APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Centre for Engineering Research and Development

Report of Activities 2016 - 17

June 2017

THIRUVANANTHAPURAM

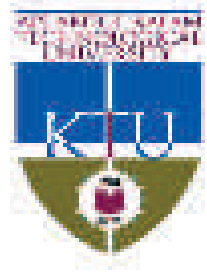
RESEARCH COUNCIL MEMBERS

No	Name	Designation
1	Dr. K.P. Isaac	Vice Chancellor, KTU
2	Dr. M.Abdul Rahman	Pro Vice Chancellor, KTU
3	Dr.K.M.Abraham	Principal Secretary, Finance department, Govt of Kerala
4	SRI. B. Srinivas, IAS	Secretary, Higher Education Dept
5	Dr. Bhaskar Ramamurthy	Director, IITM, Madras
6	Dr. P.K. Radhakrishnan	Vice Chancellor, Kerala University
7	Dr. K. Sivan	Director VSSC, Trivandrum
8	Dr Vinay Kumar Dadhwal	Director, IIST
9	Sri. S. Kedarnath Shenoy	Director, National Physical & Oceanographic Laboratory, Kochi.
10	Dr. Sivaji Chakravorti	Director, NIT, Kozhikode
11	Dr. V. Ramakrishnan	Director, IISER, Trivandrum
12	Dr. Suresh Das	Director, KSCSTE
13	Prof. Ashutosh sharma	Secretary, Department of Science and Technology, India
14	Dr. Girish Sahni	Director General, CSIR and Secretary, DSIR
15	Dr. K. Vijayakumar	Director Technical Education, Kerala
16	Dr. Shajan Kuriakose	Prof. Mechanical Engg, MA College, Kothamangalam
17	Dr. V.I Beena	Prof. Civil Engg., GEC, Kannur
18	Dr. Ciza Thomas	Prof. Computer Science, CET
19	Dr. Vrinda V Nair	Dean Research, KTU
20		Vice-Chairman, Higher education Council

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Centre for Engineering Research and Development

Report of Activities 2016-17



THIRUVANANTHAPURAM

June 2017

Universities were established across the globe as centres of higher learning to provide institutional frameworks for scholarly activities. The ancient University of Athens in Greece, The University of Nalanda and Taxila in ancient India were centres of higher learning which attracted scholars from diverse geographies. Over centuries, Universities and the World as a whole underwent significant changes. After the agricultural and industrial revolution, world witnessed a revolution which changed the complete outlook of the human - the digital revolution.

APJ Abdul Kalam Technological University (KTU) is a University born in this new era and hence is bound to embrace new technologies both in its working and in its various schemes to promote education and research. KTU is also keen in connecting to the society by addressing its needs through a technological perspective.

The University is providing grants for various research schemes thus encouraging research in affiliated institutions. There are two flagship annual events of the University – KETCON and TECHFEST which provide a venue for the young and talented to present technical papers and to exhibit their innovative products.

This report showcases all the major activities of research and the achievements of KTU made during 2016-17. I am confident that under KTU, CERD (Centre for Engineering Research and Development) can initiate more programmes to elevate the Engineering fraternity of Kerala to higher realms of research in years to come.

Dr. Kuncheria P Isaac
Vice Chancellor

Thiruvananthapuram
30-6- 2017

INTRODUCTION

Centre for Engineering Research and Development (CERD) was established by Government of Kerala vide order No GO (Ms) 79/2009/HEdn dated 4-7-2009. The Centre started functioning from 2010 June 15 onwards to provide a platform for the faculty and students of Engineering Colleges in the State to pursue their interest in research. The control and administration of the centre was vested with Engineering Research Council (ERC) constituted by the government. To boost the research activities at college level, Satellite centres were also formed and are functioning in Government Engineering Colleges in the state.

As per the APJ Abdul Kalam Technological University Act 2015 of the Government of Kerala, CERD was dissolved and brought under the University. Since then, the centre is acting as the research arm of APJ Abdul Kalam Technological University. All research activities under the University is controlled by Research Council constituted by the Government. Research regulation of KTU was published in July 2015 and PhD registrations were started under KTU in the academic year 2015-16 onwards in various affiliated engineering colleges. The 2nd Research Council (RC) meeting of the University held on 29-2-2016 approved distribution of research funding to self supported engineering colleges with NBA accredited departments in addition to Government supported engineering colleges affiliated to KTU. In the RC, it was also decided to enhance the research fellowship to 25,000/- for all three years of research.

Various schemes are being implemented by the Centre to motivate, mentor and support researchers. Some of the popular activities of CERD are:

- Research seed money to faculty members
- Support to innovative student projects at under graduate level
- Conducting workshops in thrust areas
- Funding to research promotional activities like exhibitions and conferences
- Fellowship to PhD research scholars etc.
- KTU researcher of the year award
- Centres of Excellence on thrust areas.
- Conducting KETCON and TECHFEST

The 4th RC held on 4-3-17 approved a new research scheme named 'Research Assistance Scheme' (RAS) with a research funding of 15 lakhs and 2 years project duration. This report is brought out as the third research report of KTU, detailing the research activities during the year 2016-17.

MAJOR SCHEMES OF CERD

1. Research Seed Money

The objective of this scheme is to provide financial assistance to faculty members of Government/Government-Aided/Government-Controlled/NBA accredited Private Self Financing Engineering Colleges affiliated to KTU to initiate research in frontier areas of Engineering and Technology. Based on the merit of the proposal a maximum support of Rs. 2 lakhs is provided to a project. Summary of projects and Institutions that availed funding are given below :

SL. #	Institution	Number of projects sanctioned	
		2010-2016	2016-17
1	College of Engineering Trivandrum	45	9
2	Govt. Engineering College, Thrissur.	19	1
3	Rajiv Gandhi Institute of Technology, Kottayam.	6	3
4	Govt. Engineering College, Barton Hill, Trivandrum.	1	--
5	Govt. Engineering College, Kannur	4	--
6	Govt. Engineering College, Sreekrishnapuram, Palakkad.	1	--
7	Govt. Engineering College, Wayanad.	2	--
8	Govt. Engineering College, Kozhikode.	1	--
9	T.K.M. College of Engineering, Kollam.	4	2
10	N S S College of Engineering, Palakkad.	4	--
11	L B S Institute of Technology for Women, Poojappura, Trivandrum	1	--
12	Model Engineering College, Thrikkakkaara	1	1
13	Mar Athanasius College of Engineering	--	7
14	College of Engineering Adoor	--	1
15	College of Engineering Attingal	--	2
16	College of Engineering Vadakara	--	1
17	Vidya Academy of Science and Technology	--	3
18	Saintgits College of engineering	--	4
19	Mar Baselios College of Engineering, Trivandrum	--	1
Total		89	35

Total amount sanctioned for research seed money in the year 2016-17 is Rs 47,18,669/-.

Details of few Research Seed Money Projects completed in the reporting period are given below:

Title of Project 1	**Empirical Investigations Towards Better Quality Costing Methods for Manufacturing and Service Industries in Kerala**		
Name and address of Coordinator	Dr.K.G Viswanadhan Principal College of Engineering Kidangoor,Kottayam	**Amount Rs**	**73,909/-**
	Quality cost is the expenses incurred by an organization in achieving and maintaining good quality throughout its line of operation with an aim to attain the highest level of customer satisfaction. This project presents an analysis of the effectiveness of the current methods of quality costing practices in manufacturing industries in Kerala along with their limitations and tries to develop a better and effective method for cost of quality analysis so that it could be utilized as an effective decision making tool for organizational improvements.		
Publications	1. K.G.Viswanathan,Sindhu R,"Quality Cost Awareness and Control Measures:A Case Study of Manufacturing Industries" IJESM,Volume 1,Number2,2015 2. K.G.Viswanathan,Sindhu R,"Quality Cost Awareness and Control Measures: A Case Study from Kerala", Published in International Conference on Advances in Engineering Science and Management,Agra,8 November,2015		

Title of Project 2	**Investigation of Natural Convection in a Vertical Annulus**		
Name and address of Coordinator	Dr.S.Anil Lal, Assistant Professor in Mechanical Engineering College of Engineering, Trivandrum	**Amount Rs**	**2,00,000/-**
	Natural convection heat transfer and fluid flow in the annulus formed between concentric cylinders and spheres was the subject of many theoretical and experimental studies because of their great importance in many engineering applications. This process is of technological importance in the design of heat exchanger devices, solar collectors, nuclear reactor, cooling of electrical and electronic components etc.		
Publications	1. S.Anil Lal and C.Reji, Numerical prediction of natural convection in vented cavities using restricted domain approach, International Journal of Heat and Mass Transfer, Volume 52,Issue 5,2009,pp 724-734 2. S.Anil Lal and E.Jabir,A hybrid finite element –finite volume method for incompressible flow through complex geometries using mixed grids,Proc.IMechE,Vol.223,7,Part-G:Journal of Aerospace engineering(2009).		

Title of Project 3	**Comparison of nano adsorbents with non-nano adsorbents and to develop a suitable adsorption column using the selected adsorbent for the removal of heavy metal ions from waste water.**		
Name and address of Coordinator	Padmavathy K S, Assistant Professor in Chemical Engineering, Govt. Engineering College Thrissur	**Amount Rs**	**2,20,972/-**
	The aim of the project was to develop suitable nanomaterial based adsorbent for the removal of heavy metals from waste water. Adsorption is an economic and effective method for removal of hexavalent chromium from waste water. Conventional adsorbents suffer various drawbacks due to poor adsorption capacity. Nonmaterials have high surface area and high adsorption capacity. Water analysis was performed using UV-Visible Spectrophotometer. Nanomaterials are proved to be excellent adsorbents for Cr(VI)removal when compared to conventional adsorbents.		
Publications	1.Padmavathy K.S, Haseena P.V, Dr.G.Madhu,A study on effects of pH,adsorbent dosage, Time, initial concentration and adsorbent concentration for the removal of hexavalent chromium from waste water by magnetic nanoparticles, Procedia Technology 24(2016)585-594. 2.Padmavathy K.S, "Study On Nano Adsorbents for the Selective Removal of Heavy Metal from Waste Water-A Review",NATCON,09-10 February 2012,Govt.Engg College, Thrissur		

Title of Project 4	**Analysis of Local and Network Digital Evidences for Efficient Investigation Tools**		
Name and address of Coordinator	Gilesh M P, Assistant Professor, Computer Science & Engineering GEC, Wayanad	**Amount Rs**	94,811/-
	This part of the project aims to identify alternate ways of representing access and error information to rectify the short comings in the existing digital forensics software's which are highly dependent on the log information. In majority of the cases, mining the log is tedious and unworthy for an experienced hand as well. The project aims at developing algorithms for efficient parsing of backup/log files in combination with better representation of information to enhance the accessibility of the system evidences to all classes of users. We proposed selective retrieval of files with particular features from a disk image for faster conclusions.		
Publications	Jyothish Jose, O Sujisha; M P Gilesh, Thayyil Bindima, " ***On the Fairness of Linux O(1) Scheduler*** ", Intelligent Systems, Modelling and Simulation (ISMS), 2014 5th IEEE International Conference on 2014, Langkawi Malaysia		

Title of Project 5	**Studies on swelling behaviour of expansive soils stabilized with natural waste materials**		
Name and address of Coordinator	Leema Peter, Associate Professor in Civil Engineering, College of Engineering, Trivandrum	**Amount Rs**	2,11,287/-
	The term "Swelling Soils" usually refers to those clay minerals that possess contradictory behaviour in consequence of variation in its moisture content in the course of time. When the civil engineer encountered swelling soil type, the engineering properties of the problem soil may be improved to make them suitable for construction and earth work. Soil stabilization, in the broadcast sense, is the alteration of any property of a soil to improve its engineering performance. Chemical stabilization of soils is one of the available answers for the geotechnical engineering problems and it may be used to reduce the shrinkage and swelling characteristics of the soils. The present study aims to investigate swell properties of untreated and stabilized soil using Coir pith and Municipal Solid waste fly ash in combination for weak marine clay/Kuttanad clay by conducting volumetric free swell, volumetric shrinkage strain and vertical swell pressure tests.		
Publications	1. Jayasree P.K, Balan K, Leema P and Nisha K.K, "Ïnfluence of Coir pith on Swelling and Shrinkage Characteristics of Expansive Soil", Proceedings of Indian Geotechnical Conference on Geotechnical Advances and Novel Geomechanical Applications 2013, Roorkee, India, pp 1-7. 2. Jayasree P.K, Balan K, Leema P and Nisha K.K, "Consolidation Properties of Expansive Soil Treated with Coir Waste", National Conference on Technological Trends 2013, Trivandrum, India, pp 829-834. 3. Jayasree P.K, Balan K, Leema P and Nisha K.K (2015) "Volume change behaviour of expansive soil stabilized with coir waste", ASCE Journal for materials in Civil Engineering, pp 0401.4195-1-04014195-8. 4. Jayasree P.K, Balan K, Leema P and Nisha K.K(2015) "Shrinkage characteristics of expansive soil treated with coir waste", Indian Geotechnical Journal(published online on February 05,2015)		

2. Student Projects

The objective of this scheme is to provide financial assistance to undergraduate student groups of Government/ Government-Aided/ Government-Controlled/ NBA accredited Private Self Financing Engineering Colleges affiliated to KTU for undertaking innovative projects. Based on the merit of the proposal, each project will be eligible for a maximum assistance of Rs.50,000/-.

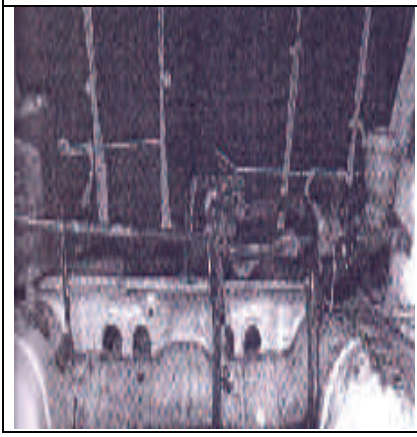
SL #	Institution	No. of projects sanctioned	
		2010-16	2016-17
1	College of Engineering, Trivandrum	74	12
2	Govt. Engineering College, Thrissur	18	2
3	R I T, Kottayam	27	6
4	Govt. Engineering College, Barton Hill	6	--
5	Govt. Engineering College, Kannur	30	--
6	Govt. Engineering College, Palakkad	8	3
7	Govt. Engineering College, Wayanad	3	--
8	Govt. Engineering College, Kozhikode	7	--
9	Govt. Engineering College, Idukki	17	--
10	T.K.M. College of Engineering, Kollam	2	1
11	N.S.S. Engineering College, Palakkad	12	7
12	MA College of Engg, Kotahamnagalam	1	13
13	College of Engineering, Pathanapuram	27	7
14	College of Engineering, Thalassery	1	--
15	LBS College of Engineering, Kasaragod	2	--
16	College of Engineering; Karunagappally	2	--
17	Sree Chithira Thirunal Engineering College, Trivandrum	1	1
18	Cochin University of Science and Technology, Kochi	1	--
19	College of Engineering; Perumon	3	--
20	College of Engineering; Adoor	1	--
21	College of Engineering; Attingal	4	3
22	Rajagiri College	--	4
23	Saintgits College of engineering	--	8
24	Vidya Academy of Science and Technology	--	5
25	Mar Baselios College of Engineering, Trivandrum	--	1
26	Jyothi Engineering College	--	1
	Grand Total	247	74

Total amount sanctioned for innovative student projects in the year 2016-17 is Rs 24,71,000/-.

Educationists should build the capacities of the spirit of inquiry, creativity, entrepreneurial and moral leadership among students and become their role model

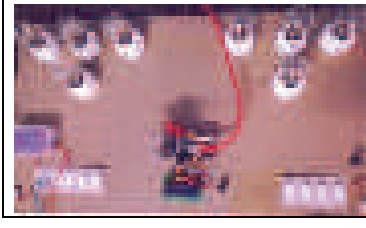
A. P. J. Abdul Kalam

Details of few student projects are given below :

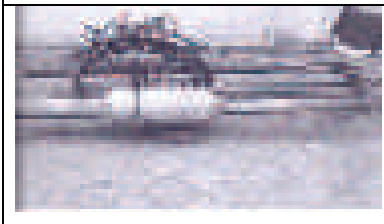
Title of Project 1	Automatic Reverse Braking Mechanism of Car on Inclined Surface		
Name and address of Coordinator	Prof. K S Sajikumar, Associate Professor Mechanical Engineering, College of Engineering,Trivandrum	Amount Rs	43,903/-
	Automatic reverse braking mechanism is a safety mechanism used in cars while starting a vehicle on an inclined surface. It is useful for those who are not expert in driving, like new drivers. The proposed system automatically sense and engages the brake and arrest the vehicle from moving backward and avoid collisions. The system makes use of electric power and additional braking cylinders to achieve this mechanism. This can be installed in existing vehicles also. A theoretical model of drum-type parking brake system is derived and later being validated by test data that measured from the parking brake test bench.		

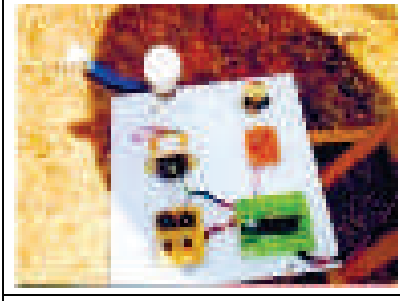
Title of Project 2	Real Time IOT Management by Mind Reading		
Name and address of Coordinator	Dr.Surekha Mariam Varghese Professor and HOD, Computer Science and Engineering Mar Athanasius College of Engineering, Kothamangalam	Amount Rs	49,131/-
 	The convergence of modern technologies has unleashed a new era in the field of computer science and BCI.It can provide a way for physically disabled people to use computers. But there are close to none ways by which a normal person can get hold of such systems with a limited budget. The project is primarily focused on using an EEG headset which is available and affordable to a normal person to provide a solution by which users can control a computer interface by mere thinking. The headset is normally used for keeping track of the mental calmness of a person		
Any Other Information	Research Paper selected for publishing by Mantech Publishers		

Title of Project 3	Methods To Improve Properties of Concrete while Using Plastic as Partially Replaced Coarse Aggregate.		
Name and address of Coordinator	Dr.Vinish V Nair, Associate Professor Civil Engineering Rajiv Gandhi Institute of Technology, Kottayam	Amount Rs	23,984/-
	A healthy and sustainable reuse of plastics offers a host of advantages. Recycling of plastic waste to produce new materials like concrete or mortar appears as one of the best solution for disposing of plastic waste, due to its economical and ecological advantages. The main issue while using plastic as an aggregate is its bonding strength with other components. This would become a serious issue as sufficient bonding between mortar and plastic aggregates is very much necessary. As 100% replacement of natural coarse aggregate with plastic coarse aggregate is not feasible, partial replacements at various percentages were examined and optimum percentage is investigated.		

Title of Project 4	Design And Implementation of A Solar PV System For The Electrification Of An Isolated Rural Household		
Name and address of Coordinator	Mini V P, Assistant Professor Electrical Engineering, College of Engineering Trivandrum	Amount Rs	29,346/-
 	The need of electrical energy is increasing alarmingly. Although centralised system has been providing inexpensive power, but it is very difficult bring into a rural area. So distributed power generation, based on locally available energy resources and supply of this additional electricity can be considered as feasible solution to this increasing energy demand. The design of Maximum peak Power Tracking (MPPT) controller for solar photovoltaic battery charging system is proposed utilizing a boost converter topology. During the day time, the additional electricity available from the solar cell can be used to charge battery; also battery is discharged during night time to provide excessive charge. This is provided using DC-DC Bidirectional converter by microprocessor monitoring.		

Title of Project 5	**Comparative Study on the Effects of Different Waste Materials on Weak Soil for Better Pavement Sub grade**	
Name and address of Coordinator	Dr Solly George, Professor Civil Engineering, Mar Athanasius College of Engineering,Kothamangalam	**Amount Rs** 46,800/-
	With rapid increase in population and huge development in infrastructure, the demand for land has increased considerably for past few decades. This has lead to limited availability of land resources. To make deficient soil useful and to meet geotechnical design requirements researches have focused more on the use of potentially cost effective materials. This dissertation work presents an experimental study on the improvement of marine clay which is a weak soil for betterment of its property to use as pavement sub grade using different additives such as glass powder, plastic strip, and quarry dust with ferric chloride at varying percentages.	

Title of Project 6	**Design, Fabrication And Testing of Pulsejet Engine**		
Name and address of Coordinator	Mr. Anjan R Nair, Assistant Professor, Mechanical Engineering, Govt. College of Engineering Kannur	**Amount Rs**	**29,457/-**
 	Pulse jet engines are designed to produce a intermittent flow of hot gases. It is an alternative to aerospace propulsion system as they have few moving parts and economical to construct. In this project, developed a valve less pulse jet engine powered bicycle. The optimum temperature is measured by using the frequency of the engine. This frequency is obtained from Fast Fourier Transform analysis(FFT).Optimum mass flow rate is found out by experimental comparisons. The speed of the bicycle is controlled by adjusting valve position. Engine is fixed by using Ü Clamp “and bolts.		

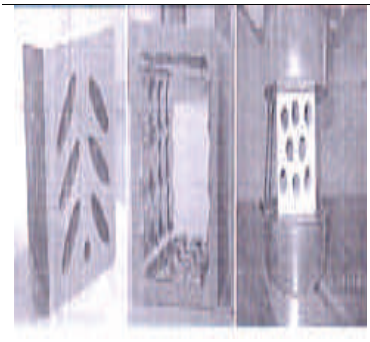
Title of Project 7	Grid Connected Concentrated Solar Power Module Using Dish-Stirling Technology		
Name and address of Coordinator	Acy M Kottalil, Professor Electrical and Electronics Engg. Mar Athanasius College of Engineering,Kothamangalam	**Amount Rs**	56,324/-
 	By the use of Concentrated Solar Power with Dish-Stirling Engine technology, efficiencies up to 34% (Ripasso Energy, Kalahari Desert) have been achieved on a commercial scale. The technology consists of a large dish aimed at the sun to reflect the rays into the focus point, which is located at the centre of the dish where a Stirling engine is located. Solar energy is collected in the form of heat, to fuel a Stirling cycle engine, which operates by letting heat flow from a hot source to a cold sink in order to do work. The work output of the Stirling cycle is then used to drive a generator and create electrical power. The CSP Stirling System is predicted to be able to produce the cheapest energy among all renewable energy sources in high (commercial) scale production and hot areas, semi-deserts etc. In this system, reliable and accurate dual axis tracking is done using LDRs and Microprocessor; grid connection is achieved using Grid-tie inverter, and suitable switchgear.		
Any Other Information	1. Best Paper Award,KETCON 2017 2. Best Project(EEE Dept) Award,PTA MACE		

Title of Project 8	Ground Improvement Using Micropiles In Weak Soils Around Kannur District		
Name and address of Coordinator	Dr. V. I.Beena, Professor Department of Civil Engg, Government College of Engineering, Kannur	**Amount Rs**	50,000/-
	This project deals with the ground improvement using micro piles in weak soils around Kannur district. Three places having soils of weak nature are located. The safe bearing capacity in the field is determined using Standard Penetration Test. Soil samples are collected and their properties are determined in Geotechnical Engineering laboratory. The collected samples are measured using standard penetration test. It is also calculated by inserting the micro piles at different angles, that differ in their lengths. These results are then tabulated, analyzed and arrived at a conclusion.		

Title of Project 9	Green Cognitive Radio for Smart Home Environment		
Name and address of Coordinator	Dr.Sudha T, Professor, Computer Science & Engg, NSS College Palakkad	**Amount Rs**	37,030/-
	A plethora of smart home devices are currently being used to enhance the resident experience. With these devices increasingly communication enabled, her is a need for a channel to enable communication. With Cognitive Radio Technology as the backbone, the spectral congestion can be eluded from smart home environment and provide a green alternative for existing smart home. This paper systematically investigates the novel idea of applying the cognitive radio for a smart home environment and evolving a prototype to implement the same.		

Any Other Information

1. Presented paper at the third international symposium on Woman in Computing and Informatics,WCI-15(co-located with Fourth International Conference on Advances in Computing, Communications and Informatics(ICACCI-2015)).
2. Paper published by ACM New York,NY,USA©2015,pp 629-634,ISBN:978-1-4503-3361-0,doi>10.1145/2791405.2791548,Aug 2015
3. Won the best student project award by Tata Consultancy Services(TCS)

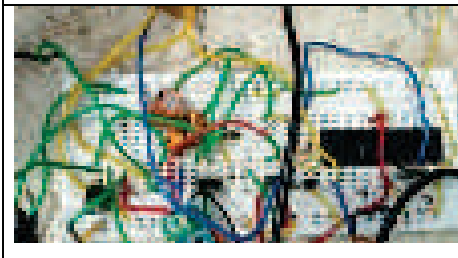
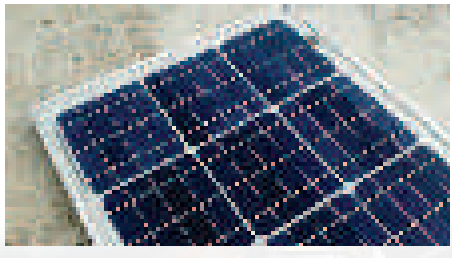
Title of Project 10	Fabrication and Testing of Porous Structures		
Name and address of Coordinator	Dr A Selvakumar, Assistant Professor in Mechanical Engineering GEC, Palakkad	**Amount Rs**	48,423/-
	Conventional machine tools are usually made up of cast iron, due to its better damping and mechanical properties compared to the materials available in the industry. However, at high speed operations, it is reported that geometrical errors occur in products resulting in dimensional in accuracies. In this study, an attempt is made to test porous cast iron specimens with different structural forms. Bionic and hexagonal form designs are selected for analysis. Again, composite materials were filled in the porous structure and their crushing strength and tension are evaluated. The results were found to be better than existing structures, and hence are found to be suitable for manufacturing of machine tool structures.		

Any Other Information

Published papers in two International Conferences.

1. Abhijith K Jacob and A Selvakumar, "Fabrication and Testing of Porous Structures", International Conference on Nano Technology for Better Living", NIT Srinagar, May 28-30,2016.(DOI:10.3850/978-981-09-7519-7nbII6-rps-279)
2. Abhijith K Jacob, Jishnu C, Rajan T and A Selvakumar, "Fabrication and Testing of Porous Structures", International Conference in Recent trends in Engineering's. Peters Engineering College,Hyderabad,October0 25-27,2016

Title of Project 11	Electric Bicycle with Three Way Charging		
Name and address of Coordinator	Beenu Mary Panicker, Asst Professor in EEE, College of Engineering, Pathanapuram	Amount Rs	47,450/-
	Now in the increase in fuel price and the environmental factors we must admit that it is far better to use a bicycle over a motor vehicle for short distance travelling. The unit developed by is a combination of the standard geared bicycle with an electric power motor that would assist the rider throughout his journey. The system is modified in such a way that rider can either choose the bicycle to be driven completely with the electric motor or he can choose it to be driven manually by himself. It uses generator for charging while riding. When rider parks the bicycle by using solar panels placed on the cycle that recharges the battery itself. During travelling alternator is used to produce electricity that recharges the battery.		
Any Other Information Project published in International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE) with title," Electric Bicycle with Three Way Charging" DOI:10.15662/IJAREEIE.2016.0504130			

Title of Project 12	Future Home		
Name and address of Coordinator	Ann Mary Joshua, Assistant Professor, Dept of EEE, RIT Kottayam	Amount Rs	7,218/-
 	Most of the existing traditional technologies that are implemented in the homes can be improved by automating and such that to reduce the effort. To achieve the desired level of automation many existing technologies can be modified and new ones can be developed and implemented. With the use of solar panels an effective micro-island can be implemented. Since the voltage of a photovoltaic cell is continuously fluctuating, a voltage regulator is required. This can be done in a most effective manner with the use of MPPT. The output voltage from a photovoltaic cell is maximum when the angle of incidence of light tends to 90 degrees. This can be maintained using a sun tracking system. To improve the automation process for a home we can implement technologies which cut off the power supply if there is no person inside the room.		

A three days workshop on State of the art Technologies in Civil Engineering was conducted in MA College of Engineering Kothamangalam on August 22 to 24, 2016. The faculty members in affiliated colleges to KTU attended the workshop. Prof. Jeevan Jacob Professor, Asst. Professor in Civil Engineering was the coordinator of the workshop.

A workshop on Collaborative research ideation in high performance computing was held on September 8, 2016, in APJ abdul Kalam Technological University. PROF. MARK NICHOLAS GAHEGAN, Department of Computer Science, University of Auckland, Newzealand and Dr. DEEPAK PADMANABHAN, School of Electronics, Electrical Engg and Computer Science, Queen's University Belfast, were the main resource persons of the workshop. About 20 faculty members working in high performance computing in various affiliated colleges to KTU attended the workshop.

3. Financial Support to Workshops/Seminars

In order to promote research in engineering and technology, financial assistance is provided for hosting Seminars, Symposia and Workshop on research related subjects. The maximum assistance is Rs. 60,000/-.

SL #	INSTITUTION	No. of Projects Sanctioned	
		2010-16	2016-17
1	College of Engineering Trivandrum	11	--
2	Govt. Engineering College, Thrissur	4	--
3	Rajiv Gandhi Institute of Technology, Kottayam.	2	--
4	Govt. Engineering College, Barton Hill, Trivandrum.	2	--
5	Govt. Engineering College, Sreekrishnapuram, Palakkad.	1	--
6	Govt. Engineering College, Wayanad	5	--
7	N S S College of Engineering, Palakkad	1	--
8	M.A. College of Engineering; Kothamangalam	2	1
9	College of Engineering, Punnappara	1	--
10	APJ Abdul Kalam Technological University	--	7
	Grand Total	29	8

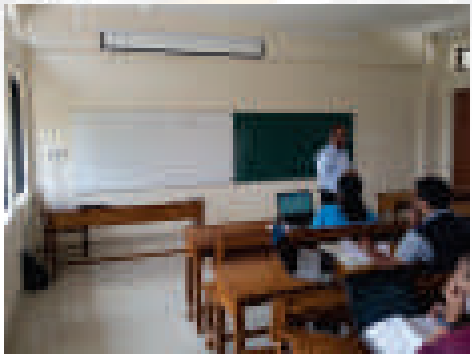
A workshop on "How to apply for International Research Grants?" was held on June 6, 2016, in APJ abdul Kalam Technological University. Valiiyappan David Natarajan, Head of Research (Grant Acquisition), Universiti Teknologi MARA Malasiya was the resource person. About fifteen researchers from affiliated engineering colleges, aiming international research funding in future, attended the work shop.

A one day workshop on Research Methodology was held on June 18, 2016, in APJ abdul Kalam Technological University for newly selected research scholars in various affiliated Engineering colleges under KTU. The topics discussed in the work shop were research design, writing research proposal, writing technical paper, IPR etc. About 30 participants planning to start their research under KTU attended the workshop.

A workshop on Collaborative research ideation in structural engineering was held on September 9, 2016, in APJ abdul Kalam Technological University. PROF. MUHAMMED BASHEER, Chair in Structural Engineering, University of Leeds, Leeds, United Kingdom, was the resource person of the Workshop. About 15 faculty members working in Civil and Mechanical departments of various affiliated colleges to KTU attended the workshop

A four day Maker Workshop exclusively for faculty members of engineering colleges was held from October 5-7 and 21, 2016, in FISAT, ERNAKULAM. The workshop, gave an opportunity to experience real time challenges in different stages of product development such as problem identification, feasibility study, technology development, prototyping, testing, market survey, development of marketing strategy etc. About 50 faculty members working in various affiliated colleges to KTU attended the workshop.

A workshop on Writing Project Proposals for FIST Funding of DST was held on October 7, 2016, in RAJAGIRI SCHOOL OF ENGG & TECH, ERNAKULAM. Dr. A. MUKHOPADHYAY, Head of FIST programme, DST, New Delhi was the resource person of the Workshop. About 50 faculty members working in various affiliated colleges to KTU attended the workshop.



A five day workshop on Numerical Methods for Researchers was held from December 26 to 30, 2016, in APJ abdul Kalam Technological University. PROF. Dr. Gangan Prathap, Former Vice Chancellor CUSAT was the resource person of the Workshop

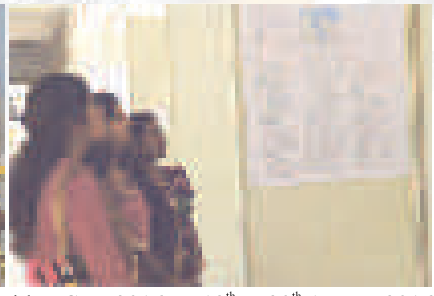
Total amount sanctioned for conducting workshops in the reporting year is Rs 4,00,000/-

4. Research Promotional Activities

Financial Assistance under this scheme is for conducting poster presentation, expert lecture etc. Maximum assistance is Rs. 60,000/-.

SL #	INSTITUTION	No. of Projects Sanctioned	
		2010-16	2016-17
1	College of Engineering Trivandrum	10	1
2	Govt. Engineering College, Thrissur	1	--
3	Rajiv Gandhi Institute of Technology, Kottayam.	3	1
4	Govt. Engineering College, Barton Hill, Trivandrum.	3	1
5	Govt. Engineering College, Wayanad	1	--
6	M.A. College of Engineering; Kothamangalam	1	--
7	TKM College of Engineering, Kollam	1	--
	Grand Total	20	3

A Poster presentation was organized in the College of Engineering Trivandrum in connection with National Conference in Technological Trends (NCTT 2016) for M.Tech, M.Plan and M.Arch students. The event was conducted from 19th to 20th August 2016. There were more than 100 posters presented from the six departments Civil, Mechanical, Electrical, Electronics, Computer science and Architecture. Dr. Usha, Professor in Electrical Engineering and Prof. Liji P I, Asst Professor in CS, College of Engineering, Trivandrum were the coordinators of the event.

Poster presentation in CET in connection with NCTT 2016 on 19th to 20th August 2016.

A Poster presentation was organized in RIT Kottayam for M.Tech students. The event was conducted on19th August 2016. There were more than 40 posters presented from the five departments Civil, Mechanical, Electrical, Electronics and Computer science. Dr. Vineetha S, Asst Professor in CS, RIT Kottayam was the coordinator of the event.




Poster presentation at Rajiv Gandhi Institute of Technology, Kottayam on 19th August 2016


Technical Events along with AAGNEYA 16 at Government Engineering College Barton Hill Thiruvananthapuramon 17th and 19th March 2017

Total amount sanctioned for research promotional activities in the year 2016-17 was Rs 1,80,000/-

5. CERD Researcher of the Year Award.

Best Researcher of the year award is given annually to the faculty of Engineering Colleges in the State considering the research output of the previous three years. The selection process is by a Screening Committee and the awardee will be eligible for a sponsored research to the tune of Rs. 15 Lakh. The award consists of citation, gold medallion (worth Rs.25,000/-), and cash award of Rs. 25,000/-.

The 4th RC meeting held on 4-3-17 recommended considering contributions of the researchers during last five years for deciding 'KTU researcher of the year' from next year onwards. It is also decided to set minimum three years teaching/research experience in KTU affiliated Colleges for a prospective applicant.

The KTU researcher of the year 2016 was Dr. Varun P Gopi, Assistant Professor, GEC Wayanad. The award was presented by the honorable Governor of Kerala Shri. Justice (Retd.) P Sathasivam in the inaugural function of the annual Kerala Technological Congress (KETCON) at Mar Athanasius College of Engineering, Kothamangalam on January 13th, 2017

Best Researcher of the year Award 2016 to Dr. Varun P Gopi, GEC Wayanad
By honorable Governor of Kerala Shri. Justice(Retd.) P Sathasivam

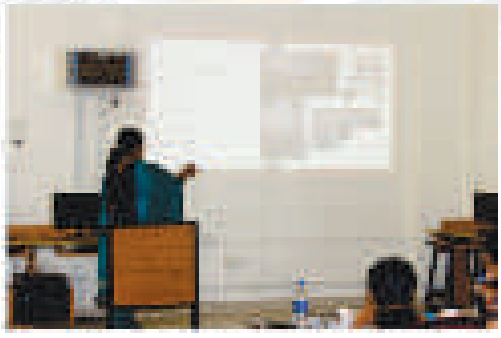
6. Kerala Technological Congress (KETCON)

The annual Kerala Technological Congress is organized to attract the researchers from all over the country to congregate in the state. Experts of international repute working in frontier areas of technology are invited as key note speakers. This provides an opportunity to the researchers in the state to interact with national/international experts and exchange ideas. The engineering research carried out in the State is showcased during this event. Project Exhibition, competitions, research poster presentation, spot events, quiz etc. are also conducted as a part of the programme. Assistance of Rs. 15 Lakhs was provided to the hosting institution. KETCON & TECHFEST 2017 was conducted in association with Kerala State Council for Science Technology and Environment (KSCSTE).

KETCON & TECHFEST 2017 was conducted on 13th and 14th January 2017. MA College of Engineering Kothamangalam was the venue of the twin events for the year 2017. The theme of the event was Energy Technologies. Honorable Chancellor and Governor of Kerala Sri Justice (Retd) P Sathasivam inaugurated the twin events on 13-1-2017. Dr. V. Ramgopal Rao, Director, IIT Delhi delivered the keynote speech on Nano electronics.

In the congress technical papers were presented orally or in poster form. 20 tracks were identified covering the entire spectrum of Engineering and Technology for paper presentation. Based on invitation for technical papers with wide publicity, the number of extended abstracts received was 647. After a series of reviews by peer groups entrusted by the college, 259 papers were selected for oral presentation in 20 tracks. Of these, 179 papers got registered for presentation. It is worthy to note that 154 papers were orally presented in 7 parallel venues and 11 posters were registered and presented. Of the research papers presented, the best paper in every track was separately selected by a jury of the respective track with the best-paper award which carried a cash prize of Rs 2000/- (Rupees Two thousand only) and a Certificate of Merit. Similarly, a cash prize of Rs 2000/- and a Certificate of Merit were awarded to the best poster presented. All these highlight the interest developed by this event in the minds of students and faculty of the engineering colleges, and engineering professionals in Kerala.

Inauguration and keynote speech functions of KETCON 2017
at MA College of Engineering Kothamangalam on 13th January 2017

KETCON 2017 at MA College of Engineering Kothamangalam on 13th and 14th January 2017

The valedictory function was held at 4:00 pm on January 14, 2017. Dr. Suresh Das, Executive Vice President, KSCSTE distributed the prizes to the winners.

7. TECHFEST

TECHFEST is the programme of Kerala State Council for Science Technology and Environment (KSCSTE) for competitive showcasing of innovative Engineering B.Tech final year projects jointly organised with CERD since 2013. This exhibition is conducted along with KETCON in the same host Institute.

In the event, TECHFEST-2017 of KSCSTE, 306 project proposals were received from 56 institutions. From these proposals, 35 proposals were shortlisted in the Competition Category and 91 proposals under the Exhibition Category. Out of this, 19 projects participated in the contest and 51 projects in exhibition categories in MA College on 13th and 14th January 2017.

In addition to these, the 50 projects were selected under KSCSTE's INNOVATE scheme from 265 proposals of 44 institutions. 39 teams selected under INNOVATE scheme participated in the exhibition.

A panel of experts nominated by KSCSTE, evaluated and graded these, for the awards. Based on final evaluation of the innovations displayed at the venue in the competition Category, three teams were awarded with first, second, and third prizes by the honourable Vice Chancellor, in the valedictory function held on January 14, 2017. Ten teams were awarded special prizes. Prize money to winners sponsored by TCS were also distributed in the valedictory function.

Prizes	Title of the innovaton	Name of the Mentor	Group Members	College
First	Design and Fabrication of a 3-Axis CNC Router Cum Engraving Machine with Bluetooth Connectivity	Mrs Leeba Varghese	• Cibin K Biju • Bijo Peter • Cibi Mathew • Samuel Baby Mathew	VISWAJYOTHI COLLEGE OF ENGINEERING & TECHNOLOGY
Second	VLC using light fidelity	Shyba S	• Nirmal A Kumar • Yazin Haris Thangal • Rocky S Kadambanatt	TKM COLLEGE OF ENGINEERING
Third	Feeder inter-area fault location identification and service wire back flow protection system for KSEB	Er: Polly Thomas	• Denil Roy Joshua • Ajin George Reji • Aswin D • Harshed T N	SAINTGITS COLLEGE OF ENGINEERING

Opening TECHFEST 2017 by Prof. Ramgopal Rao, Director IIT Delhi

TECHFEST 2017 at MA College of Engineering Kothamangalam on 13th and 14th January 2017

Spot events - Quiz competition during TECHFEST 2017 on 13th January 2017

Prize distribution of TECHFEST on 14th January 2017

8. Financial Assistance for Paper Presentation Abroad Scheme

CERD is assisting faculty to present technical papers in International Conferences, for those who are satisfying stipulated criteria. The maximum assistance is of Rs.1.5 lakh**.**

The 3rd RC meeting held on 2-7-16 decided to allow this assistance to those faculty members, who publish two SCI/SSCI journal papers since the date of avail of same facility previously.

INSTITUTION	2010-16	2016-17
College of Engineering; Trivandrum	9	1
Govt. Engineering College, Kannur	1	--
Govt. Engineering College, Barton Hill, Trivandrum	1	--

Under this scheme, Dr.Anish K John, Assistant Professor, GEC Barton Hill received incentive for presenting paper in 2nd Thermal & Fluid Engineering Conference and 4th International Workshop on Heat Transfer Organized by American Society of Thermal and Fluids Engineers held at Las Vegas, Nevada, USA during 2-5 April 2017.

Dr. Anish K John presented a paper in 2nd Thermal & Fluid Engineering Conference and 4th International Workshop on Heat Transfer Organized by American Society of Thermal and Fluids Engineers held at Las Vegas, Nevada, USA

9. Financial Assistance for Paper Presentation in India.

CERD is assisting faculty to present technical papers in National/International Conferences in India organized by Professional bodies, for those who are satisfying stipulated criteria. The maximum assistance is Rs.40,000/-. The 3rd RC meeting held on 2-7-16 decided to allow this assistance to those faculty members, who publish one SCI/SSCI journal paper since the date of avail of same facility previously.

Under this scheme Dr. Sheela Evangeline Y, Professor in Civil Engineering, College of Engineering, Trivandrum received incentive for presenting paper in Indian Chapter of International Geosythetc Society, 6th Asian Regional Conference on Geosynthetics at New Delhi during 8-11 November 2016.

INSTITUTION	2010-16	2016-17
College of Engineering; Trivandrum	5	1

Dr. Sheela Evangeline Y, presented paper in Indian Chapter of International Geosythetc Society, 6th Asian Regional Conference on Geosynthetics at New Delhi.

10. Incentive for Peer Reviewed Reputed Technical Journal Publication

This scheme provides an incentive to faculty for publishing technical papers in reputed and peer reviewed journals having Impact factor higher than 0.25. The maximum assistance for one paper is Rs.10,000/-. The 3rd RC meeting held on 2-7-16 decided to limit the incentive for journal paper publications only to publications in science citation indexed journals. The 4th RC meeting held on 4-3-17 decided to sanction journal incentive only to the corresponding author of the SCI/SSCI journal paper. It is also decided to limit the number of incentives to a Faculty as one in a calendar year.

SL. #	INSTITUTION	2010-16	2016-17
1	College of Engineering Trivandrum	85	18
2	Govt. Engineering College, Thrissur	16	2
3	Rajiv Gandhi Institute of Technology, Kottayam	15	--
4	Govt. Engineering College, Barton Hill, Trivandrum	3	6
5	Govt. Engineering College, Sreekrishnapuram, Palakkad	3	--
6	Govt. Engineering College, Idukki	4	1
7	Govt. Engineering College, Kannur	10	--
8	T.K.M. College of Engineering, Kollam	1	--
9	Govt. Engineering College, Kozhikode	1	--
10	Govt. Engineering College, Wayanad	5	--
Total		143	27

Total amount sanctioned for giving incentives to authors of journal paper publication in the year 2016-17 is Rs 2,70,000/-

11. Centre of Excellence

CERD takes a lead role in establishing Centres of Excellence in Thrust areas for undertaking research. At present the following centres have been funded. A maximum of Rs 50 lakhs assistance is provided to establish the centres at Govt. Engineering Colleges.

A proposal for starting CENTRE OF EXCELLENCE IN SYSTEMS, ENERGY & ENVIRONMENT was submitted by Dr. T. D. John, Professor in ME, GEC Kannur as Principal Investigator and Dr. Jayaprakash P, Professor in EEE and Dr. K. M. Peethambaran, Professor in ME of GCE Kannur are Co investigators. A pilot research project under taken in the centre in this proposal is "Experimental investigations and performance evaluation of Biogas Fed Solid Fuel Cell System (SOFCS) for power production". Dr. P.V Aravind, Associate Professor, Process and Energy, Delft University of Technology, Netherlands was proposed as the collaborating scientist in the research. The proposal was accepted with a funding of Rs 25 lakhs in three years. At present the following centres have been funded.

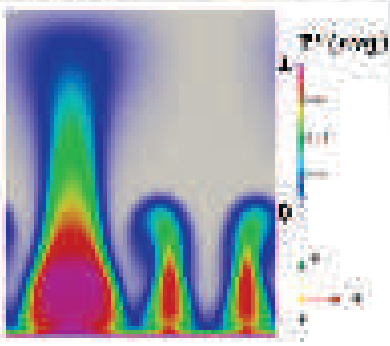
Sl #	Name	Institution	Co-ordinator
1	Centre for Research in Fluid Dynamics	College of Engineering, Trivandrum	Dr. Anil Lal
2	Laboratory for Nano Particles	Govt. Engineering College, Thrissur	Dr. Manjith B
3	Advanced Digital Signal Processing Laboratory	Rajiv Gandhi Institute of Technology, Kottayam	Dr.Leena Mary
4	Centre of Excellence in Advanced Computing	Govt. Engineering College, Palakkad	Shri.Naseer C
5	Centre of Excellence in Systems, Energy & Environment	Govt College of Engineering, Kannur	Dr. T.D John

11.1 Centre of Excellence in CET

The Centre is known as **Centre for Research in Fluid Dynamics.** So far two PhD works have been completed and six are in progress at the Centre. Four MTech thesis have been submitted to the University of Kerala and another four is to be submitted to KTU in 2016-17 academic year. Strengthened interaction with IIT Madras, IIT Kanpur and IIT Bhubaneswar on academics and collaborative research through joint works & conferences and GIAN courses. Experimental work and visualisation studies were carried out using the wind tunnel facility with testing specification 100 km/hr speed with a test section of size 50cmx50cmx2m. The major achievement during the period of this report is that, a three-dimensional multi-block computer code has been made operational and utilized for the analysis of complex features of flow in typical problems such as Natural convection in a vertical annulus, three dimensional aspects of junction flow and vortex shedding in a cylindrical vessel with a rotating lid. Computational facility is enhanced by installing 3 new workstations and accessories. Published 4 international papers and two are under review process.

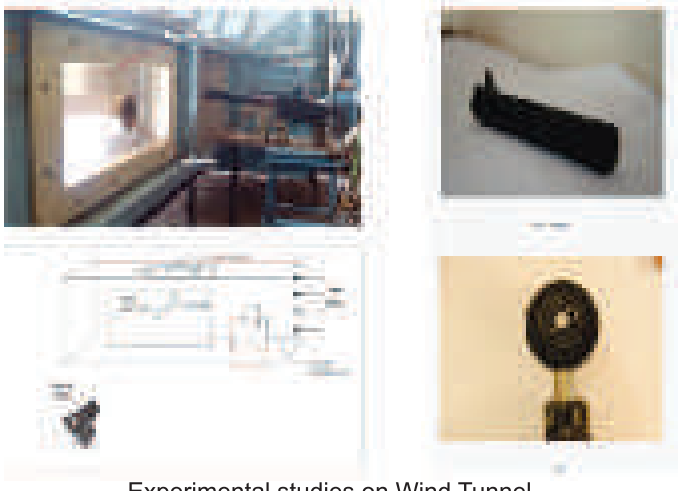
List of PhD

1. Development of a computational tool for the Analysis of Hypersonic Flow using DSMC Method- Reji. R.V
2. Patient-Specific Modelling of Blood Flow in Arteries - Jabir. E



Predicted time averaged temperature contours over the circular curved surface of the inner surface of the annulus, developed into a plane at modified Reynolds number 10000

3D vortex structures of second invariant of the velocity gradient tensor criteria at Re = 6000



Experimental studies on Wind Tunnel

List of publications

1. Abhilash.R, Lal, S. Anil, Flow topolical investigation of vortex systems in the junction between a flat plate in a cascade and plane end walls, Proceedings of First National Aerospace Propulsion Conference, 2017, IIT Kanpur, India.

2. Abhilash.R, Lal, S. Anil, Investigations on Bimodal dynamics of junction flows using Large Eddy Simulation, communicated to National Conference in Fluid Mechanics and Fluid Power, 2017, Amrithapuri, India.

3. Abhilash.R, Lal, S. Anil, Three dimensional analysis natural convection in a narrow vertical annular closed at bottom and opened at top, communicated to International Journal of Thermal Sciences, 2017.

4. Reji R.V., Anil Lal S., H. D. Kim, DSMC Study on the Re-entry Aerothermodynamics of Space Recovery Capsules, 13th International Symposium on Experimental Computational Aerothermodynamics of Internal Flows(ISAIF-13), 7-11 May 2017, Okinawa, Japan.

5. R.V. Reji and S. Anil Lal , Simulations of hypersonic low past a re-entry capsule using DSMC method, Frontiers in Heat and Mass Transfer 7 (2016), no. 28, 1-8.
6. R.V. Reji and S. Anil Lal, A new direct simulation Monte-Carlo implementation for more efficient simulation of hypersonic low over arbitrarily shaped bodies using dynamic cells, Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering (2016), pp. 1-16.
7. E Jabir and S. Anil Lal, Numerical analysis of blood flow through an elliptic stenosis using large eddy simulation, Proc Mech E Part H: J Engineering in Medicine (2016).
8. Jabir, E. and Lal, S. Anil, Blood Flow Through Concentric Stenosis: An Investigation Using LES, Proceedings of the International Conference on Interdisciplinary Advances in Applied Computing, 2014, Amritapuri, India, pages 14:1|14:7.
9. Jabir, E. and Lal, S. Anil, Simulation of Blood Flow Through Eccentric Stenosis Using LES Proceeding of International congress on computational Mechanics and simulation, 2014, CSIR-SERC, Chennai, India.

11.2 Centre of Excellence at RIT, Kottayam.

As per order no. CERD/2010/224-CoE 3 dated 31st March 2011, CERD sanctioned an amount of 20 lakhs under 'Centre of Excellence' scheme to RIT Kottayam. Utilizing this and other funds gathered through funded projects, an exclusive research lab initially named as Advanced Digital Signal processing research (ADSPR) lab was set up at Department of Electronics And Communication Engg. Based on the activities of ADSPR Lab during 2011 – 13, additional funding of Rs. 30 lakhs was sanctioned by CERD as per order no. C2/224 CoE3/2013, dated: 01.11.2013 to extend the lab facilities to a full fledged centre of excellence. On 10th Dec. 2013, this lab was dedicated by Prof. SadaokiFurui, a well known researcher at Tokyo Institute of Technology, Japan. As per the directions of CERD, lab was renamed as 'Centre for Advanced Signal Processing (CASP)' in 2016.

During the span of 2011-2016, CASP has completed four sponsored projects which includes project funded by Department of Electronics and Information Technology (MHRD, Govt. of India), Kerala State Council of Science, Technology and Environment (KSCSTE, Govt. of Kerala) and All India Council for Technical Education (AICTE) for a total amount of 86 lakhs. There three ongoing sponsored projects funded by KSCSTE, CERD and NIT Trichy. Two new project proposals have been submitted for funding. There are eight Ph. D scholars attached to CASP who work in different areas of signal processing. Currently there are three project fellows working under various sponsored projects taken up by CASP.

CASP has organized following programmes for promoting research activities in the year 2016-17:

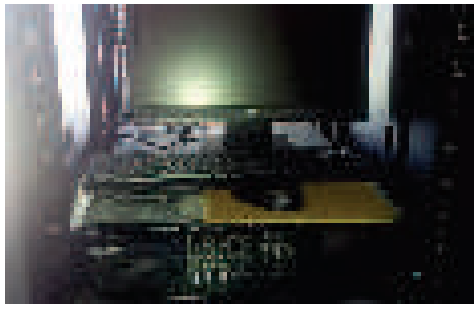
Sl. No	Programme	Date	Invited Speakers
1	Research Colloquium on "Recent Advances in Signal Processing for Speech, Image and Communication" (RASSIC 2016)	Aug 26-27, 2016	Track 1 - Speech Processing 1. Prof. B. Yegnanarayana, BITS Hyd 2. Prof. K. V. V. Murthy, IIT Gandhinagar 3. Prof. Ajish K. Abraham, AIISH Mysore 4. Dr. K. Sri Rama Murty, IIT Hyd Track 2 - Signal Processing for Communication 5. Dr. Sooraj K Ambat, NPOL Kochi 6. Dr. Dinesh Dileep Gaurav, Microsoft Research, Bagalore 7. Dr. Amit Kumar Dutta, Cypress Bangalore Track 3 - Image Processing 9. Prof. C. Chandra Sekhar, IIT Madras 10. Prof. C. Krishna Mohan, IIT Hyd 12. Dr. Guruprasad S, Audience Bangalore
2	Invited talk on "Automatic Speaker Recognition using ALIZE"	Jan 16, 2017	Dr. KarthikaVijayanv, Post Doctoral Fellow, IISc Bangalore
3	Invited talk on " Deep Learning"	Apr 7, 2017	Dr. Sriram Ganapathy, Assistant Professor, IISc Bangalore

Invited Talk on "Deep Learning" by Dr. Sriram Ganapathy and "Automatic Speaker Recognition" by Dr. Karthika Vijayan, IISc Bangalore

Participants and invited speakers of RASSIC' 16 -Research colloquium organized by CASP on Aug 26-27, 2016

11.3 Centre of Excellence at GEC, Palakkad

As per order no. C2/260/2013-CoE 4 dated 17-2-2014, an amount of 20lakhs was sanctioned to GEC Palakkad to start Centre of Excellence in Advanced Computing. The Centre is equipped with two DELL servers and 40 computers. An average of 65 students is utilizing this centre on every working day for different purposes. The software facility in the lab includes MSC Nastran, Rational Rose (UML, software design tool), Mentor Graphics etc.



The Centre of Excellence in Advanced Computing

11.4 Centre of Excellence at GEC, Thrissur

To promote thrust area research, as per order no. CERD/2010/233 dated 7-05-2011, an amount of Rs 30 lakhs was sanctioned under 'Centre of Excellence' scheme to GEC Thrissur for starting 'Laboratory for Nano Particles'.

The laboratory has been setup with sophisticated equipments and infrastructure as aimed. M.Tech students and faculty interested in the area are utilizing the facility. Synthesis of novel materials was experimented. The equipments procured in this phase are mainly meant for synthesis of nanomaterials. However material characterization is an essential requirement to know the properties of the materials so synthesized. As a second phase a proposal has been forwarded to the state government for setting up of a complete characterization facility worth Rs.10 crores. Presently, the characterization of samples are done at external centres on a paid basis. Hence more thesis and research works could be taken up by the centre after enhancing the facility which would motivate students and faculty to take up research in this area resulting in better utilization of the lab. Further, the institution is planning to discuss the possibilities of opening the lab to science students from other colleges requesting to use the facility.

Major equipments in Laboratory for Nano particles
(CVD unit, Mono mill, Spray pyrolysis unit and Spin coating unit)

12. CERD Ph.D Research Fellowship

This Scheme is available to students intending to pursue full time research leading to PhD Degree. Selection is on the basis of research aptitude test and personal interview. The executive committee of KTU revised the monthly fellowship to Rs 25,000/- from March 2016 at par with MHRD.In addition, annual contingent grant of Rs. 20,000/- is also paid.

INSTITUTION	No. of Candidates	
	2010-16	2016-17
College of Engineering Trivandrum	17	4
Govt. Engineering College, Thrissur	11	2
RIT Kottayam	1	4
Rajagiri School of Engineering and Technology		1
Govt. Engineering College, Wayanad		2
Govt. Engineering College, Kozhikkode		1
Govt. Engineering College, Palakkad		1
Model Engineering College		1
TKM College of Engineering, Kollam		1
Total	29	17

The total amount given to research scholars as fellowship in the year 2016-17 is Rs 96 lakhs

PARAM SHAVAK SUPER COMPUTING FACILITY

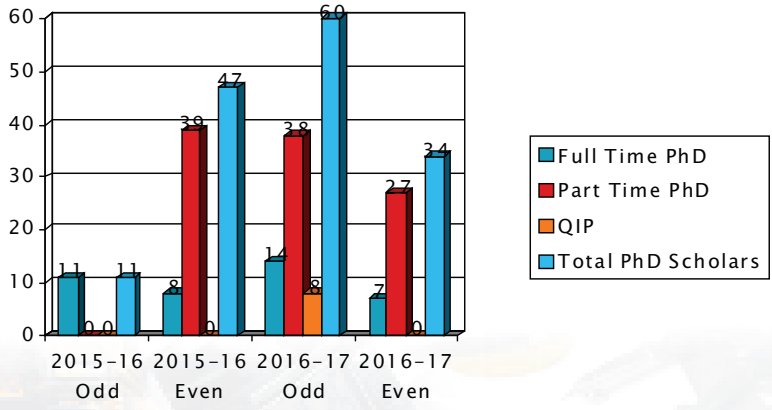
PARAM SHAVAK, a super computing facility is installed by APJ Abdul Kalam Technological University at State Data Centre, Techno Park Trivandrum for facilitating high end research of faculty in affiliated Engineering Colleges. The total amount spent for setting this facility is 12 lakhs.

High performance computing applications available on PARAM Shavak include:
Bio-informatics: mpiBLAST
Molecular Dynamics: GROMACS, LAMMPS, NAMD
Weather forecasting and Oceanography: WRF, MOM
Quantum Chemistry: NWChem, ABINIT
Materials Science: Quantum Espresso
CFD: OpenFOAM

Researchers of **Centre for Research in Fluid Dynamics** functioning in CET and faulty in 6 other affiliated colleges started utilising this facility in their research activities.

PhD RESEARCH UNDER KTU

With the implementation of the Ph.D regulations of APJ Abdul Kalam Technological University, the registration of Ph.D scholars under KTU has started in 2015-16 academic year. The applications for research program are invited by the University twice a year to enable admissions in the months of July and January .The selection procedure is through discipline wise common written tests and/or personal interview as decided by the University from time to time. For selection of eligible candidates, written objective type test and interview were conducted.



Status of PhD registration in KTU

There are totally 152 full time and part time PhD registrations in KTU and these scholars are perusing PhD under the guidance of 83 supervisors in twenty eight engineering colleges affiliated to KTU.

Don't read success stories, you will only get a message. Read failure stories, you will get some ideas to get success

A. P. J. Abdul Kalam

Printed at : Sobhana Printers # 9349867638