

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, పరంగల్ - 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)

Annual Report for Academic Year 2020-21

Center of Excellence

INDO-AMERICAN ARTIFICIAL HEART PROJECT (IAAHP)

IAAHP TEAM

			
Prof. K. Eswaraiiah Dept. of <u>ME</u>	Prof. K. VenuMadhav Dept. of <u>EIE.</u>	Dr. G. Ganesh Kumar Dept. of <u>ME</u>	Dr. A. Madhukar Rao Dept. of <u>EEE</u>

Indo-American Artificial Heart Project (IAAHP) has been started in the year 2016 headed by **Dr.PesaruSudhakar 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:

1. To execute Haemolysis Test and run mock up loop at AIG Hospitals under the supervision of Dr. P. Naveen Chander Reddy, MD, AIG Hospitals to reduce the NIH to 0.0001
2. Design a 3-D Centrifugal pump in CATIA used in Centrimag pump.
3. Perform Computational Fluid Dynamics (CFD) Analysis using ANSYS Fluent software (Research Version purchased by KITSW) and run the program in Work station (purchased by KITSW) to generate H-Q Curves.
4. Plot the Simulation curves and 3-D printing models of a Centrimag Pump used in Total Artificial Heart (TAH).
5. Develop a 3-D printed models using Mark forge Mark Two/Form 3B+ 3D-Printing Machine
6. Perform the trail runs (both hydrodynamic and Haemolysis test) on the mock up setup.
7. Support PBS to perform an Animal Testing at Palamuru Bio Sciences (PBS) to modify and remodel the designed pump

OUTCOMES

1. Research Publications by Faculty/Students:

- ✓ Ganesh Kumar, G., Sridhar, K., Ashoka Reddy, K., Venu Madhav K., Eswaraiah. K., (2021), “Experimental and Numerical Studies of a Centrifugal Heart Pump Used for Total Artificial Heart (TAH), ASAIO Journal June 21, Volume 67 (2), ISSN 1058-2916, pp 88, Wolters Kluwer Publishers (Published abstract in ASAIO SCI Journal)
- ✓ Ganesh Kumar, Sridhar, K., G., Ashoka Reddy, K., Venu Madhav K., Eswaraiah. K., (2021), “Comparative Studies on six and four bladed Centrifugal Heart Pump Used for Left Ventricular Assisted Device (LVAD)”, ASAIO Journal June 21, Volume 67(2), ISSN 1058-2916, pp 88, Wolters Kluwer Publishers (Published abstract in ASAIO SCI Journal)

2. Details of Expenditure for Academic Year 2020-21:

S. No	Details of Expenditure	Item Details	Amount in INR
Expenditure Spent:			
1	Major Equipment Purchased/ Purchase of Software:	NdFeB sintered anisotrop ring Magnet BMN-48	₹ 50,993.00
2	Incentives/ Sponsorship/TA-DA/ Rent Allowance etc., to Faculty/others	ASAI0 Registration and others	₹64, 736.00
Total (One Lakh Fifteen Thousand Seven Hundred and Twenty Nine Only)			₹ 1, 15, 729.00

3. 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	Mark Forge Mark Two 3D printing machine	16, 22, 500-00	To generate the working model of the pump using Onyx Material
2	Flash forge Dreamer Dual Extruder -Think 3D	85,000-00	To generate the experimental models of an artificial heart pump
3	ANSYS 19.2	5, 01, 500-00	To Simulate the fluid flow through pump
4	WORKSTATION-HP Z8 Work Station	10,68,000-00	To Generate H-Q Curves of an Artificial Heart Pump
Approximately Total Cost Spent Till Now including Sponsored faculty is about Thirty One Lakhs Sixty One Thousand Two Hundred and Seventy One Rupees Only			₹31, 61, 271-00

4. Role of KITSW in IAAHP:

IAAHP KITSW team is

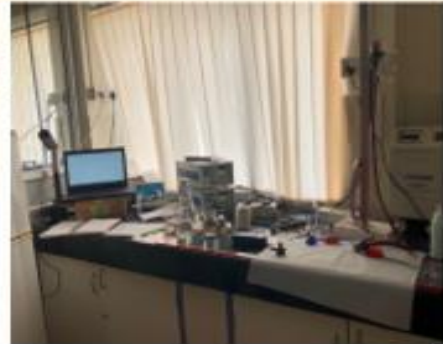
- working on **Computational Fluid Dynamics Analysis** using ANSYS workbench for modeling and analysis of Heart Pump and development of prototype model using **3D Printer**.
- Generate the H-Q curves for the pump

- performing hemolysis and hydrodynamic tests to study the characteristics of blood flow through pump experimentally.
- Design a test rig for study of properties of ring magnets used in Heart Pump
- Design and developing a **Brushless Direct Current (BLDC) motor control system.**

Activities performed as a part of IAAHP:

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Visit to BITS
Pilani
Hyderabad
Campus for
performing
Hemolysis
Test





IAAHP Team

1. Prof. K. Eswaraiah, Chairman, IAAHP, KITSW
2. Prof. K. Venu Madhav, Member, IAAHP, KITSW
3. Dr. G. Ganesh Kumar, Member, IAAHP, KITSW
4. Dr. A. Madhukar Rao, Member, IAAHP, KITSW
5. Sri. V. Pradeep, Member, IAAHP, KITSW