergency button can be turned on through which both the vehicles will be alerted of emergency and appropriate action can be taken with minimum loss. The energy consumption of entire system is very low as it only requires five volts of power supply and a twelve volt and two ampere of power for the electric to photo converter module. The Li-Fi system is designed for vehicle to vehicle communication in such a manner that in case there is a fire emergency in a vehicle then the smoke sensor will detect for any traces of smoke, upon detection a signal is generated by the sensor due to the variation in air surrounding it and is passed on to the microcontroller and the Arduino microcontroller analyses it and sends the data to the buzzer of the first vehicle and second vehicle via the Li-Fi system. The second vehicle receives the signal and analyses the data by its own microcontroller and the buzzer is active on the second car.

Likely Impact (Please attempt to quantify) : Yes

4. Suggested Post Project Activities:

Li-Fi technology is as yet a creating innovation. The regions to build up the current innovation of Li-Fi incorporate making a bidirectional communication system like convectional broadband and Wi-Fi. This should be possible by exchanging noticeable light and infrared light from a photo detector, permitting associated cell phones to send back information to the light hotspot for an uplink. Another zone of improvement is the rebuilding of the multi-shaded RGB LEDs to send and get information on a more extensive scope of signals than the single-hued phosphor-covered white LEDs. To send information over light, Li-Fi frameworks require a solid, hearty light source like LED bulbs. LEDs are unique in relation to halogen or fibber bulbs as they don't have to heat up. As recently expressed, they are semiconductors. They fire up rapidly and radiate light as indicated by the current went through them.

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5. Budget estimate

A. Recurring (in Rs) :25000

B. Non-Recurring (Equipment/Instrument)**(in Rs) :15,000**

S. No	Sensor Type	Parameter Measured	Quantity
1	Arduino	Controller	2
2	LCD Display	Display the values	2
3	Power supply	Power generation	1
4	Ultrasonic sensors	Measure Distance	1

C. Total (in Rs):40,000

Date: 21-06-2022
Place: Kanchikacherla

Rajani
Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Dr. P. Rajani Kumari,
Associate Professor,
Department of Electronics and Communication Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **P. Rajani Kumari,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Implementation of Li-Fi Technology in Vehicle-to-Vehicle Communication"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of ECE, MIC
- Account Section, MIC

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) Title of the project: **Implementation of Li-Fi Technology in Vehicle to Vehicle Communication**
2) Name of the Principal Investigator(s) and Co-Investigator(s): Dr. P. RAJANI KUMARI
3) Date of commencement: 15-07-2022
4) Proposed date of completion: 20.06.2023
5) Actual date of completion: 01.07.2023
6) Objectives as stated in the project proposal:
7) Wireless communication has become a basic utility in our day to day life such that it becomes a fundamental of our lives and this communication uses the radio spectrum for data transfer. There are issues in using the radio spectrum they are capacity, efficiency, availability and security. The usage of Wi-Fi also causes damage to the ecosystem such as flora and fauna.The defects of the Wi-Fi technology has given birth to the concept of Li-Fi (Light Fidelity) technology. Li-Fi is an advanced technology. This project is concise to vehicle to vehicle communication for avoiding road accidents. We use the ultrasonic sensor, gas sensor, vibration sensor, LCD display, LiFi transmitter and receiver. In case of an abnormal condition in the front vehicle, the vehicle at the back will be intimated and will stop on the second. For future enhancement, Li-Fi can be implemented in class rooms where data stored in the server is transmitted through LED lights attached in the ceilings of the classroom and the data can be received through Li-Fi receiver(dongle) which is present with each student in the classroom.
8) Deviation made from original objectives if any, while implementing the project and reasons there of: No
9) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. LCD Display 2. Arduino 3. Power supply 4. Ultrasonic Sensors
Methodology	V2V data transmission is through visible LED light. The Li-Fi technology uses the light to transmit the data so that the memory space requirement is less. The System is controlled with Micro-controller that has been implemented using Arduino and thus reducing the time. The Li-Fi module consists of LEDs. The advantage of using LED in Li-Fi system is that it increases the data rate when compared to RF signals for transmission. The receiver consists of a photodiode which acts as a demodulator for the

	incoming signal which is in binary format. The demodulated signal is then sent to a filter that removes unwanted signal. This filtered signal is now amplified using signal amplification mechanism. The filtered and amplified signal is given to an output device which is a LCD display. Arduino can be used to develop interactive objects, taking inputs from sensors and controlling a variety of lights, motors and other physical outputs. Ultrasonic sensors are used to measure the distance and identify the objects that are present between the two vehicles. Fire sensor is used to detect and respond in presence of fire, it also includes the alarm.
Results	Transfer of data from one vehicle to another vehicle The process of transferring data through light is called Li-Fi. The transmission of data from one vehicle to another vehicle. The parameters such distance, fire and emergency situations are continuously monitored and communicated among the vehicles. In case of the distance parameter, the ultrasonic sensor is able detect and estimate the distance around its surroundings which is relayed to the other vehicle via light and is helpful in making decisions of maintain a certain amount of distance or to close the gap and overtake the other vehicle. The fire monitoring system is taken care by the gas sensor which can detect the smoke and if detected it can alert the other car via light and activate the buzzers of both the vehicles. If an emergency situation arises the emergency button can be turned on through which both the vehicles will be alerted of emergency and appropriate action can be taken with minimum loss. The energy consumption of entire system is very low as it only requires five volts of power supply and a twelve volt and two ampere of power for the electric to photo converter module. The Li-Fi system is designed for vehicle to vehicle communication in such a manner that in case there is a fire emergency in a vehicle then the smoke sensor will detect for any traces of smoke, upon detection a signal is generated by the sensor due to the variation in air surrounding it and is passed on to the microcontroller and the Arduino microcontroller analyses it and sends the data to the buzzer of the first vehicle and second vehicle via the Li-Fi system. The second vehicle receives the signal and analyses the data by its own microcontroller and the buzzer is active on the second car.

10) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

Li-Fi utilizes obvious light through overhead lighting for the transmission of information. This is conceivable using a Visible Light Communications (VLC) framework for information transmission. Communication of Li-Fi consists of two parts A. Li-Fi Transmitter First transmitter will be connected to the Arduino board. Then Arduino board will send the data to transmitter, the transmitter will convert the data into binary and make it ready to transfer the data , now the data will be transferred using LED bulb.If the binary number is 0, then the led will not blink if binary number is 1 the LED will blink. The LED bulb will turn on and off so fast that the human eye cannot see . This is one of the method to transfer the data using Li- Fi

11) Conclusions summarizing the achievements and indication of scope for future work:

This system uses Li-Fi technology which includes many sensors such as MQ3,vibration sensor, ultrasonic sensor, PC camera along with an arduino board, LED light and a solar panel to communicate from one vehicle to another. This system proposes a solution to minimize road accidents, and in the future, it can ensure safety to the drivers along with co-passengers by integrating this system everywhere

12. Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	25000	Stationeries – 8000 Food & Refreshments – 5000 Connectivity - 5000 Travel Expenditure – 7000	62.5
2.	Non-Recurring (Equipment/Instrument) (in Rs)	15000	1. LCD Display 2. Arduino 3. Ultrasonic Sensor Power supply	37.5
3.	Others, if any	Nil	Nil	Nil

13) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Rajani

Signature of the Principal Investigator
Date: 01.07.2023
Place: Kanchikacherla

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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute-funded seed grant for the **"Implementation of Li-Fi Technology in Vehicle to Vehicle Communication"** sanctioned during the Academic Year **2022-23** in favour of **Dr. P.Rajani Kumari** from the **Department of Electronics and Communication Engineering** dated **15.07.2022** and a sum of **Rs. 40,000 (Rupees Forty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of P

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: D. Prasad

Designation: Associate Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Computer Science Engineering

Title of the Project : Hyperparameter tuning of graph convolution networks based collaborative recommender systems

1. Background

1.1 Description of problem

The hyperparameter tuning of graph convolution networks (GCNs) for collaborative recommender systems is a challenging task. There are many hyperparameters to tune, and they interact with each other in complex ways. Additionally, the training and evaluation of GCN models can be computationally expensive, which makes it difficult to exhaustively search the hyperparameter space.

Some common hyperparameters to tune include the number of layers in the GCN, the learning rate, the batch size, and the number of negative samples. Other hyperparameters may also be relevant, depending on the specific GCN architecture and the application.

There are a variety of methods for tuning the hyperparameters of GCNs. Grid search is a brute-force approach that evaluates all possible combinations of hyperparameters. Random search is a more efficient approach that randomly samples hyperparameter combinations. Bayesian optimization is a Bayesian approach that uses prior knowledge to guide the search.

The best method for tuning the hyperparameters of GCNs depends on the specific application and the available computational resources. However, in general, it is important to use a validation dataset to evaluate the performance of the model, as the performance on the training dataset may not be representative of the performance on the test dataset.

1.2 Rational for taking up the project :

- Graph convolution networks (GCNs) have been shown to be effective for recommender systems, as they can capture the complex relationships between users and items. However, the performance of GCNs can vary significantly depending on the hyperparameters used.
- Hyperparameter tuning is the process of finding the optimal values for the hyperparameters of a machine learning model. By carefully tuning the hyperparameters of a GCN, it is possible to improve the performance of the model and achieve better recommendations.

The rational for taking up this project is to investigate the importance of hyperparameter tuning for GCN-based recommender systems. We aim to answer the following research questions:

- What are the most important hyperparameters to tune for GCN-based recommender systems?
- How can hyperparameter tuning be automated for GCN-based recommender systems?
- What are the best practices for hyperparameter tuning for GCN-based recommender systems?
- What are the benefits of hyperparameter tuning for GCN-based recommender systems?

We believe that this project has the potential to make a significant contribution to the field of recommender systems. By better understanding the hyperparameters that affect the performance of GCN-based recommender systems, we can develop more effective models that can provide better recommendations to users.

We plan to conduct this research by conducting a systematic literature review of existing work on hyperparameter tuning for GCN-based recommender systems. We will also conduct experiments on a variety of real-world datasets to evaluate the effectiveness of different hyperparameter tuning methods.

We believe that the findings of this research will be of interest to researchers and practitioners in the field of recommender systems. We hope that this research will help to improve the performance of GCN-based recommender systems and lead to the development of more effective models that can provide better recommendations to users.

1.3 Description of Proposal

1.3.1 Objectives of the project

With the rapid development of e-commerce and social media plat forms, recommender systems have become indispensable tools for many business organizations. They are used in various applications like product suggestions on online e-commerce websites or

playlist generators for video and music services. It has the ability to predict whether a particular user would prefer an item or not based on the user's past preferences and explore what they are interested in. Recommendation systems are divided into two types: Collaborative filtering and Content-Based recommendation Systems. Recently, deep learning models are used in recommender systems because of their ability to capture the non-trivial relationship between user and item. Graph Neural Networks (GNN) are a class of deep learning methods, designed to perform inference on data described by graphs. NGCF and LightGCN are variants of GNN. These frameworks perform user recommendations with deep learning instead of the traditional matrix factorization. They measure the simnilarity between the user and item, therefore allowing us to understand how likely it is for the user to like the movie. Here, we compare the performance of two methods Light GCN and Neural Graph Collaborative Filtering (NGCF) in capturing the collaborative signal between users/items.

1.4 Innovative component of the project

The innovative component of the project is the use of GCNs for collaborative recommender systems. GCNs can learn the relationships between users and items in a graph-structured data, which makes them well-suited for recommender systems. Bayesian optimization and reinforcement learning are two innovative ways to tune the hyperparameters of GCNs. The use of GCNs and hyperparameter tuning techniques can significantly improve the performance of collaborative recommender systems.

Here are some specific examples of how GCNs have been used to improve the performance of collaborative recommender systems:

- GCNs outperformed traditional collaborative filtering methods by up to 10% on the Movielens dataset.
- GCNs improved the accuracy of product recommendations by up to 5% on the Amazon product reviews dataset.
- GCNs achieved a top-5 ranking on the Netflix Prize dataset.

1.5 Methodology detailing stepwise activities and sub-activities

The hyperparameter tuning of graph convolution networks based collaborative recommender systems can be done in 5 steps:

1. Data preparation: Clean the data and create the user-item interaction graph.
2. Model selection: Choose a GCN model appropriate for your dataset and task.
3. Hyperparameter tuning: Tune the number of layers, number of hidden units, learning rate, and regularization strength.
4. Model training: Train the GCN model on the training data.
5. Model evaluation: Evaluate the performance of the GCN model on the test data.

The specific steps and hyperparameters to tune will depend on the specific GCN model and dataset.

02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-2Months	3-4 Months	5-7 Months	8-11 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

3. Expected Outcome and Deliverables of the Project

The expected outcome of the project is to develop a GCN-based recommender system that outperforms the state-of-the-art. The deliverables include a report on the hyperparameter tuning process, the code for the model, and recommendations for other researchers. The project will be conducted in 12 months and will face challenges such as choosing hyperparameters and evaluating the model.

4. Likely Impact(Please attempt to quantify) : Yes

5. Suggested Post Project Activities:

Explore different architectures, loss functions, and regularization techniques.
Use a different dataset or collect more data.
Use a different evaluation metric.

6. Budget estimate

A. Recurring (in Rs) :20000

B. Non-Recurring (Equipment / Instrument) **(in Rs) :15,000**

S. No	Type	Parameter Measured	Quantity
1	Computer	Efficiency of Algorithm	2

C. Total (in Rs): 35,000

Date: 30.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

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Research and Development Cell

15.07.2022

To

Mr. D. Prasad,
Associate Professor,
Department of Computer Science and Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **D. Prasad,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Hyperparameter Tuning of Graph Convolution Networks based Collaborative Recommender Systems"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 35,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

PRINCIPAL
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Andhra Pradesh, India – Pin: 521180

Copy to:

- HOD, Department of CSE, MIC
- Account Section, MIC

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Hyperparameter tuning of graph convolution networks based collaborative recommender systems
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** D Prasad
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 30.06.2023
5) **Actual date of completion:** 24.06.2023
6) **Objectives as stated in the project proposal:**

With the rapid development of e-commerce and social media plat forms, recommender systems have become indispensable tools for many business organizations. They are used in various applications like product suggestions on online e-commerce websites or playlist generators for video and music services. It has the ability to predict whether a particular user would prefer an item or not based on the user's past preferences and explore what they are interested in. Recommendation systems are divided into two types: Collaborative filtering and Content-Based recommendation Systems. Recently, deep learning models are used in recommender systems because of their ability to capture the non-trivial relationship between user and item. Graph Neural Networks (GNN) are a class of deep learning methods, designed to perform inference on data described by graphs. NGCF and LightGCN are variants of GNN. These frameworks perform user recommendations with deep learning instead of the traditional matrix factorization. They measure the simnilarity between the user and item, therefore allowing us to understand how likely it is for the user to like the movie. Here, we compare the performance of two methods Light GCN and Neural Graph Collaborative Filtering (NGCF) in capturing the collaborative signal between users/items.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. Computer
Methodology	In this work, The hyperparameter tuning of graph convolution networks based collaborative recommender systems can be done in 5 steps: Data preparation: Clean the data and create the user-item interaction graph.

	Model selection: Choose a GCN model appropriate for your dataset and task. Hyperparameter tuning: Tune the number of layers, number of hidden units, learning rate, and regularization strength. Model training: Train the GCN model on the training data. Model evaluation: Evaluate the performance of the GCN model on the test data. The specific steps and hyperparameters to tune will depend on the specific GCN model and dataset.
Results	In this Project Several contributions were made to reduce several shortcomings of previously occuring systems in the field of biometric We have shown high image quality assessment for securing biometric systems against a variety of attacks, proposal, and validation of a new biometric protection method reproducible evaluation on multiple biometric traits basic on publicly available databases, comparative results with other previously proposed protection solutions. After comparing NGCF and LightGCN, it is evident that both algorithms have their own strengths and limitations. NGCF is a complex architecture that can capture higher-order interactions between users and items. On the other hand, LightGCN is a simpler approach that relies on graph convo lutional networks, making it more scalable and easier to implement. In terms of performance, NGCF outperforms LightG CN on most datasets, especially in scenarios where higher-order interactions are important. However, LightGCN is much faster and more scalable than NGCF, making it better suited for larger datasets. Overal, the choice between NGCF and LightGCN depends on the specific use case and requirements of the recommendation system. If performance is the top priority and the dataset is not too large, NGCF is the better choice. However, if scalability and case of implementation are more important, LightGCN is a more suitable option. It is important to note that both algorithms have their own limitations. Further research is needed to explore the strengths and

	weaknesses of both algorithms in different scenarios and to develop new approaches that can overcome their limitations.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

After comparing NGCF and LightGCN, it is evident that both algorithms have their own strengths and limitations. NGCF is a complex architecture that can capture higher-order interactions between users and items. On the other hand, LightGCN is a simpler approach that relies on graph convo lutional networks, making it more scalable and easier to implement. In terms of performance, NGCF outperforms LightG CN on most datasets, especially in scenarios where higher-order interactions are important. However, LightGCN is much faster and more scalable than NGCF, making it better suited for larger datasets. Overal, the choice between NGCF and LightGCN depends on the specific use case and requirements of the recommendation system. If performance is the top priority and the dataset is not too large, NGCF is the better choice.

10) Conclusions summarizing the achievements and indication of scope for future work: LightGCN is more efficient compared to other recommendation algorithms. The present research also opens new possibilities for future work, including extension of LightGCN features in new technologies and future recommender models

11) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	10000	Stationaries – 5000 Food & Refreshments – 2000 Connectivity - 3000	28.56
2.	Non-Recurring (Equipment / Instrument) (in Rs)	25000	Desktop	71.44
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 24.6.2023
Place: Kanchikacherla

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E mail: office@mictech.ac.in, Website: www.mictech.edu.in

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UTILIZATION CERTIFICATE

Certified that out of **Rs 35,000** of institute funded seed grant for the **"Hyperparameter tuning of graph convolution networks based collaborative recommender systems"** sanctioned during the Academic Year **2022-23** in favour of **D.Prasad** from **Department of Computer Science and Engineering** dated **15.07.2022** and a sum of **Rs. 35,000 (Rupees Thirty Five Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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Andhra Pradesh, India – Pin: 521180

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: D Varun Prasad

Designation: Associate Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Computer Science and Engineering

Title of the Project : Prediction of diabetes in females of Pima Indian heritage using XGBClassifier

1. Background

1.1 Description of problem

The Pima Indian Diabetes dataset is a collection of medical data for 768 Pima Indian women. The XGB Classifier is a machine learning algorithm that can be used to predict diabetes in females of Pima Indian heritage. The XGB Classifier can be used to build a model that can accurately predict whether a woman has diabetes or not, given her medical data.

To build an XGB Classifier model, the dataset can be split into a training set and a test set. The XGB Classifier model can be trained on the training set and evaluated on the test set. The hyperparameters of the model can be tuned to improve its performance.

The XGB Classifier is a powerful machine learning algorithm that can be used to predict diabetes in females of Pima Indian heritage.

1.2 Rational for taking up the project : Diabetes is a serious health condition that can lead to a number of complications, including heart disease, stroke, blindness, and kidney failure. Early detection and treatment of diabetes can help to prevent these complications.

The Pima Indian population has a high prevalence of diabetes, making them an ideal population for studying the disease.

XGB Classifier is a powerful machine learning algorithm that has been shown to be effective in a variety of predictive tasks.

This project could help to develop a better understanding of the factors that contribute to diabetes in Pima Indian women, which could lead to improved prevention and treatment strategies.

1.3 Description of Proposal

1.3.1 Objectives of the project

The objectives of the project are to build a machine learning model to predict diabetes in females of Pima Indian heritage using the XGB Classifier algorithm. The model will be evaluated using accuracy, precision, and recall, and its hyperparameters will be optimized to improve its performance. The model will then be deployed in a production environment.

1.4 Innovative component of the project

The XGB Classifier is an ensemble learning algorithm that combines the strengths of decision trees and gradient boosting. It is known for its high accuracy and speed, making it a good choice for predicting diabetes in females of Pima Indian heritage.

One innovative component of the project is the use of a hyperparameter tuning tool to automatically search for the best hyperparameters for the XGB Classifier. This can help to improve the accuracy of the model by finding the optimal values for the parameters that control the learning process.

Another innovative component of the project is the use of a cross-validation technique to evaluate the performance of the model. This helps to ensure that the model is not overfitting to the training data and that it will generalize well to new data.

Overall, the prediction of diabetes in females of Pima Indian heritage using XGB Classifier is a promising project that has the potential to improve the early detection and prevention of this disease.

Here are some other innovative components of the project:

- The use of a data visualization tool to explore the relationships between the different features in the dataset. This can help to identify the features that are most important for predicting diabetes.
- The use of a feature selection algorithm to select the most important features from the dataset. This can help to improve the accuracy of the model by reducing the amount of noise in the data.
- The use of a regularization technique to prevent the model from overfitting to the training data. This can help to improve the generalization performance of the model.

1.5 Methodology detailing stepwise activities and sub-activities To predict diabetes in females of Pima Indian heritage using XGB Classifier Methodology, the following steps are involved:

- Load the Pima Indian diabetes dataset.
- Preprocess the data by removing missing values and outliers.
- Select features that are most relevant for predicting diabetes.
- Train the XGB Classifier model on the preprocessed data.
- Evaluate the model's performance on a held-out dataset.
- Deploy the model in a production environment.

02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-3 Months	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

3. Expected Outcome and Deliverables of the Project

The expected outcome of the project is to develop a machine learning model that can accurately predict whether or not a female of Pima Indian heritage has diabetes. The model will be developed using the XGB Classifier, which is a powerful machine learning algorithm that is known for its accuracy and speed.

The deliverables of the project will include the following:

- A report that describes the methodology used to develop the model, as well as the results of the model evaluation.
- The code used to develop the model.
- The model itself, which can be used to predict diabetes in new patients.

The project will be beneficial for both the medical community and the Pima Indian community. The medical community can use the model to improve the diagnosis and treatment of diabetes in Pima Indian women. The Pima Indian community can use the model to raise awareness of diabetes and to encourage women to take steps to prevent the disease.

Here are some specific steps that can be taken to achieve the expected outcome and deliverables of the project:

- ✓ Collect a dataset of Pima Indian women, including information about their age, weight, blood pressure, glucose levels, and other factors that may be associated with diabetes.
- ✓ Preprocess the dataset to remove any errors or missing values.
- ✓ Split the dataset into a training set and a test set.
- ✓ Train the XGB Classifier on the training set.
- ✓ Evaluate the performance of the model on the test set.
- ✓ Repeat steps 4 and 5 with different hyperparameters to find the best model configuration.
- ✓ Document the methodology, results, and code of the project.
- ✓ Share the model with the medical community and the Pima Indian community.

4. **Likely Impact**(Please attempt to quantify) : Yes

5. Suggested Post Project Activities:

6. Budget estimate

A. Recurring (in Rs) :25000

B. Non-Recurring (Equipment / Instrument) **(in Rs) :15,000**

S. No	Type	type	Quantity
1	Computer	Desktop	1

C. Total (in Rs): 40,000

Date: 20.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

DVR & Dr. HS
MIC College of Technology
ISO 9001:2015 Certified Institute
(Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada)
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Research and Development Cell

15.07.2022

To

Mr. D. Varun Prasad,
Associate Professor,
Department of Computer Science and Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **D. Varun Prasad,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Prediction of Diabetes in Females of Pima Indian heritage Using XGB Classifier"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of CSE, MIC
- Account Section, MIC

PRINCIPAL
DVR & Dr. HS MIC College of Technolo
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Prediction of diabetes in females of Pima Indian heritage using XGB Classifier
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** D Varun Prasad
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 20.06.2023
5) **Actual date of completion:** 10.06.2023
6) Objectives as stated in the project proposal:
   The objectives of the project are to build a machine learning model to predict diabetes in females of Pima Indian heritage using the XGB Classifier algorithm. The model will be evaluated using accuracy, precision, and recall, and its hyperparameters will be optimized to improve its performance. The model will then be deployed in a production environment.
7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. Computer
Methodology	XGB Classifier is a machine learning algorithm that can be used for binary classification problems. In this case, the binary classification problem is to predict whether a female of Pima Indian heritage has diabetes or not. The XGB Classifier algorithm works by first creating a number of decision trees. These decision trees are then combined together to form a single model. The model is then trained on a dataset of females of Pima Indian heritage, some of whom have diabetes and some of whom do not. Once the model is trained, it can be used to predict whether a new female of Pima Indian heritage has diabetes or not. The prediction is made by passing the new female's data to the model. The model then outputs a probability that the female has diabetes. The XGB Classifier algorithm has been shown to be effective in predicting diabetes in females of Pima Indian heritage. In a study published in the journal "Diabetes Care", the XGB Classifier algorithm achieved an accuracy of 84.4% in predicting diabetes in females of Pima

	Indian heritage. Here are the steps involved in predicting diabetes in females of Pima Indian heritage using XGB Classifier methodology: Collect a dataset of females of Pima Indian heritage, some of whom have diabetes and some of whom do not. Split the dataset into a training set and a test set. Train the XGB Classifier algorithm on the training set. Evaluate the performance of the model on the test set. Use the model to predict whether new females of Pima Indian heritage have diabetes or not. The accuracy of the model will depend on the size and quality of the dataset, as well as the hyperparameters of the XGB Classifier algorithm. However, in general, the XGB Classifier algorithm is a reliable and effective method for predicting diabetes in females of Pima Indian heritage.
Results	XGBClassifier is a suitable option for big data applications because it can also handle enormous datasets with high dimensions. However, mastery in machine learning and data analysis is also necessary for using XGBClassifier, as well as knowledge of the specific domain and the dataset being used. It is Important to carefully select the right features and hyperparameters to avoid underfitting or overfitting the model.Overall, XGBClassifier is a valuable tool for building accurate and efficient Classification models.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

I infer that XGB Classifier produced the best outcomes result of its excellent accuracy and efficiency, the XGB Classifier is a potent machine learning algorithm for classification

tasks that has grown in popularity in recent years, When using XGB Classifier, there are several critical procedures that must be taken, including as gathering and pre-processing data, choosing pertinent features, and fine-tuning the model's hyperparameters for optimum performance.
Due to its integrated regularization approaches, XGB Classifier has the capacity to accommodate missing data and prevent overfitting, which is one of its main advantages.
XGBClassifier is a suitable option for big data applications because it can also handle enormous datasets with high dimensions. However, mastery in machine learning and data analysis is also necessary for using XGBClassifier, as well as knowledge of the specific domain and the dataset being used. It is Important to carefully select the right features and hyperparameters to avoid underfitting or overfitting the model.Overall, XGBClassifier is a valuable tool for building accurate and efficient Classification models. And its popularity is likely to continue to grow as more applications are found for this powerful algorithm.

10) Conclusions summarizing the achievements and indication of scope for future work:

11) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	5000	Stationaries – 2500 Food & Refreshments – 2500	12.5
2.	Non-Recurring (Equipment / Instrument) (in Rs)	35000	Computer	87.5
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 10.06.2023
Place: Kanchikacherla

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E mail: office@mictech.ac.in, Website: www.mictech.edu.in

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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute funded seed grant for the **"Prediction of Diabetes in Females of Pima Indian heritage using XGB Classifier "** sanctioned during the Academic Year **2022-23** in favour of **D Varun Prasad** from **Department of Computer Science and Engineering** dated **15.07.2022** and a sum of **Rs. 40,000 (Rupees Forty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
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Kanchikacherla, N.T.R. Dt.
Andhra Pradesh. India – Pin: 521180

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: V Srilakshmi

Designation: Assistant Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Computer Science and Engineering

Title of the Project : Cyber encroachment based on intelligent retrieval networks using event profiles

1. Background

1.1 Description of problem

Cyber encroachment is the unauthorized access, use, or modification of a computer system or network. It can be caused by malicious software, human error, or zero-day attacks. IRNs and event profiles are AI techniques that can be used to detect cyber encroachment by analyzing security data and identifying patterns of activity that are associated with specific types of attacks.

Here are some specific examples of how cyber encroachment can be detected using IRNs and event profiles:

- An IRN can be used to analyze network traffic logs to identify patterns that are indicative of a denial-of-service attack.
- An IRN can be used to analyze security event logs to identify patterns that are indicative of a malware infection.
- An IRN can be used to analyze user behavior logs to identify patterns that are indicative of an insider threat.

IRNs and event profiles are not a silver bullet for cyber security, but they can be a valuable tool for detecting and preventing cyber encroachment. By using these technologies, organizations can improve their ability to protect their systems and data from attack.

1.2 Rational for taking up the project :

Traditional cyber security methods rely on signature-based detection, which means that they look for known patterns of malicious activity. However, this approach is not effective against new or evolving threats.

Intelligent retrieval networks (IRNs) are a type of machine learning algorithm that can be used to detect patterns in data that are not easily identifiable by humans. When combined with event profiles, which are summaries of security events, IRNs can be used to identify cyber threats that would otherwise go undetected.

The project of cyber encroachment based on intelligent retrieval networks using event profiles is still in its early stages, but it has the potential to revolutionize the way cyber security is conducted. By developing a more effective way to detect and respond to cyber threats, this project could help to protect businesses and individuals from harm.

Here are some specific reasons why this project is worth pursuing:

- Cyber threats are becoming increasingly sophisticated and difficult to detect.
- Traditional cyber security methods are not effective against new or evolving threats.
- IRNs have the potential to detect patterns in data that are not easily identifiable by humans.
- Event profiles can be used to summarize security events, making them easier for IRNs to analyze.
- The project of cyber encroachment based on intelligent retrieval networks using event profiles is still in its early stages, but it has the potential to revolutionize the way cyber security is conducted.

1.3 Description of Proposal

1.3.1 Objectives of the project :

The objectives of the "Cyber encroachment based on intelligent retrieval networks using event profiles" project are to develop a new approach to cyber threat detection that is more accurate, efficient, and effective. This will be achieved by using machine learning techniques to learn from historical data and identify patterns that are indicative of malicious activity. The project also aims to reduce the number of false positive alerts and make it easier for security analysts to investigate and respond to cyber threats.

Here are some of the specific challenges that the researchers are addressing in this project:

- How to develop intelligent retrieval networks that can effectively learn from historical data and identify patterns that are indicative of malicious activity.
- How to reduce the number of false positive alerts without sacrificing the accuracy of detection.

1.4 Innovative component of the project

The innovative component of the project is the use of intelligent retrieval networks to create event profiles. This approach has several advantages over traditional methods of cyber threat detection, such as the ability to detect new and unknown threats, evasion techniques, and threats spread across multiple systems and networks.

Here are some of the specific benefits of using intelligent retrieval networks for cyber encroachment detection:

- Increased accuracy
- Reduced false positives
- Improved scalability
- Increased efficiency

1.5 Methodology detailing stepwise activities and sub-activities

Cyber encroachment based on IRNs using event profiles involves collecting event data, creating event profiles, detecting intrusions, and responding to intrusions.

Here are the 4 steps in detail:

1. Data collection: Collect event data from the system or network.
2. Event profiling: Create event profiles for each type of event.
3. Intrusion detection: Use the event profiles to detect intrusions.
4. Response: Respond to intrusions by mitigating the damage or notifying the authorities.

02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-3 Month	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

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3. Expected Outcome and Deliverables of the Project

The expected outcome of the project is to develop a cyber encroachment detection system that uses intelligent retrieval networks and event profiles. The deliverables of the project would include a system architecture, prototype, evaluation criteria, and report. The benefits of the system include early detection, identification of the source, and stopping the spread of cyber encroachment. The project would be conducted in 5 phases and completed in 12 months. The project would improve the security of organizations against cyber encroachment and help to reduce the cost of cyber attacks.

4. Likely Impact(Please attempt to quantify) : Yes

5. Suggested Post Project Activities:

The conditions are varied for various domains.

6. Budget estimate

A. Recurring (in Rs) :15000

B. Non-Recurring (Equipment / Instrument) **(in Rs) :25,000**

S. No	Equipment	Parameter Measured	Quantity
1	Computer		1

C. Total (in Rs): 40,000

Date: **25.06.2022**
Place: Kanchikacherla

Signature of the Principal Investigator

DVR & Dr. HS
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Research and Development Cell

15.07.2022

To

Ms. V. Srilakshmi,
Assistant Professor,
Department of Computer Science and Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **V. Srilakshmi,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Cyber Encroachment based on Intelligent Retrieval Networks using Event Profiles"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 40,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of CSE, MIC
- Account Section, MIC

PRINCIPAL
DVR & Dr. HS MIC College of Technology
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Andhra Pradesh, India – Pin: 521180

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Cyber encroachment based on intelligent retrieval networks using event profiles
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** V Srilakshmi
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 25.06.2023
5) **Actual date of completion:** 15.06.2023
6) **Objectives as stated in the project proposal:**

The objectives of the "Cyber encroachment based on intelligent retrieval networks using event profiles" project are to develop a new approach to cyber threat detection that is more accurate, efficient, and effective. This will be achieved by using machine learning techniques to learn from historical data and identify patterns that are indicative of malicious activity. The project also aims to reduce the number of false positive alerts and make it easier for security analysts to investigate and respond to cyber threats.

Here are some of the specific challenges that the researchers are addressing in this project:

- How to develop intelligent retrieval networks that can effectively learn from historical data and identify patterns that are indicative of malicious activity.
- How to reduce the number of false positive alerts without sacrificing the accuracy of detection.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. Computer
Methodology	Cyber encroachment based on intelligent retrieval networks using event profiles is a machine learning-based approach for detecting cyber threats. It involves collecting security events, creating event profiles, training a machine learning model, and then using the model to detect cyber threats. The methodology has several advantages over traditional signature-based methods, such as being more scalable, accurate, and flexible. However, it

	also has some challenges, such as the need for a large amount of labeled data and the need to constantly update the model. Here are some of the methods that can be used to identify cyber threats and vulnerabilities: penetration testing, vulnerability scanning, log analysis, honeypots, and threat intelligence. The best method for a particular organization will depend on its specific needs. The most common method used in network level cyber attacks is phishing. Other common methods include malware, zero-day attacks, DDoS attacks, and ransomware. It is important to be aware of these methods so that you can take steps to protect yourself and your organization.
Results	Cyber encroachment based on intelligent retrieval networks using event profiles is a new AI-based approach to cyber threat detection. It works by collecting and storing security events in a database, then training an AI model on this data to learn the patterns of normal and malicious behavior. The AI model can then be used to detect cyber encroachment by analyzing new security events and identifying any suspicious activity. The cyber encroachment approach has several advantages over traditional cyber threat detection methods, such as its ability to detect new and unknown threats, threats disguised as normal activity, and threats spread across multiple systems and networks. It is still under development, but it has the potential to be a powerful tool for detecting and preventing cyber threats.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

The cyber encroachment approach has several advantages over traditional cyber threat detection methods, such as its ability to detect new and unknown threats, threats disguised as normal activity, and threats spread across multiple systems and networks. It is still under development, but it has the potential to be a powerful tool for detecting and preventing cyber threats.

10) Conclusions summarizing the achievements and indication of scope for future work:

In Intelligent retrieval networks have been shown to be effective in detecting cyber encroachment. Event profiles can be used to improve the accuracy of detection. Machine learning techniques can be used to train intelligent retrieval networks to detect cyber encroachment. Future work includes developing more robust and efficient intelligent retrieval networks, improving event profiles, and exploring other machine learning techniques for cyber encroachment detection.

11) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	15000	Stationaries – 15000	37.5
2.	Non-Recurring (Equipment / Instrument) (in Rs)	25000	Computer	62.5
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 15.06.2023
Place: Kanchikacherla

DVR & Dr. HS
MIC College of Technology
(Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada)
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UTILIZATION CERTIFICATE

Certified that out of **Rs 40,000** of institute funded seed grant for the **"Cyber encroachment based on intelligent retrieval networks using event profiles"** sanctioned during the Academic Year **2022-23** in favour of **V Srilakshmi** from **Department of Computer Science and Engineering** dated **15.07.2022** and a sum of **Rs. 40,000 (Rupees Forty Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

V. Sai M.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

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FORMAT FOR INSTITUTE FUNDED SEED GRANT PROPOSAL

Name of the Principal Investigator: V Lakshmi Chetana

Designation: Assistant Professor

Name of the Co-Investigator (if any): Nil

Designation: Nil

Department: Computer Science and Engineering

Title of the Project : Unassailability by using distributed ledger technology and AI

1. Background

1.1 Description of problem

DLT is a technology that allows for the secure and transparent sharing of data between multiple parties. It works by storing data on a network of computers, each of which has a copy of the data. This makes it very difficult to tamper with the data, as any changes would need to be made to all of the copies of the data on the network.

AI can be used to develop systems that can detect and respond to attacks on DLT systems. For example, AI can be used to identify patterns of activity that could indicate an attack, and to develop strategies to mitigate the effects of an attack. The combination of DLT and AI has the potential to create a system that is highly unassailable. By storing data on a DLT system and using AI to protect it from attack, organizations can ensure that their data is safe and secure.

1.2 Rational for taking up the project : DLT is a type of database that is shared and synchronized across multiple computers. This makes it very difficult to tamper with or hack, as any changes would have to be made on all of the computers in the network. AI is a field of computer science that deals with the creation of intelligent agents, which are systems that can reason, learn, and act autonomously. AI can be used to analyze large amounts of data and identify patterns that would be difficult or impossible for humans to detect.

Together, DLT and AI can be used to create systems that are unassailable in the sense that they are very difficult to tamper with or hack, and they can detect and respond to threats in real time.

Here are some rationales for taking up a project in this area:

- To improve the security of critical infrastructure. DLT and AI can be used to create systems that are more secure than traditional systems, which are often vulnerable to

cyberattacks. This could help to protect critical infrastructure, such as power grids and financial systems, from attack.

- To improve the detection and response to cybercrime. DLT and AI can be used to create systems that can detect and respond to cybercrime in real time. This could help to reduce the impact of cybercrime and make it more difficult for criminals to succeed.
- To create new and innovative products and services. DLT and AI can be used to create new and innovative products and services, such as secure voting systems and decentralized marketplaces. This could help to improve the lives of people around the world.

1.3 Description of Proposal

1.3.1 Objectives of the project

Create a secure and tamper-proof system for recording and managing data. Distributed ledger technology (DLT) is a decentralized database that is shared by all participants in a network. This makes it very difficult to tamper with data, as any changes would need to be verified by all participants in the network.

Use artificial intelligence (AI) to detect and prevent cyber attacks. AI can be used to analyze large amounts of data in real time to identify patterns and anomalies that may indicate a cyber attack. This can help organizations to detect and respond to attacks more quickly and effectively.

Improve the transparency and accountability of organizations. DLT can be used to create a transparent and auditable record of all transactions and activities. This can help to improve the accountability of organizations and reduce the risk of fraud and corruption.

1.4 Innovative component of the project

DLT is a decentralized database that is shared among multiple computers. This makes it very difficult to hack or tamper with data, as any changes would need to be verified by all of the computers on the network.

AI can be used to analyze data from DLT to identify patterns and anomalies that could indicate a cyber attack. AI can also be used to develop predictive models that can forecast future attacks.

The project Unassailability is using DLT and AI to create a system that can:

- Detect cyber attacks in real time
- Automatically respond to attacks and mitigate their impact

- Share information about attacks with other organizations to improve overall security posture

1.5 Methodology detailing stepwise activities and sub-activities

Step 1: Identify the assets to be protected.

This involves identifying the assets that are most critical to the organization, such as customer data, financial data, and intellectual property.

Step 2: Assess the risks of cyber encroachment.

This involves identifying the potential threats to the identified assets, such as data breaches, malware attacks, and sabotage.

Step 3: Design a DLT-based system for unassailability.

This involves designing a system that will use DLT to protect the identified assets from cyber encroachment. The system should be designed to be secure, scalable, and efficient.

Step 4: Implement the DLT-based system.

This involves deploying the designed system into the organization's IT infrastructure.

Step 5: Integrate AI into the DLT-based system.

This involves integrating AI capabilities into the DLT-based system to improve its effectiveness in detecting and preventing cyber encroachment.

Step 6: Test and monitor the DLT-based system.

This involves testing the system to ensure that it is working as expected and monitoring the system for any signs of cyber encroachment.

02: Work Plan

Phase-wise plan of action up to post project activities detailing time schedule.

Time	1-3 Month	4-6 Months	7-9 Months	10-12 Months
Activity	Literature survey	Problem identification & Framing research design	Project Implementation & Finding	Preparing project report & Paper Communication

3. Expected Outcome and Deliverables of the Project

DLT and AI can be used to develop a robust system for unassailability. The above methodology provides a step-by-step approach to designing, implementing, and integrating DLT and AI for unassailability.

Scope for future work:

- Developing more secure and efficient DLT platforms
- Developing more sophisticated AI models for cyber encroachment detection and prevention
- Exploring the use of other emerging technologies, such as quantum computing, for unassailability

4. **Likely Impact**(Please attempt to quantify) : Yes

5. **Suggested Post Project Activities:**

6. **Budget estimate**

A. Recurring (in Rs) :25000

B. Non-Recurring (Equipment / Instrument) **(in Rs) :20,000**

S. No	Sensor Type	Parameter Measured	Quantity
1	Computer		1

C. Total (in Rs): 45,000

Date: 10.06.2022
Place: Kanchikacherla

Signature of the Principal Investigator

DVR & Dr. HS
MIC College of Technology
ISO 9001:2015 Certified Institute
(Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada)
Kanchikacherla - 521180, NTR Dist, A.P, India.
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Research and Development Cell

15.07.2022

To

Ms. V. Lakshmi Chetana,
Assistant Professor,
Department of Computer Science and Engineering,
DVR & Dr. HS MIC College of Technology,
Kanchikacherla.

Sub: Letter of sanction

Dear **V. Lakshmi Chetana,**

The Management of DVR & Dr. HS MIC College of Technology appreciate your efforts in submitting your proposal titled: **"Unassailability by Using Distributed Ledger Technology and AI"** seeking a seed grant. After thorough scrutiny, the Research Advisory Committee of the Institution has selected and recommended your proposal for the sanction of **Rs 45,000/-** to work for a period of **one** Year.

This seed money grant is provided to enable you to undertake preliminary research work which can result either in a 'proof of concept' or 'proof of experience'. Further, you are expected to apply to external funding agencies (both public and private) to take the outcomes of this project to its intended goal.

You are expected to submit a utilization certificate within a month of the completion of the project. The work done under this project shall be used only for the benefit of the institution and it will not be used or transmitted to anywhere else. The conditions for the conduct of this work will be as per the Seed Grant Policy of the institution.

Wishing you good luck.

Principal

Copy to:

- HOD, Department of CSE, MIC
- Account Section, MIC

PRINCIPAL
DVR & Dr. HS MIC College of Technology
Kanchikacherla, N.T.R. Dt.
Andhra Pradesh, India – Pin: 521180

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PROJECT COMPLETION REPORT FOR INSTITUTE FUNDED SEED GRANT

1) **Title of the project:** Unassailability by using distributed ledger technology and AI
2) **Name of the Principal Investigator(s) and Co-Investigator(s):** V. Lakshmi Chethana
3) **Date of commencement:** 15.07.2022
4) **Proposed date of completion:** 10.06.2023
5) **Actual date of completion:** 1.06.2023
6) **Objectives as stated in the project proposal:**

Create a secure and tamper-proof system for recording and managing data. Distributed ledger technology (DLT) is a decentralized database that is shared by all participants in a network. This makes it very difficult to tamper with data, as any changes would need to be verified by all participants in the network.

Use artificial intelligence (AI) to detect and prevent cyber attacks. AI can be used to analyze large amounts of data in real time to identify patterns and anomalies that may indicate a cyber attack. This can help organizations to detect and respond to attacks more quickly and effectively.

Improve the transparency and accountability of organizations. DLT can be used to create a transparent and auditable record of all transactions and activities. This can help to improve the accountability of organizations and reduce the risk of fraud and corruption.

7) Deviation made from original objectives if any, while implementing the project and reasons thereof: No
8) Details of experimental set up, methods adopted, data collected supported by necessary table, charts, diagrams & photographs:

Experimental set up	1. Computer
Methodology	DLT and AI can be used to create unassailable methodologies by providing transparency, tamper-proof records, and automation. This can be used to improve the integrity and reliability of auditing, software development, financial transactions, and other critical processes. Future work could focus on developing more robust and efficient DLT and AI algorithms, integrating DLT and AI with existing systems, and exploring new applications for unassailability.
Results	DLT and AI used to achieve unassailability in secure identity management, data sharing, voting, and supply chains. More generally, they can create more resilient systems and develop new security algorithms.

9) Detailed analysis of results indicating contributions made towards increasing the state of knowledge in the subject:

Distributed ledger technology (DLT) and artificial intelligence (AI) can increase the unassailability of systems and data in a number of ways.

- DLT can create tamper-proof records of transactions and data.
- AI can develop more sophisticated and effective security systems.
- Some examples of how DLT and AI can be used to increase the unassailability of systems and data include secure voting systems, secure supply chain management, secure data storage, and secure identity management.

The use of DLT and AI to increase the unassailability of systems and data is still a relatively new area of research, but it has the potential to revolutionize the way we protect ourselves from cyberattacks.

10) Conclusions summarizing the achievements and indication of scope for future work:

Distributed ledger technology (DLT) and AI can be used to improve the unassailability of intelligent retrieval networks by:

- Storing event profiles in a secure and tamper-proof manner using DLT.
- Training intelligent retrieval networks to detect cyber encroachment patterns in real time using AI.
- Creating a decentralized network of intelligent retrieval networks using DLT.

Future work includes developing new DLT-based architectures for intelligent retrieval networks, improving the accuracy and efficiency of AI-based cyber encroachment detection algorithms, and exploring new ways to integrate DLT and AI to improve the unassailability of intelligent retrieval networks.

Challenges include scalability, security, and privacy.

Despite these challenges, DLT and AI have the potential to revolutionize the field of cyber security.

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11) Budget utilization:

Sr.	Budget Head	Funds Sanctioned	Expenditure	% of Total cost
1.	Recurring (in Rs) :	25000	Connectivity - 15000 Travel Expenditure – 10000	55.6
2.	Non-Recurring (Equipment / Instrument) (in Rs)	20000	Computer	44.4
3.	Others, if any	Nil	Nil	Nil

12) Plan for utilizing the equipment facilities in the future, if any – **Not applicable**

Signature of the Principal Investigator
Date: 1.06.2023
Place: Kanchikacherla

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UTILIZATION CERTIFICATE

Certified that out of **Rs 45,000** of institute funded seed grant for the **"Unassailability by using distributed ledger technology and AI"** sanctioned during the Academic Year **2022-23** in favour of **V Lakshmi Chetana** from **Department of Computer Science and Engineering** dated **15.07.2022** and a sum of **Rs. 45,000 (Rupees Forty Five Thousand only)** has been utilized for the purpose for which it was sanctioned. The balance amount if any is refunded to the institution.

Signature of PI

Signature of Accounts Officer

Accounts Officer
DVR & Dr.HS MIC College of Technology
Kanchikacherla, NTR District,A.P. -521 180

Signature of Head of the Institution

PRINCIPAL
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