

## 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 2021-22

## Center of Excellence

# INDO-AMERICAN ARTIFICIAL HEART PROJECT (IAAHP)

### IAAHP TEAM

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

**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:**

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**

**Published Two Conference Papers in American Society of Artificial Internal Organs (ASAIO) Journal, USA.**

1. **Ganesh Kumar, G., Sridhar, K., Ashoka Reddy, K., VenuMadhav 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**)
2. **Ganesh Kumar, Sridhar, K., G., Ashoka Reddy, K., VenuMadhav 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**)




### 3. Details of Expenditure for Academic Year 2021-22:

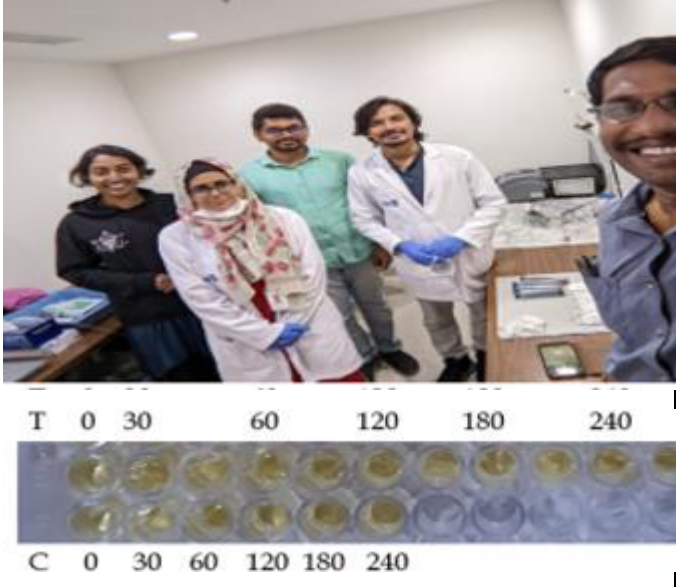

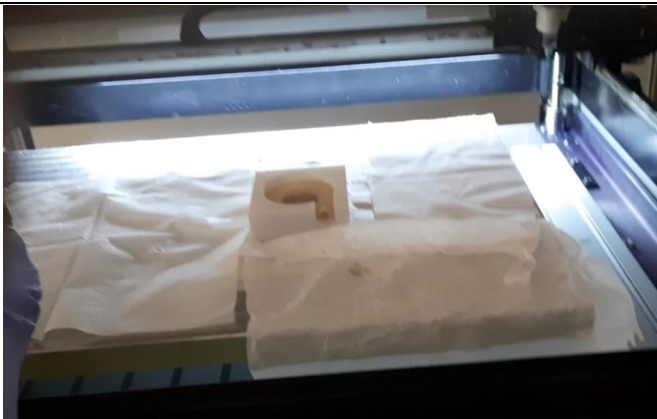
S. No	Details of Expenditure	Item Details	Amount in INR
<b>Expenditure Spent:</b>			
1	Major Equipment Purchased/ Purchase of Software:	NdFeB sintered anisotrop ring Magnet BMN-48	Nil
2	Incentives/ Sponsorship/TA- DA/ Rent Allowance etc., to Faculty/others		₹ 45,100.00
<b>Total (Rupees Forty Five Thousand One Hundred Only)</b>			<b>₹ 45,100.00</b>




### 4. List of Major equipment available /Facilities Available in IAAHP Lab:




S. No	Name of the Equipment/ Software	Cost of the equipment/ Software in ₹	Purpose of the equipment
<b>3D Printer</b>			
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
<b>Approximately Total Cost Spent Till Now including Sponsored faculty is about Eighty Lakhs Fifty Five Thousand Rupees Only</b>			<b>₹ 32, 77, 000-00</b>

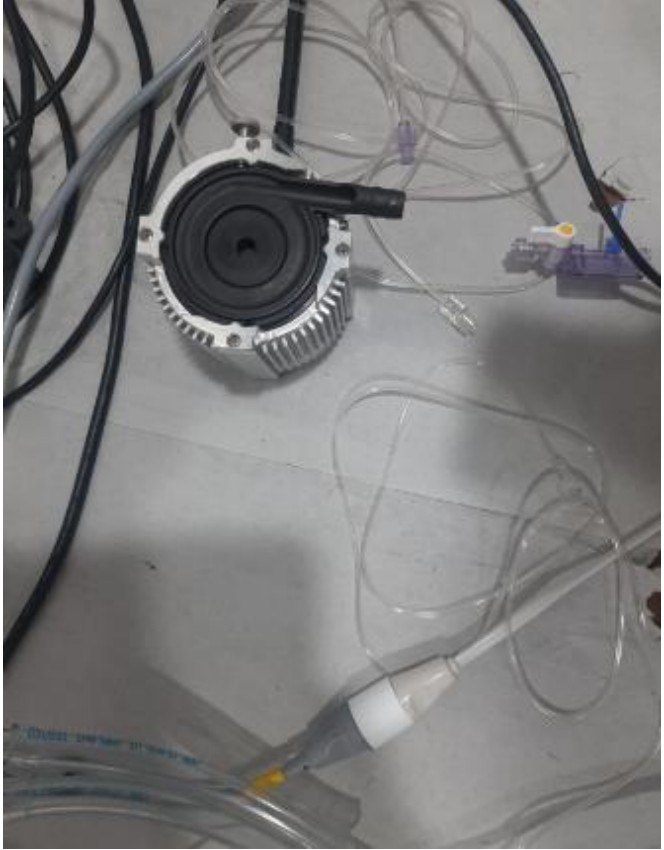

**Activities performed as a part of IAAHP:**

S. No	Details of Activities	
1.	<p>Sri. Chada Ramesh Reddy Visited our institute to discuss about the status of study on properties of Magnet</p> <p>Further Dr. Ganesh has given a brief presentation on IAAHP progress at KITSW 28.06.2022</p>	 
2.		
3.	<p>Successfully completed the trail runs of Hemolysis test at AIG on 03.12.2021</p> <p>Obtained NIH of 0.0016</p>	



		 <p>T 0 30 60 120 180 240</p> <p>C 0 30 60 120 180 240</p>
4.	<p>Inspection of injection moulded components at KarthikMoulds on 22.12.2021 by IAAHP KITSW team</p>	
5.	<p>Performed programming on Hyrel 3D printer to perform Gluing to top and bottom casing.</p>	

<p>6.</p>	<p>Visited PBS for making the arrangements for Animal testing on 11.11.2021</p>	
<p>7.</p>	<p>Visited AIG for performing Hemolysis Test using Bovine Blood on 10.11.2021</p>	 

		
<p>8.</p>	<p>Inspection of injection moulded components at KarthikMoulds on 22.12.2021 by IAAHP KITSW team</p>	
<p>9.</p>	<p>Visited AIG Hospitals to perform Hemolysis test 24.09.2021</p>	

<p>10.</p>	<p>Tested pump on Centrimag Motor on 22.12.2021 to perform hydrodynamic test</p>	
<p>11.</p>	<p>Performed Hemolysis test on Pump made by KITSW team on 18.09.2021</p>	



<p>12.</p>	<p>Arranged the Hemolysis test setup at AIG Hospital on 11.09.2021</p>	
<p>13.</p>	<p>Given Training to Students on 3D printer by IAAHP team on 23.04.2022</p>	

**IAAHP KITSW team Members:**

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

1. Dr. K. Eswaraiah, Prof. of ME, Chairman, KITSW
2. Dr. K. Venu Madhav, Prof.&HoD, EIE, Member, KITSW
3. Dr. G. Ganesh Kumar, Assoc. Prof., Member, KITSW
4. Dr. A. Madhukar Rao, Dept. of EEE, Member, KITSW