Form A

STARTUP CENTRE
INDIAN INSTITUTE OF TECHNOLOGY BHUBANESWAR

Application Form for Opening Startups by Registered Firms and Subsidiaries/Ancillaries ofEstablished Firms

1. **Name of the Startup: Zero Cost Refrigeration System**

2. **Name of the Applicant/CEO: Prof. Shiba Narayan Sahu**

3. **Permanent Address of the Applicant: Asst. Professor, Department of Mechanical Engg.**

   Gandhi Institute for Education and Technology, Baniatangi

   Bhubaneswar, Dist : Khordha, Odisha

   E-mail : snsahu@gietbbsr.com

   Telephone Number: 9438137168

   Nationality: Indian

   Category of the Applicant: (Tick) GEN √ SC ☐ ST ☐

   Qualification: M.Tech(Mechanical Engg.), Ph.D.(Contd.)

   Present Occupation/Engagement: Asst. Professor ork Experience (if any): 7 Years

   Date of Birth 02-07-1986 Sex Male

4. Father's Nameof the Applicant : Shri Nilachal Sahu

   Permanent address: Odisha State Administrative Service

   Bordi, Kuhura, Golamunda, Dist: Kalahandi

Phone : 9438137168 Email: snsahu@gietbbsr.com

5. **Are you a registered company?** Yes / No√

6. **If you are registered company,**

   ☐ ☐ ☐

   (a) How long have you been in business?

   < 1 year 1 – 5 years > 5 years

   (b) To which category does your unit belong:

   ☐ Proprietorship ☐ Partnership √ Pvt. Limited ☐ Other (Please specify)

7. If you are a subsidiary/ancillary unit of an established firm

(a) Name and address of the firm sponsoring the startup

_____

_____

(b) Nature of relationship with the parent firm

Subsidiary unit ☐ Ancillary unit ☐ Other (please specify) ☐

(c) Nature of arrangement with the parent firm

a. Financial:

b. Organizational:

c. Physical:

d. Flow of product/service:

e. Any other (please specify):

8. Details of the other members of the team:

1. Name of the member: Prof. Rajdeep Paul

Educational qualification: M.Tech.(Mechanical Engg.)

Nationality: Indian

Category: GEN √ SC ☐ ST ☐ ☐

Father's Name Shri Manoranjan Paul

Permanent address: Kailashar, Tripura

Phone : 9402341985 ,8800408548 Email: prajdeep@gietbbsr.com

2. Name of the member: Prof. Padmalochan Prusty

Educational qualification: M.Tech.(Mechanical Engg.) (Gandhi Institute for Education & Technology, Baniatangi)

Nationality:

Category: GEN √ SC ☐ ST ☐

Father's Name Shri Narayan Prusty

Permanent address: Odogaon, Nayagarh, Odisha

Phone : 9437781566 Email: pprusty@gietbbsr.com

3. Name of the member: Prof. Laxman Kumar Sahoo

Educational qualification: M.Tech.(Mechanical Engg.), Ph.D.(contd.)

Nationality:

Category: GEN √ SC ☐ ST ☐

Father's Name Shri Dhruba Charan Sahoo

Permanent address: Department of Mechanical Engg., Gandhi Institute for Education & Technology

Baniatangi, Dist : Khordha

Phone : 9438857504 Email: lksahoo@gietbbsr.com

9. Your Startup is related to:

☑ Product ☐ Service ☐ Technology ☐ Other (Please Specify)

10. Do you have a novel technology idea/ concept? Yes√ / No

11. Do you represent a 1st generation start-up company? Yes / No

12. Do you or team members have any previous business experience? Yes ☐ No√

If Yes, briefly mention how the past experience is going to help you in this new venture?

_____

_____

13. Is this Startup related to your or any team members family business? Yes ☐ No √

14. How many employees will be working in the startup?

a. Full Time**: 04**

b. Part Time : 04

15. What is the expected time to develop a working prototype or concept?

Maximum 5 to 7 months

16. Why do you want to locate in IIT BhubaneswarStartup Centre?

The main objective is to promote emerging technological and knowledge-based innovative thoughts by our undergraduate Engineering students along with the faculty members to nurture their ideas beyond the traditional activities. These types of entrepreneurial ideas are required to be fostered and developed in a supportive environment. Therefore we are eager to locate start up centre at IIT Bhubaneswar to promote and support our students as well as faculty members and assist them to become technology based entrepreneurs.

17. Specify requirements(Mentoring/Equipment/Workshop facility) from IIT Bhubaneswar(if any)

18. If you are selected as aStartup in IIT Bhubaneswar, time required to initiate the activity:

Maximum within a month time

19. Write a brief note about your product/service/technology

The LPG is cheaper and possesses an environmental friendly nature with no ozone depletion potential (ODP). It is used in world for cooking purposes. The various methods of refrigeration are based on standard refrigerants . But in this case the refrigerator has been designed to work on LPG. It works on the principle that during the conversion of LPG into gaseous form the expansion will be take place. Due to this expansion in LPG gas the pressure will drops. And the volume will be increase this will be result into dropped in temperature and it acts as refrigerant.

20. Give a Summary of the Business Plan for the Startup:

A. Product Description, Design, IPR issues, and Stage of development

This product investigates the result of an experimental study carried out to determine the performance of domestic refrigerator when a propane-butane mixture (Liquefied Petroleum Gas (LPG)) is used. LPG is locally available and comprises 24.4% propane, 56.4% butane and 17.2% isobutene and vary from company to company . The performance parameters investigated is the refrigeration effect for a particular time period. The refrigerator worked efficiently when LPG was used as refrigerant instead of CFC 12. The evaporator temperature reached -5 ºC with and an ambient temperature of 12 ºC. Also from the experiment, which done in atmospheric condition, we can predict the optimum value of cooling effect with the suitable operating condition of regulating valve and capillary tube of the system. The results of the present work indicate the successful use of this propane-butane mixture as an alternative refrigerant to CFC 12 in domestic refrigerant.

B. Machinery and capital needs (if any)

Name of Equipment	Age and condition of equipment
Compressor	Year of Purchase- 2010-2011
Slotting Machine	Year of Purchase- 2010-2011
Drilling Machines	Year of Purchase- 2010-2011
Welding Machines (Arc , Gas, TIG)	Year of Purchase- 2010-2011
Lathe Machines	Year of Purchase- 2010-2011

Three Phase Power Supply	Year of Purchase- 2010-2011
Shaper Machine	Year of Purchase- 2010-2011
Milling Machine	Year of Purchase- 2010-2011
Universal Testing Machine	Year of Purchase- 2010-2011
Izod and Charpy Testing Equipment	Year of Purchase- 2010-2011
Hardness Testing(Rockwell and Brinell) Machine	Year of Purchase- 2010-2011
Universal Testing Machine	Year of Purchase- 2010-2011
Bench vices	Year of Purchase- 2010-2011
Different Files(Finish cut, Double Cut etc.)	Year of Purchase- 2010-2011
Sheet Cutting Machine	Year of Purchase- 2010-2011
Power Hacksaw	Year of Purchase- 2010-2011
Surface Grinding Machine	Year of Purchase- 2014-2015
Cylindrical Grinding Machine	Year of Purchase- 2014-2015

C. Competitor analysis

It will work on the principle that during the conversion of LPG into gaseous form the expansion will be take place. Due to this expansion in LPG gas the pressure will drops. And the volume will be increase this will be result into dropped in temperature and it acts as refrigerant.

D. Market analysis

LPG is expected to result in comparable product efficiencies based on its characteristics. Therefore, the two types of refrigerants (LPG and CFC) to be examined using a modified domestic refrigerator in term of their performance characteristics parameters such as pressure and temperature at specified location at the refrigerator and the safety requirements while conducting the experiment. By performing the tests on new system, it is indicated that the successful of using LPG as an alternative refrigerant to replace CFC in domestic refrigerators is possible by getting LPG.

E. Equipment, Accessories, and Software Required

(i)LPG Gas Cylinder

(ii) Capillary Tube

(iii) Evaporator

(iv) High Pressure pipes

Name of Equipment	Age and condition of equipment
Compressor	Year of Purchase- 2010-2011
Slotting Machine	Year of Purchase- 2010-2011
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Shaper Machine	Year of Purchase- 2010-2011
Milling Machine	Year of Purchase- 2010-2011

F. Break-up of the estimated project cost

Prototype Development and Testing:	Rs. 1,50,000/-
Working Capital:	Rs. 1,50,000/-
Test Marketing:	Rs. 1,00,000/-
Legal Expenses:	Rs. 50,000/-
Contingency:	Rs. 50,000/-
Any other expenses: (Pls specify)Rs.	
Total Project Cost:	Rs.5,00,000/-

G. Expected revenue during the first three year of commercialisation

Approximtely 25 to 30% profit

H. Have you received any financial support for your proposed/present work? If yes, give detailsNo

I. Other expected sources of funds No

J. Potential users of the end product

(i) Manufacturing industry

(ii) Domestic use

K. Time schedule/progress plan (preferable in chart/diagram)

First of all one box of the plywood will be made. The plywood sheet size should be 12mm for used the LPG refrigerator. The size of the refrigerator may be 724*457*381 mm3. The evaporator is fitted on the upper portion of box inside. Inside the refrigerator, we also put the thermo-coal sheet, because of the cold air cannot the transfer from inside to outside of refrigerator. The gas tank is connected by pipes to the capillary tube. The capillary tube is fitted with evaporator. The evaporator coiled end is connect to the stove by another gas circulation pipe. When two pressure gauge is put between capillary tube and gas tank, and another is put the end of the evaporator. Copper is the preferred material for use with mostrefrigerants. Because of its good heat transfer capacity as well as corrosion resistance and cheaper in cost.As for all materials, the allowable internal pressure for any copper tube in service is based on the formula used in the American Society of Mechanical Engineers Code for Pressure Piping. In this system , two flow control valves of globe type of 4 mm of internal diameter may be used. Evaporators are heat exchangers with fairly uniform wall temperature employed in a wide range of HVAC-R products, spanning from household to industrial applications. In general, they are designed aiming at accomplishing a heat transfer duty at the penalty of pumping power. There are two well-established methods available for the thermal heat exchanger design, the log-mean temperature difference (LMTD) and the effectiveness/number of transfer units.

L. How will you promote/advertise your product?

M. Have you interacted with any faculty of IIT Bhubaneswarfor colloboaration?

21. What are the financial strengths of your team member?

The members of the team are well qualified Engineers and having the technical skills.

22. Any other information which would help in evaluating your proposal.

The LPG is cheaper and possesses an environmental friendly nature with no ozone depletion potential (ODP). It is used in world for cooking purposes. The various methods of refrigeration are based on standard refrigerants . But in this case the refrigerator has been designed to work on LPG.

23. Give names, designations,affiliations, and addresses (contact and email) of two references:

Reference 1	**Reference 2**
Dr. Mohan Charan Panda	**Dr. Jibanannda Jena**
Dean(Academics)	**Dean(Planning & Coordination)**
Gandhi Institute for Education& Technology	**Gandhi Institute for Education & Technology**
Mobile No. 9556041223	**Mobile No. 9937578679**

I certify that the information set provided above is correct. Further,our entity

- has not exceeded turnover of INR 25 crore for any of the financial years; and
- is working towards innovation,development, deployment or commercialisation of new products, processes or services driven by technology or intellectual property; and
- is not formed by splitting up or reconstruction of a business already in existence.

Applicant'sName & Signature (Team Leader) **Mentor's Signature & Affiliation (if any)**

Name & Signature of Member

Name & Signature of Member

Send the soft copy of theapplication form to **office.startupcentre@iitbbs.ac.in** and hard copyby post, to:

Startup Centre
IIT Bhubaneswar
Samantapuri
Near Swosti Premium Hotel
Bhubaneswar, Odisha Pin: 751013