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KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506015, TELANGANA, INDIA

काकतीय प्रौद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६०१५, तेलंगाना, भारत

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫ తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

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Annual Report for Academic Year 2024-25

Center of Excellence

INDO-AMERICAN ARTIFICIAL HEART PROJECT (IAAHP)

IAAHP TEAM

		
Prof. K. VenuMadhav Dept. of <u>EIE</u> .	Dr. G. Ganesh Kumar Dept. of <u>ME</u>	Dr. G. Saikumar Dept. of <u>ME</u>

by
IAAHP Team KITSW

Indo-American Artificial Heart Project (IAAHP) has been started in the year 2016 headed by **Dr. Pesaru Sudhakar Reddy, MD**, Professor of Medicine, University of Pittsburgh Medical Center (UPMC) and Chairman, Science Health Allied Research & Education (SHARE), Pittsburgh, PA, USA. Our Institute has joined the team in March 2018.

Objectives of IAAHP for AY 2024-25:

- To publish an abstract in ASAIO-2025
- Develop a revised prototype model of centrifugal pump using Injection moulding in Vasantha Tool Crafts Pvt. Ltd., (VTC) Hyderabad.
- To rectify the issues of pump raised during hydrodynamic and haemolysis studies and redesign the pump in collaboration with VTC, Hyderabad
- To Perform Hydrodynamic and Haemolysis Test on modified model of the pump to achieve required Normalized index of Haemolysis using mock up loop test rig designed by IAAHP KITSW team.
- To perform Computational Fluid Dynamics (CFD) Analysis of fluid flow using ANSYS work bench for modelling to a new design of Pump.
- To study the properties of magnet to overcome wobbling issue.
- To perform Animal test on INDUS Pump designed by KITSW
- To study the properties of Magnet

Outcomes:

1. Published one Conference Paper in American Society of Artificial Internal Organs (ASAIO) Journal, USA. The details are as below:
Rugveda Thanneeru, Sadia Alvi, Sai K. Gadakary, Ganesh K. Gampa, James Antaki, Harvey S. Borovetz, Naveen Chander Reddy, P. S. Reddy, (2023), "In-Vitro Evaluation of India-US (INDUS) Magnetically Levitated Blood Pump", to 70thASAIO Journal 2024, ID No. P66, 70 (3), May 2024 ISSN 1058-2916. (Attached Annexure)
2. Purchased Vacuum desiccator and Vacuum pump for checking leakages in impeller
3. Performed Animal test at Palamuru Bio Sciences for number of times and the animal has survived for 3 weeks.
4. IAAHP team has generated experimental Pressure head Vs discharge (H-Q) curves for the modified model of the centrifugal pump using Mock up loop test rig which was developed to by IAAHP KITSW team.
5. Further conducted Haemolysis Test to calculate NIH (Normalized index of Haemolysis)

6. Developed a protocol for performing animal test.
7. Developed protocol and performed Von Willebrand factor (vWF) test at AIG hospital
8. A new version of centrifugal pump in collaboration with Vasantha Tool Crafts Pvt. Ltd., Hyderabad have been developed.
9. Performed gluing process at KITSW for injection moulded parts.
10. Dr. G. Sai Kumar has visited Cornell University, Ithaca to meet Dr. James Francis Antaki, Professor of Medicine, Cornell University to discuss about the facilities available such as 3D printers, laser cutting machine, mini lathe, etc to develop prototypes. Further, visited artificial heart lab to see different types of control systems used for the ECMO.
11. Dr. G. Sai Kumar is working on study of properties of magnet at Laxven Systems, Hyderabad
12. Attended ASAIO 2024 conference. Presented poster in the conference. Attended the presentations held regarding the VADs, and the research work of the participants.
13. Visited Dr. Salim's hospital and he has shown different types of control systems used for the ECMO and explained the operation.
14. The effect of different curing times and curing methods were tested and made succeed.
15. KITSW team is supporting AMTZ, Visakhapatnam to establish equipment for performing animal testing in addition to Palamuru Biosciences, Mahbubnagar for validation.

Details of Expenditure spent during 2023-24 in IAAHP Lab:

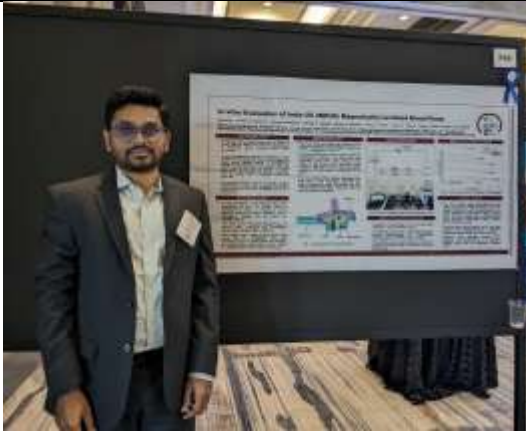
S. No	Item Details	Purpose	Cost of item in ₹.
1.	ASAI0 Air tickets	To present Conference Paper at ASAI0	1,42,406.00
2.	ASAI0 Accommodation		43,681.00
3.	ASAI0 TA/DA, food charges		10,130.00
4.	Travel allowances Dr. G. Sai Kumar at Hyderabad		14,292.00
5.	NdFeB sintered	Customs Duty	23, 844.00
6.	Anisotrope BMN-48 Ring-magnet	To study the properties of Magnet	34,894.00
7.	Glue Dispensing System	For Gluing of Top casing and bottom casing as well as impeller and cover of an INDUS pump	6,96,200.00
8.	5000-EC with Light Shield & Manual Shutter	For curing of Top casing and bottom casing as well as impeller and cover of an INDUS pump	7,84,110.00
9.	<i>Visit of Dr. G. Ganesh Kumar and Dr. G. Saikumar to AMTZ, Vizag</i>	<i>To attend an International Clinical Engineering and Health Technology Management Congress (ICEHTMC-2023) and World Health Innovation Forum (WHIF)</i>	21,705.00
10.	<i>Expenditure of Dr. GSK during his stay @ hyderabad</i>	<i>For Fuel, Toll Plaza, Travel, Postal/courier</i>	48,640.00
11.	Repair of Mark Forged Mark Two 3D printer	Adriotec Information Systems	44, 250.00
12.	Fee of Legal Advisor for Patent Grant	For Grant of Patent	25, 000.00
13.	Resin Tank and Resin	Imaginarium Solutions Pvt. Ltd.	43, 746.00
14.	Ring Magnets (Bomatec Malayasia)	For INDUS pump \$340.00 @88/- per \$	29, 920.00
15.	Onyx Material for Markforged Mark Two 3D printer	Supplier (Monotech Systems Ltd.)	41, 701.00
16.	Clearance of Customs Duty	Shkavi Logistics Pvt. Ltd.	18, 468.00
17.	Rent	For stay of Dr. GSK @Hyderabad for 12 months @ 8, 000.00/month	96, 000.00
Rupees Twenty One Lakhs Fourteen Thousand Nine Hundred and Eighty Seven Rupees (Excluding Salary of Dr. GSK)			21, 14, 987.00

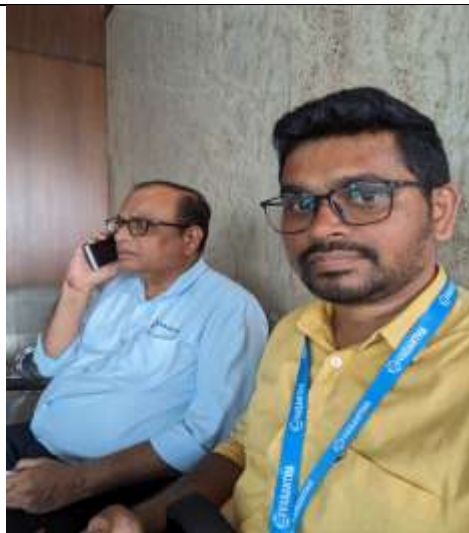
List of Major equipment available /Facilities Available in IAAHP Lab till this academic Year:

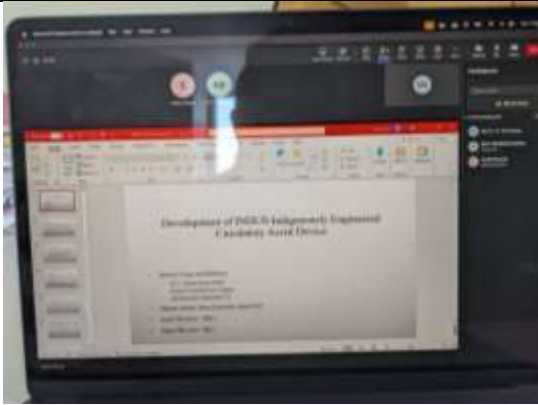
S. No	Name of the Equipment/ Software	Cost of the equipment/ Software in ₹	Purpose of the equipment
3D Printer			
1	SLA Form 3B + <i>Sponsored by Alumni -Class of 1996 Exit Batch</i>	6, 77, 000-00	To generate the working model of the pump with surface finish of less than 0.2 µm
2	Mark Forge Mark Two 3D printing machine	16, 22, 500-00	To generate the working model of the pump using Onyx Material
3	Flash forge Dreamer Dual Extruder -Think 3D	85,000-00	To generate the experimental models of an artificial heart pump
4	ANSYS 19.2	5, 01, 500-00	To Simulate the fluid flow through pump
5	WORKSTATION-HP Z8 Work Station	10,68,000-00	To Generate H-Q Curves of an Artificial Heart Pump
6	Glue Dispensing System	6,96,200.00	To automate the Gluing Process for assembling pump parts
7	5000-EC with Light Shield& Manual Shutter: PN39823	7,84,110-00	For curing the glue used to join Impeller Cover with impeller and also top casing and bottom casing of Heart pump
8	Vacuum Desiccator with vacuum pump	22, 100-00	For Checking the leakages in impeller after Gluing process
Approximately Total Cost Spent Till Now including Sponsored faculty is about One Crore Forty Lakhs Rupees Only		₹ 1, 40, 00, 000-00	

Important Events during 2023-24

1	Conducted leakage test using Vacuum Desiccator in @AIG Hospital		
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2	Dr. G. Sai Kumar has Presented Paper at ASAIO 2024 at Marriott Baltimore Waterfront		
3	Performed Hemolysis test @ AIG with the revised heart pump designed by KITSW and manufactured by Vasantha Tool Crafts, Hyderabad. The initial Hct value found to be 20% which is very less and the required Hct value is above 30%. The average NIH obtained is 0.0018.	 	 

4	IAAHP KITSW Team (Mr. Rahul student of KITSW & Dr. G. Sai Kumar) studying properties of Magnet @ Laxven Systems, Cherlapally, Hyderabad		
5	Collecting Bovine Blood @ EMR (Emergency Medical Response) Hyderabad to perform hemolysis test at AIG Hospital		
6	Inspecting Injection Pump Models prepared by Vasantha Tools Crafts		

7	Participated and represented in Ethics meeting @ AIG Hospital to conduct the left thoracotomy using CentriMag pump	 	
8	Submitted a proposal to BIRAC ETA for funding from AIG Hospitals (meeting On 01.02.2024) Meeting held to discuss the about the proposal		
10	Interactive session on 'Artificial circulatory support device: Bench to bedside' was organised by AIG Hospitals, 22. 02. 2024. Dr. G. Saikumar and Dr. Sukesh		

	Kumar presenting at the session		
11	Meeting with AMTZ team to establish the Animal testing lab at AMTZ on 27.02.2024		
12	Meeting at NARFBR, Hyderabad to establish animal testing facility		

IAAHP KITSW team Members:

The following are the members involved in IAAHP in KITSW during 2022-23:

1. Dr. K. Venu Madhav, Professor of EIE & Dean AA Prof., Member, KITSW
2. Dr. G. Ganesh Kumar, Assoc. Prof., Member, KITSW
3. Dr. G. Sai Kumar, Asst. Prof. Member, KITSW