3.1.1 Grants received from Government and non-governmental agencies for research projects/endowments in the institution during the last five years

Academic Year	:	**2020-2021**
Name of the Project Application	:	**STAIRCASE ATTACHMENT FOR PHYSICALLY CHALLENGED PERSON**
Name of the Principal Investigator	:	**Dr. B. Radha Krishnan** Assistant Professor, Department of Mechanical Engineering, Nadar Saraswathi College of Engineering and Technology, Vadapudupatti, Theni.
Name of the Co-Principal Investigator	:	**Mr. A. Vennimalairajan** Assistant Professor, Department of Mechanical Engineering, Nadar Saraswathi College of Engineering and Technology, Vadapudupatti, Theni.
Name of the Funding Agency	:	**KGR Travels, Pannaipuram, Theni - 625 531**
Amount Sanctioned	:	**Rs. 3,10,000** /-
Duration of the project	:	Six Months

THENI MELAPETTAI HINDU NADARGAL URAVINMURAI

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

Date: 06/07/2020

To

Managing Director,
KGR Travels,
Pannaipuram,
Theni - 625 531.

Dear Sir,

Sub: *Research project work – Joint Venture* – reg.

The Nadar Saraswathi College of Engineering and Technology (NSCET), known for its updated infrastructure and facilities, was established in 2010. It is situated in Vadaputhupatti, Annanji, in Theni. Nadar Saraswathi College of Engineering and Technology (NSCET) focuses on providing a high-quality learning and teaching atmosphere coated with layers of discipline and structured behaviour. We offer courses in Civil Engineering, Computer Science and Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering, Mechanical Engineering, and PG Courses in Manufacturing and Structural Engineering. Our college is also involved in Fostering research and Consulting work in Engineering Competence. Our Mechanical Engineering faculty members also have expertise in their core area of Mechanical Engineering. Therefore, I am expressing our interest in establishing research work and joint venture collaboration with **KGR Travels**. We look forward to working with a new research venture from **KGR Travels**

Thanking you,

Yours sincerely,

06/07/20

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531.

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
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Date: 10/07/2020

To

The Principal,

Nadar Saraswathi College of Engineering and Technology,

Annanji (P.O), Vadapudupatti, Theni-625 531.

Dear Sir,

Subject: **Research Project Fund** – reg.

Your request letter for the research project has been received. KGR Travels possesses a wealth of expertise in the domain of transportation. We kindly request the research assistance of your esteemed institution regarding Staircase Attachment for Physically Challenged Persons. Given these circumstances, we are honored to grant your request and extend a proposal for research submission. It is expected that the research endeavor will effectively contribute to the progression of mechanical component manufacturing. We kindly request that you provide a comprehensive project proposal that includes a budget.

Thank you

Managing Director

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY THENI 625 531

Dr. C. MATHALAI SUNDARAM, M.E., M.B.A., Ph.D.
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531

THENI MELAPETTAI HINDU NADARGAL URAVINMURAI

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

Date: 15/07/2020

To

Managing Director,
KGR Travels,
Pannaipuram,
Theni - 625 531.

Dear Sir,

Subject: ***Research project work- acknowledging your letter dated*** **10/07/2020** - Submission of the Project Proposal titled "Staircase Attachment for Physically Challenged Person" - Reg.

Ref: Your Reference letter Dated 10/07/2020.

I am writing to extend my heartfelt gratitude on behalf of the faculty and students of Nadar Saraswathi College of Engineering and Technology for granting us the opportunity to submit our project proposal to **KGR Travels**. We are truly honored and grateful for the chance to be considered for collaboration on this project. We understand the importance of your company to the industry and recognize the value of working with a reputed organization like Rogith Enterprise. Your support in allowing us to present our ideas and solutions is encouraging and motivating for our academic community. Hence, I am submitting a research proposal titled "Staircase Attachment for Physically Challenged Person" for your kind perusal and further action. And for all the necessary budget as well as the allocation of team members for the proposed project, kindly receive the same and do what is needed.

Yours Sincerely,

15/07/20

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY
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Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

Date: 15/07/2020

To

Managing Director,
KGR Travels,
Pannaipuram,
Theni - 625 531.

Dear Sir,

Sub: ***Submission of the Project proposal with budget and allocation of the team.***

Concerning the above, I am submitting a project proposal attached to the budget and assigning the team for the forthcoming research project. Kindly receive it and do what is needed.

Yours Sincerely,

15/07/20

Dr. C. MATHALAI SUNDARAM, M.E., M.B.A., Ph.D.,
Principal
Nadar Saraswathi College of
Engineering and Technology
Vadapudupatti, Theni-625 531.

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY
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Vadapudupatti, Theni-625 531.

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Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

Project Overview

Background:

Current boarding procedures for buses, trains, and other public transportation vehicles often rely on fixed staircases or ramps, leaving individuals who use wheelchairs, walkers, or require additional assistance stranded at the platform/doorway. This lack of accessibility impedes their ability to utilize public transportation, restricting their freedom of movement and participation in essential activities.

Detailed Project Description:

The creation of accessible buses for the disabled is a crucial undertaking that necessitates careful consideration of the particular demands and difficulties of this community. When designing and building accessible buses, it is crucial to take accessibility features, seating and safety, collaboration, training, testing, and communication into account.

A sliding mechanism is used to attach a complete staircase structure. The right side of the staircase has a lift installed. Due to the high floor vehicles, the system was specifically created for Indian public transit. The high floor condition compared to other nations is one of the biggest challenges when developing accessible buses. When a handicapped person uses the device, the staircase completely slides out from the left side of the structure. When the lifting pad begins to function, it will move closer to the road and lift wheelchair-bound passengers onto the floors of the buses.

The person will eventually settle down in their designated location. The escalator will be reversed back to its original location, and the stairs will be put in place so that regular people may use it. In the design and fabrication process, testing is a crucial step that is carried out in a mechanical laboratory with a structural setup. The bus should be extensively examined before it is placed into operation to make sure that all accessibility elements are working correctly and the bus complies with all necessary safety regulations. To make sure that the bus is safe and functioning under a variety of circumstances, this testing should incorporate simulations of real-world events.

Objectives:

In order to guarantee that people with challenges have equitable access to transport services and may travel securely and comfortably, attachment for disabled people in public transport has several goals. The following actions can be taken to accomplish these goals:

Accessibility: Making sure people with disabilities can use public transit is the first goal. Having accessible buses, trains, and other forms of public transportation that can serve the various needs of people with disabilities can help achieve this. 9 Wheelchair ramps, lifts, audio-visual announcements, priority seating, and other helpful devices are examples of accessibility initiatives.

Safety: Making sure people with disabilities are safe when using public transit is the second goal. This can be done by including securement systems for wheelchairs and other mobility devices, railings and grab bars all throughout the bus or train, and other safety features like intercoms or emergency buttons. It is crucial to give drivers and other employees the proper instruction on how to operate vehicles safely and help people with impairments.

Comfort: Making public transport comfortable for those with impairments is the third goal. Air conditioning and heating systems, roomy and comfortable seating, and a clean, well-maintained bus or train can all help achieve this.

Inclusivity: The fourth objective is to promote inclusivity and diversity in public transport. This can be achieved by involving individuals with disabilities in the design and planning of public transport services, promoting awareness and understanding of disability issues, and ensuring that public transport services are welcoming and accommodating to individuals with disabilities.

Affordability: Making public transport accessible to those with disabilities is the fifth goal. This can be accomplished by offering reduced rates or free transportation passes to those with disabilities and making sure that no financial obstacles hinder them from using public transportation.

Proposed Solution:

We propose the development and deployment of a portable, modular staircase attachment specifically designed for temporary installation on various public transport vehicles. This attachment will offer:

- Adjustable platform: An electrically powered platform that extends and retracts to seamlessly bridge the gap between vehicle door and ground level, accommodating various vehicle heights and user needs.
- Safety features: Secure handrails, non-slip flooring, and emergency stop buttons for safe and confident operation.

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531.

- Lightweight and compact design: The attachment will be easily deployable and retractable by a single operator, minimizing disruption to passenger flow and minimizing storage space requirements within vehicles.

- Universal compatibility: The design will be adaptable to most common public transport vehicle types, maximizing its impact throughout the network.

Benefits:

This portable staircase attachment will lead to numerous benefits for both passengers and the transportation authority:

- Increased accessibility: Individuals with disabilities will gain independent access to public transportation, empowering them to participate fully in community life and access essential services.
- Improved public image: Demonstrating commitment to inclusivity and equal access will enhance the transportation authority's public image and social responsibility.
- Operational efficiency: By reducing reliance on fixed infrastructure modifications, the portable design can streamline deployment and maintenance procedures.
- Enhanced safety: Standardizing accessibility procedures across different vehicles can decrease potential accidents and injuries during boarding and disembarking.

Timeline:

1. Research and Analysis (1 month):
2. Design and Prototyping (2 months):
3. User Interface Development (1 month):
4. Documentation (1 month):

Deliverables:

1. Staircase Attachment for Physically Challenged Person
2. Simple user interface for machine operation.
3. Documentation for machine users.
4. Test results and performance analysis reports.

Budget Allocation:

1. Research and Analysis: Rs. 55,000/-
2. Design and Prototyping: Rs. 1,20,000/-
3. User Interface Development: Rs. 80,000/-
4. Documentation: Rs. 55,000/-

Total Budget: Rs. 3,10,000/-

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Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
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Tamilnadu, India.

Risks and Mitigation:

1. Technical Risks: Regular testing and prototyping to identify and address issues within budget constraints.

2. Market Acceptance: Engage potential users for feedback to ensure the machine meets their expectations.

Conclusion:

This project, within the budget of Rs. 3,10,000/-, aims to deliver a cost-effective Staircase Attachment for Physically Challenged Person that addresses the domestic need for efficiency, and cost reduction. With a carefully planned approach and adherence to budget constraints, we anticipate delivering a valuable solution to domestic users.

PRINCIPAL INVESTIGATOR

PRINCIPAL

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of
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Vadapudupatti, Theni-625 531.

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Tamilnadu, India.

Date:15/07/2020

The Following faculty members are assigned to conduct the research work for the proposed project, "Staircase Attachment for Physically Challenged Person".

List of Faculty members

S. No	Name of the PI & Co-PI	Designation and Specialization	Contact Information
1.	**Dr. B. Radhakrishnan**	Associate Professor/ Mechanical Engineering	9159989767 radhakrishnannscet@gmail.com
2.	**Mr. A. Vennimalairajan**	Assistant Professor/ Mechanical Engineering	8778284005 Avmrajan5@gmail.com

15/07/20

PRINCIPAL

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
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Date: 03.08.2020

To

The Principal,
Nadar Saraswathi College of Engineering and Technology,
Vadapudupatti, Theni -625531.

Dear Sir,

Sub: Staircase Attachment for Physically Challenged Person – Project Proposal accepted & Sanctioned a Research fund of Rs. 3,10,000 - Reg.

Ref: Your Reference letter Dated 05.01.2021

I am delighted to inform you that the proposal for the Staircase Attachment for Physically Challenged Person has been thoroughly reviewed and approved. We recognize the potential impact and significance of your project, and we are enthusiastic about supporting its successful execution. The approved fund for project is **INR 3,10,000 (Three Lakhs and Ten Thousand Indian Rupees).** This budget encompasses the costs associated with the purchase, installation, and any additional requirements to ensure the smooth implementation of the project.

1	**Project Title**	Staircase Attachment for Physically Challenged Person
2	**Project Duration**	05.01.2021 – 31.05.2021
3	**Budget**	Rs.3,10,000/-
4	**Investigator Details**	Dr. B. Radhakrishnan & Mr. A. Vennimalairajan,

Thank you

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY THENI 625 531

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D., *Managing Director*
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531.

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY

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Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

PROJECT COMPLETION REPORT

1. Project Title: Staircase Attachment for Physically Challenged Person
2. Name of the Investigator : Dr. B.Radha Krishnan
   a. E-mail: radhakrishnannscet@gmail.com
   b. Contact Address: Nadar Saraswathi College of Engineering and Technology, Annanji(P.O), Vadapudupatti, Theni-625531.
   c. Mobile No.: 9159989767
3. Name of the Institution of which Investigator is attached: Nadar Saraswathi College of Engineering and Technology
4. Name of the Director / Principal of the Institution: Dr. C. Mathalai Sundaram
5. Date of Release of R & D Grant: 05/01/2021
6. Amount of R & D Grant: Rs. 3,10,000
7. How much work is yet to be completed with the reason of delay: **NIL**
   a. Percentage of work completed: 100%
   b. Amount utilized till date: Rs.3,50,000
8. How much work is yet to be completed with the reason of delay: **NIL**
   a. Work yet to be completed with details: **NIL**
   b. Reason for delay : NIL
9. Probable date of completion of the project: **NIL**

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY THENI 625 531

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531

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Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

10. Amount of matching grant: 3,50,000 INR
    a) Name and address of the organization: Nadar Saraswathi College of Engineering and Technology, Annanji(P.O), Vadapudupatti, Theni-625 531.
    b) Amount received: Rs.3,50,000
    c) Amount utilized till date: Rs. 3,50,000
11. Name of the organizations providing support to the project: **NIL**
    a. Name of the organization: **NIL**
    b. Nature of support e.g. financial, technical and infrastructural: **NIL**
    c. Support yet to be received: **NIL**

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THENI
625 531

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
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Vadapudupatti, Theni-625 531.

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Tamilnadu, India.

STAIRCASE ATTACHMENT FOR PHYSICALLY CHALLENGED PERSON

ABSTRACT

Developing accessible buses for people with disabilities is a critical effort that carefully considers the community's unique needs and challenges. It is critical to consider accessibility when developing and building accessible buses. It is critical to consider accessibility features, seating and safety, collaboration, training, testing, and communication. A sliding mechanism is employed to connect the entire staircase structure. An elevator is installed on the right side of the staircase. Because of the high-floor cars, the system was designed specifically for Indian public transport. One of the most challenging obstacles in developing accessible buses is the high floor condition compared to other countries. When a disabled person uses the device, the staircase slides out from the structure's left side. When the lifting pad starts working, it will travel closer to the road and raise passengers who use wheelchairs onto the buses' flooring. The individual will finally settle in their allocated location. The escalator will be returned to its former location, and stairs will be installed so ordinary people can use it. Testing is an essential phase in the design and fabrication process, and it is performed in a mechanical laboratory using a structural setup. The bus should be thoroughly inspected before it is put into service to ensure that all accessibility aspects are operational and that it complies with all essential safety laws. This testing should include simulations of real-world occurrences to ensure that the bus is safe and functional under various conditions.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWING

According to the basic aspect of the present invention is to provide an automatic staircase for a disabled person.

According to one aspect of the present invention is to provide the design and Fabrication of an Automatic movable staircase for public transport; the system comprises a hollow Steel frame and hydraulic [illegible] for [illegible] Sliding Mechanism.

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Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of
Engineering and Technology
Vadapudupatti, Theni-625 531

The embodiment of the present invention is illustrated with the help of accompanying drawings.

Figure 1 illustrates a frame arrangement of the automatic staircase in public transport.

Figure 2 illustrates a lifting and sliding setup of an automatic Movable staircase.

DETAILED DESCRIPTION

According to one embodiment of the present invention, the automatic Movable staircase setups in public transport are easy to access for disabled persons.

With reference to Figure 1, the invention is illustrated the hollow steel frame, Movable staircase and lifting setups, according to the present invention. The system comprises a sliding staircase frame lifting frame, Pneumatic system and control switch.

CONSTRUCTION

1. Automatic Movable staircase setups in lifting systems in public transport.
   (A) Sliding staircase pneumatic system
   (B) lifting Punomatic system
   (C) control switch
   (D) Assembly of frame

2. Bus attachment movable staircase lifting setup as claimed in claim 1, wherein the rectangular steel frame [A] for the bus attachment movable staircase in sliding pneumatic system this system for using setup sliding probate.

3. The Bus attachment movable staircase lifting setup as claimed in claim 1, wherein the attachment of [D] is used for the assembly frame in [A] sliding pneumatic system [B] and lifting pneumatic system.

4. The bus attachment movable staircase lifting setup as claimed in claim 1, wherein control switch [C] is used to control the [A] sliding pneumatic system and [B] lifting pneumatic system control lift in the bus.

5. The bus attachment movable staircase lifting setup as claimed in claim 1, wherein the supporting to sliding frame and lifting frame [D] assembly main frame is used for bus supporting structure attachment of bus.

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Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
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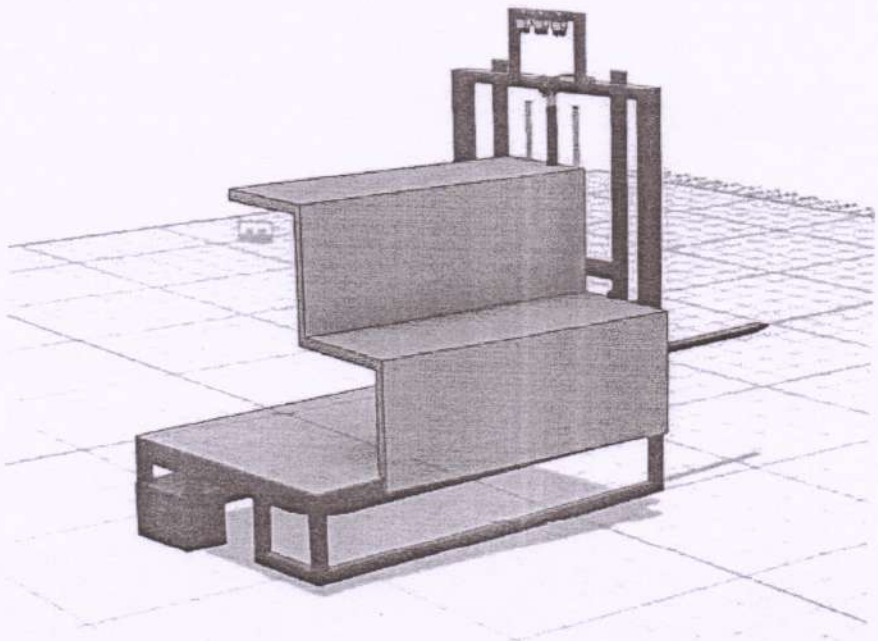
Project Achievements in brief:

A background staircase attachment for physically challenged individuals refers to a structural addition designed to facilitate access to elevated areas for people with mobility challenges. This attachment is integrated into the existing architectural environment, allowing individuals with disabilities to navigate stairs more easily. This project aims to develop a cost-effective Stair case attachement within a budget of Rs. 3,10,000/-.



Objectives

The objective of a staircase attachment for physically challenged individuals is to enhance accessibility, inclusivity, and safety in built environments, ensuring that individuals with mobility challenges can navigate stairs comfortably and independently.

Exclusions

1. Installation of the machine at user locations (if applicable).
2. Post-production marketing and sales activities.

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Principal
Nadar Saraswathi College of
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Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

Conclusion

This project within the budget of Rs. 3,10,000/-, aims to deliver a cost-effective Staircase Attachment for Physically Challenged Person that addresses the industry's need for efficiency and cost reduction. With a carefully planned approach and adherence to budget constraints, we anticipate delivering a valuable solution to plastic production.

Principal Investigator

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY
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625 531

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of Engineering and Technology
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Vadapudupatti, Annanji (po), Theni - 625 531,
Tamilnadu, India.

UTILIZATION CERTIFICATE

1. Title of the Project : Staircase Attachment for Physically Challenged Person.
2. Name of the Institution : Nadar Saraswathi College of Engineering and Technology, Theni
3. Name of the Principal Investigator : Dr. B. Radhakrishnan, AP/Mech, Mr. B. Vennimalairajan, AP/Mech

Certified that out of ₹ 3,10,000 of grants-in-aid sanctioned during 2020-2021 in favor of Nadar Saraswathi College of Engineering and Technology under consultancy projects dated 03/08/2020 and ₹ 3,10,000. A sum of ₹3,10,000 has been utilized to develop a Staircase Attachment for Physically Challenged Person, resulting in validation for which it was sanctioned. I certify that the entire grant amount has been utilized judiciously and exclusively for the purpose stated in the research proposal.

10/04/21

PRINCIPAL INVESTIGATOR

10/04/21

PRINCIPAL

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
Nadar Saraswathi College of Engineering and Technology
Vadapudupatti, Theni-625 531.

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY ★ THENI 625 531

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Vadapudupatti, Theni-625 531

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East Street, Kariyanampatti, Pannaipuram, Theni. Dt-625524

Cell : 96776 97747 kgr_travel_Pannaipuram kgr travel

Date: 23.04.2021

To

The Principal,

Nadar Saraswathi College of Engineering and Technology,

Annanji (P.O), Vadapudupatti,Theni- 625 531.

Dear Sir,

Subject: ***Staircase Attachment for Physically Challenged Person*** – reg.

We acknowledge receipt of the research team's report on the project, which Assistant Professor Dr. B. Radhakrishnan of the Department of Mechanical Engineering led. Our expert group assessed this report, and we are additionally delighted to inform you that the submitted project report outcomes are acceptable for our production necessities, and we value the cooperation on this understanding.

We hope that we will have the opportunity to join another research project again, and we are grateful to Nadar Saraswathi College of Engineering and Technology for the successful completion of the research project.

Thanking you.

NADAR SARASWATHI COLLEGE OF ENGINEERING & TECHNOLOGY THENI 625 531

Dr. C. MATHALAI SUNDARAM, M.E.,M.B.A.,Ph.D.,
Principal
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Managing Director